



Submission No 35

Inquiry into Australian Defence Force Regional Air Superiority

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RE: Submission to the Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into **Australian Defence Force Regional Air Superiority**.



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1. About this submission

This submission:

1. Describes aspects of public awareness of Defence and Aerospace issues and how that has changed over the past couple of decades. Public scrutiny of Defence decisions is better informed than at any other time in history. Defence has a responsibility to be transparent in its decision-making processes. As much is stated in the quote “Our doctrine must be open to challenge and review”(Fundamentals of Australian Aerospace Power.’ 4th Edn. pp.21).
2. Looks at the F-111 fleet and proposes an affordable way to achieve Air Superiority in the region for the foreseeable future.

2. Politics or Prudence?

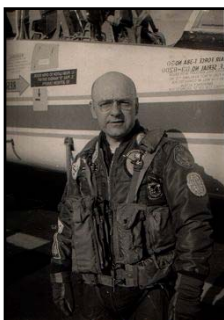
Decisions about Australia’s Defence procurements will have repercussions for generations to come. Political expediency in these decisions would be put to one side by anyone who really cares about the security of their children, or that of their children’s children.

Australia has resident professionals inside and outside defence who have already devoted much time, and published many papers, on the complexity that is Air Defence, and their opinions should be listened to and weighed up with the utmost gravity. Refer to <http://www.ausairpower.net/> for probably the most complete analyses of these problems in relation to Australia’s strategic and tactical needs.

There is a huge a reality gap between the some of the pronouncements of Defence in recent times and the **expectations** of the Australian citizens who now at least with access to information, take an interest in the RAAF procurement and strategy plans. When the publicly released statements of Defence start to read like brochures from the manufacturer these concerned citizens start to worry.

We are used to bold claims when buying software entertainment products – and even get a laugh out of the marketing material produced by arms and aerospace manufacturers, but we expect rigorous and transparent rational debate **and** lateral thinking from the people that we entrust to solve our defense problems.

The following three examples remind us of the human sides and human costs incurred in the employment of air power.



Dudley Henriques

He has flown at least seventy different types of airplanes, including experimental, prototype, and fighters, both jet and propeller, high performance airplanes for over forty of those years, holds commercial ratings for both single and multi-engine aircraft, is a certified flight instructor and a professional civilian pilot.

Dudley first got enthused about flight sims with [Janes Combat Simulations](#) 1998 sim [World War 2 Fighters](#) which modelled several a/c, including the P-51 Mustang. Dudley had previously developed airshow routines for the P-51.

Dudley Henriques on Airshow flying :

“In one instance, I was asked to take off right after a close friend was killed. The show director was a nice enough guy. He was obviously very nervous about approaching me. He said it would be better if the show continued. I flew the routine seeing the wreckage each time I went inverted in my Cuban turn around... It's not really a game for show offs. I've climbed out of my airplane soaking with sweat after only fifteen minutes of this kind of flying. I've sat down with the [Thunderbirds](#) and the Blues ([Blue Angels](#)) in their after-show debrief sessions and seen the stress in their faces from a show. It's hard, exacting work and it can and has killed many of us who took it lightly...and even some who took it seriously. “ - From [Dudley Henriques](#) contributions to the [Flight Sim Museum](#)



[J.D. Wetterling](#)

In 1968-69 J.D. Wetterling flew 268 combat missions in an F-100 in Vietnam and was awarded two Distinguished Flying Crosses, fourteen Air Medals, and the Vietnamese Cross of Gallantry. He was Top Gun in every fighter squadron in which he served in the USAF.

In his novel “Son of Thunder” he describes his own experiences flying the F-100 Super Sabre with the [629th Tactical Fighter Squadron](#) out of Tuy Hoa.

On his first mission, a “road interdiction”, his wingman is destroyed in front of him by AAA fire. He is now a deacon in the Presbyterian Church and on [his website](#) he discusses what effect this and other wartime experiences had on his life.



[J.D. Wetterling](#)'s airbase in Vietnam, taken from the cockpit of his F-100. [Larger image here](#)



[Jos Gruppung](#)

Jos grew up during World War 2 near Amsterdam. He has put together the definitive history of the Microsoft Civil Flight Simulators [here](#)

"Air Combat is something I loathe."

“ I was born in Amsterdam in 1938 and lived during WWII just outside Amsterdam, between Amsterdam and Schiphol Airport. Although I was young, I was old enough to still remember the sound of low flying screaming airplanes over our region and house. Fortunately there wasn't very much bombing, except around Schiphol.

And I still lively remember the hunger as well as the taste of sugar-beets, tulip-bulbs and the like, that we had to eat because of the lack of more normal food like potatoes, bread and milk.

So you must excuse me, I find nothing fun at combat games, how nicely finished they are (or just because they are!). This is again reinforced by the happenings in New York and consecutively in Afghanistan. "

From ([Friends of the Museum - excerpt](#))

3. Regional Air Defence Superiority for Australia			
		F-111	F-35
	<p>GREEN cells indicate a clear advantage. Explanatory notes for the table follow.</p> <p><i>Images from The Flight Sim Museum</i></p>		
1	Cost	Already in budget	Unknown
2	Maintenance	Existing facilities, skills and budget	Cost unknown.
3	Spares	Low cost, plentiful supply	Cost unknown.
4	Technology	Owned	Total technology transfer in doubt
5	Remaining life	30-40 years	Unknown
6	CAS capability	Good	Good
7	Speed	Supersonic	Subsonic
8	Supercruise	Yes, with engine upgrade	No.
9	Range	Long	Short
10	TFR	Yes	No
11	Payload	25,000 lbs	17,000 lbs (non VTOL version) and with severely compromised radar signature
12	Low Level Deep Penetration Strikes	TFR, speed at low level, avionics and 2 man crew, large payload. Able to outrun interceptors.	No TFR, subsonic, 1 man crew, small payload. Unable to outrun current interceptors.
13	Electronic Warfare	Excellent (EF-111)	Unknown
14	Avionics – AG	Good	Presumably good.
15	Avionics – AA	Poor – can be upgraded.	?
16	Potential for upgrade to BVR intercept role	Good	Poor (short range and no supersonic sprint)
17	Dogfight	Poor	Poor
18	Networking	?	Good

19	Stealth	Poor without terrain masking Good with terrain masking	Mid-range
20	Flight Envelope	Treetop level (supersonics) to 60,000 feet plus	Low level subsonic to probably 35,000 feet.
21	Crew safety	Watertight ejection capsule for both crew	Ejection seat, life-raft has to be inflated by pilot after ditching
22	Can Eject underwater	Yes	No
23	Landing with undercarriage retracted or missing	Yes	Doubtful
24	Safety Record	One of the best in the history of military aviation	Unknown
25	Two engines?	Yes.	No.

Explanatory Notes

1. **Cost.** We own the F-111 already, they are paid for. Resources currently allocated to F-35 acquisition can be diverted to increasing F-111 and other RAAF capabilities (tankers, avionics and comms/networking upgrades). Total cost of the acquisition and ownership of the F-35 is unknown.

“ The F-111s were built in the 1968 period, but put into storage for various modifications and were not flown until 1973, which means they did not start accruing flight hours until then. Due to poor serviceability in the past, they did not run up a lot of hours and a good number are now **around the 5000 hr** mark in total hours.

The design is nominally **lifed at 10,000 hrs**, but it looks that the fuselages will last longer as is. The wings on the other hand are running out of life and require deep refurbishment and fixes to last longer.

[Air Power Australia](#) had the cost of manufacturing brand new wings done by a manufacturer who puts the cost of **new build wings at less than AUD 2 million** per shipset. Whether we have new wings built or refurbished from the large stock at [Aerospace Maintenance and Regeneration Center \(AMARC\)](#), we are looking at **decades of extra service life** to be had.

As for all of the other systems, the hydraulics are in great condition and [Rosebank Engineering](#) could keep them going indefinitely. Avionics you have to periodically replace in all aircraft, and engines we have original stock here and in [AMARC](#) capable of going for decades, although the [Air Power Australia](#) position is that new engines would be even cheaper to run and burn less gas.

Basically there are no issues in keeping them flying for decades yet.
No different from the B-52, C-5 and B-1B. “

Dr. Carlo Kopp. Correspondence to the author, 2006



[Aerospace Maintenance and Regeneration Center \(AMARC\)](#)

There are 200 F-111's in there somewhere.

2. **Maintenance** - Maintenance infrastructure and skillsets are already in place for the F-111. New maintenance infrastructure, inventory and skillsets will be required for the F-35. Very expensive. Does it make more sense to put a huge amount of money into starting again? Possibly - IF - there were significant gains in capability at the end of the process. However the F-35 is less capable than the F-111 in most respects.
3. **Spares** - F-111 spare parts and spare airframes are available by the hundreds, in storage in the USA. The USA only retired the F-111 to ease the passage of funding for the F-22 programme, not because they were fielding a replacement for the F-111, nor was it regarded as obsolete. As proof of this, look at the RAAF's record at the [Red Flag Air Warfare](#) exercises held in the US. **We win the bombing competitions now** - and this is up against the cream of the Western World's strike aircraft - the F-15E Strike Eagle, F-117 Stealth, B-1B Lancer and the phenomenally expensive B-2B Stealth Bomber.

The RAAF is probably the only bomber operator to ever shoot down an enemy interceptor with an AIM-9.

(During Maple Flag).

(From conversation between the author and RAAF F-111 Bomber/Navigator, 1995).



RAAF F-111G model recently acquired (1995) from the USA and with low hours, for a pittance. This model was fitted out to deliver nuclear weapons over the North Pole and the trackless wastes of Siberia. Astro-Navigation (Litton AN/ASQ-119 Astrotracker astrocompass) and Nuclear consent kit was removed by the ADF personnel. There are many more airframes like this available to Australia (over 200), as we are the only approved export customer for the F-111.

Image by the Author and from [The Flight Sim Museum](#)



The original mechanical navigation kit in the RAAF F-111.

[Image by the author](#)

4. **Technology** - There are serious questions about technology transfer from the USA. Will they allow access to all the technology of the F-35? They have already fallen short on technology transfer with Australian Army helicopters, leading to Defence deciding to go with European manufacturers. The European manufacturers have proven to be much more open on these issues.
5. **Remaining life** - The F-111 airframe is relatively young. (18 years on average). The USA plans to operate the B-52 out till at least 70 years. There is no reason why we can't plan for operate the F-111 for another 30 to 40 years or longer, remembering we have access to low-hour airframes in storage. By retiring the F-111 30+ years early we are throwing away a capability which is only half-used. I also note that Air Marshal Angus Houston's ASPI paper "Is the JSF good enough?" starts from the premise that we **need** to replace the F-111.
6. **Close Air Support** - The F-35 is designed as a CLOSE AIR SUPPORT vehicle. A replacement for the AV-8B Harrier and the F/A-18 Hornet. The F-111 performs extremely well in this role, having the supersonic **dash** capability to reach the FEBA quickly and then a **loiter** capability due to variable geometry wings and high internal fuel capacity.
7. **Speed** - The F-111's speed at low level is **unsurpassed** and only limited by the temperature limits on the airframe due to friction with the atmosphere. *SEE POINT 9 next.*
8. **Supercruise** (supersonic flight without reheat) is achievable on the F-111 by fitting the same engines used in the F-22. This would make it (with avionics upgrades) probably the most formidable long range interceptor extant.
9. **Range** - A Strategic Bomber has a LONG RANGE and large payload. The B-52 for example is a Strategic Bomber. The F-111 combines long range with Mach-2 capability (useful in sprints). The F-35 is short range and subsonic, a purely tactical machine.



A RAAF F-111 approaches the refueling boom of a U.S. Air Force KC-135 Stratotanker during an in-flight refuelling evolution in the skies over the Nevada Test and Training Range on Feb. 14, 2006. Image: US DOD

10. **TFR** - Combined with the Terrain Following Radar (TFR) this F-111's sprint capability adds greatly to aircrew/airframe survivability in hostile environments. The combination gives the F-111 the ability to out-run any interceptor at low level, at the same time using terrain masking to evade SAMs. Once again this has all proven empirically, again and again at the [Red Flag Air Warfare](#) exercises.
11. **Payload** - The JSF is really designed for internal weapon carriage only. External Air-to-Ground stores dramatically reduce the range and negate the 'stealth' elements of the design.
12. **Low Level Deep Penetration Strikes** - Flying deep penetration low level strikes is a 2 person job. There is no doubt about that. Look at 2 of the premiere aircraft designed for similar roles in Western Europe – the Panavia Tornado, and in the former Soviet Union – the Su-24 Fencer. Both have 2 man crews. What aircraft was chosen to fly the 1980's attack from the UK to Libya? The F-111. It has a proven track record of successful strike missions and it's capability in that regard has not been negated.
13. **Electronic Warfare** - The EF-111 variant has a track record of successful EW missions. It has the endurance to fly long sorties in support of strike packages, the power to generate strong signals and the sprint capability to run from interceptors if need be.
14. **Avionics – AG –**

Pave Tack laser designation pod on the F-111.

F-111 - Pave Tack Laser Targeting Pod Image
by author and from [The Flight Sim Museum](#)

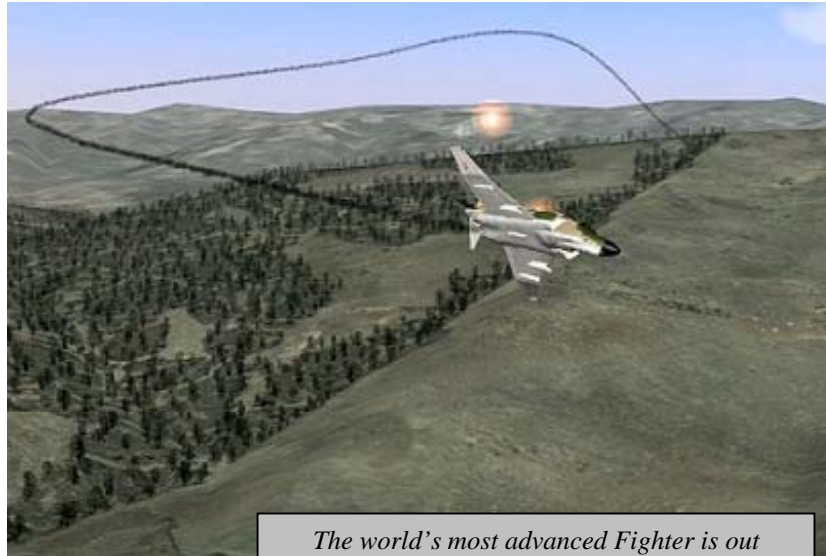


“ Despite its age the AN/AVQ-26 Pave Tack still offers sightline stabilisation and field of regard performance superior or equal to the best targeting pods in the market. Replacement of the obsolescent internal thermal imager, computer and other hardware could provide the Pave Tack with competitive reliability and superior imaging performance against production targeting pods, since the unique optical design and low drag internal carriage would be retained.”

From <http://www.ausairpower.net/DT-F-111-Update-Feb-03.html>

15. **Avionics – AA** - In recent conflicts (particularly Desert Storm) we have seen that BVR accounts for 90% of Air to Air action. The F-15 Eagles accounted for most of the kills in that conflict. Bear in mind that the F-111 **was originally designed as a joint USAF/USN interceptor** under Sec. Def. Robert McNamara. The TFX prototype actually took off from an aircraft carrier and the [F-14 \(video\)](#) (can be seen as an evolution of the F-111 design. Two large engines and swing-winged.
16. **Potential for upgrade to BVR intercept role** - . The F-111 has ample space to be fitted with state of the art AA radar. It has sprint / intercept performance up there with the current generation of dedicated interceptors, in fact exceeding the straight line performance of most of them. The F-35 is not designed as an interceptor, it's low speed precludes it from that role.

17. **Dogfight** - The F-111 is not a dogfighter due it's handling being optimised for speed. As mentioned above, dogfighting plays little role in modern air warfare. However there is an important caveat – history has shown (Vietnam War, Falklands War) that the dogfighting role is still important, so the capability for **dogfight** must be maintained **within the total force structure** – not necessarily in one airframe. Despite the claims of multi-role attack/fighters manufacturers these designs are **always** a compromise. *The F-35 is not a dogfighter* due to it's low power to weight ratio.



The world's most advanced Fighter is out manoeuvred by a smaller, cheaper adversary.

In the skies over North Vietnam the F-4 Phantom II was comprehensively trounced for a time by mass produced, cheap MiG-17's MiG-19's and MiG-21's. Of course this could never happen again... could it?

Image from [The Flight Sim Museum](http://www.migman.com)

The manufacturer admitted as much recently, adding that it was designed, using networking and stealth, to avoid getting into those situations.

Famous last words, as the US Navy interceptor F-4 Phantom pilots found in the skies over North Vietnam. They had to add guns and modify the wing slats – and then re-learn dogfighting skills to (eventually) cope with the much smaller and much cheaper MiG-15, MiG-17, MiG-19 and MiG-21. There are also many situations outside of full-scale war where an interceptor is called on to visually identify targets. Once in visual range, dogfight agility is required if the interceptor is to manage the situation.

18. **Networking** - The F-35 is designed with networking in mind. ADF personnel can upgrade the F-111 avionics, as they already have done so a number of times.
19. **Stealth** - The F-111 was designed before “Stealth Technology”, or the use of faceted (F-117, 1970's) or complex curve (F-22, 1980's) bodies specifically designed to reduce radar signature was possible. Nonetheless, it's normal low level flight profile utilising terrain masking combined with good intel and planning means that the RAAF has achieved outstanding and consistent results in penetrating the most sophisticated air Defence environments currently fielded – refer to point 3 – RED FLAG. The F-35 on the other hand, although originally marketed as a “Stealth” aircraft, has been divested of this claim in recent times. It also lacks the speed and low level TFR, which could compensate for the radar visibility.
20. **Flight Envelope** - [Ref Federation of American Scientists](#)
21. **Crew safety** - [Ref Federation of American Scientists](#)
22. **Can Eject underwater** - [Ref Federation of American Scientists](#)
23. **Landing with undercarriage retracted or missing** - Proven in 2006. RAAF pilot who was only current on the type for **2 weeks** successfully landed an F-111 which had lost a main wheel on takeoff due to maintenance error. The standard procedure for most military aircraft in this situation is to head to sea and eject.

24. **Safety Record** - The exemplary safety record ([Ref Federation of American Scientists](#)) of the F-111 is even more remarkable when you factor in the mission profile with **all weather and low level** (extremely low level) flight in a normal day's work. The only comparable mission profile was that of the 2-seater Grumman A-6 Intruder, which was subsonic.
25. **Two engines?** - Essential for safety on the long distances flown by the RAAF in Australia.

Conclusion.

- **Australia already has the potential to possess Regional Air Superiority...** by bringing a suitable portion of the existing F-111 fleet up to Long Range Interceptor specifications.
- This solution is cost effective and smart.
- It uses existing and **battle-proven** technology.
- It builds on the **existing skill sets** within the RAAF.



[The F-111 was chosen to carry the flame away from the Sydney 2000 Olympics \(VIDEO\)](#)



Picture: David Grey/Reuters.