COMMONWEALTH OF AUSTRALIA

Official Committee Hansard

JOINT STANDING COMMITTEE ON FOREIGN AFFAIRS, DEFENCE AND TRADE

DEFENCE SUBCOMMITTEE

Reference: Review of Defence annual report 2002-03

FRIDAY, 4 JUNE 2004

CANBERRA

BY AUTHORITY OF THE PARLIAMENT

INTERNET

The Proof and Official Hansard transcripts of Senate committee hearings, some House of Representatives committee hearings and some joint committee hearings are available on the Internet. Some House of Representatives committees and some joint committees make available only Official Hansard transcripts.

The Internet address is: **http://www.aph.gov.au/hansard**

To search the parliamentary database, go to:
http://parlinfoweb.aph.gov.au

JOINT COMMITTEE ON FOREIGN AFFAIRS, DEFENCE AND TRADE

Defence Subcommittee

Friday, 4 June 2004

Members: Senator Ferguson *(Chair)*, Mr Brereton *(Deputy Chair)*, Senators Bolkus, Cook, Eggleston, Chris Evans, Harradine, Hutchins, Johnston, Sandy Macdonald, Marshall, Payne and Stott Despoja and Mr Baird, Mr Baldwin, Mr Beazley, Mr Bevis, Mr Byrne, Mr Edwards, Mr Laurie Ferguson, Mrs Gash, Mr Hawker, Mr Jull, Mr Lindsay, Mrs Moylan, Mr Nairn, Mr Price, Mr Prosser, Mr Scott, Mr Snowdon, Mr Somlyay and Mr Cameron Thompson

Subcommittee members: Mr Scott *(Chair)*, Mr Price *(Deputy Chair)*, Senators Chris Evans, Ferguson *(ex officio)*, Hutchins, Johnston, Sandy Macdonald and Payne and Mr Baldwin, Mr Beazley, Mr Bevis, Mr Brereton *(ex officio)*, Mr Byrne, Mr Edwards, Mrs Gash, Mr Hawker, Mr Lindsay, Mr Nairn, Mr Snowdon, Mr Somlyay and Mr Cameron Thompson

Senators and members in attendance: Senators Ferguson and Sandy Macdonald and Mr Beazley, Mr Bevis, Mr Byrne, Mr Price, Mr Scott and Mr Cameron Thompson

Terms of reference for the inquiry:

Pursuant to paragraph 1 (b) of its resolution of appointment, the Joint Standing Committee on Foreign Affairs, Defence and Trade is empowered to consider and report on the annual reports of government agencies, in accordance with a schedule presented by the Speaker of the House of Representatives.

The Speaker's schedule lists annual reports from agencies within the Defence and Foreign Affairs portfolios as being available for review by the Committee.

WITNESSES

Subcommittee met at 8.58 a.m.

BROWN, Group Captain Geoffrey Charles, Officer Commanding, Airborne Early Warning and Control, System Project Office, Royal Australian Air Force

CARR, Mr David Noel John, Air Analyst, Air Operations Division, Defence Science and Technology Organisation, Department of Defence

CLARK, Dr Graham, Research Leader, Aircraft Structures, Defence Science and Technology Organisation, Department of Defence

CLARKE, Air Vice Marshal Kerry Francis, Head of Capability Systems, Royal Australian Air Force

HARVEY, Air Commodore John Paul, Director-General New Air Combat Capability, Department of Defence

HOUSTON, Air Marshal Allan Grant, Chief of Air Force, Royal Australian Air Force

MARTIN, Mr Colin Arthur, Chief of Air Operations Division, Defence Science and Technology Organisation, Department of Defence

MONAGHAN, Air Vice Marshal John Gordon, Head of Aerospace Systems Division, Royal Australian Air Force

CHAIR—I declare open this public hearing on the review of the Defence annual report 2002-03 by the Defence Subcommittee of the Joint Standing Committee on Foreign Affairs, Defence and Trade. The subcommittee will take evidence from the Department of Defence, Dr Carlo Kopp and Mr Peter Goon. Before introducing the witnesses, I refer members of the media who may be present at this hearing to the need to fairly and accurately report the proceedings of the committee. I now welcome representatives of the defence department to today's hearing. Although the subcommittee does not require you to give evidence on oath, I should advise you that these hearings are legal proceedings of the parliament and therefore have the same standing as proceedings of the respective houses. Do you wish to make an opening statement?

Air Marshal Houston—Thank you for the opportunity to appear again before this committee. Over the last three years as Chief of Air Force I have enjoyed the frequent interaction with all of you. As you all know, the 2000 white paper emphasised that air combat was our most important capability, because of the role it plays in the defence of Australia. I therefore consider that continued interaction between us is important on this matter.

In preparation for this hearing, I reviewed the *Hansard* record of the responses from General Cosgrove and me to your questions from the last open session, which was conducted on 15 December 2003. Given the time available and the wide-ranging nature of the questions across a number of subjects, I confirm the responses as appropriate. In particular, I fully support General Cosgrove's responses on air combat. They were spot on. With regard to my own testimony, there are some matters which need more elaboration. To that end, as agreed with the committee, I have provided a classified paper on preparedness aspects and an unclassified paper on the air combat

capability, which I now table. We are also working with DSTO, ASPI and other agencies on a number of air combat issues, and I undertake to keep the committee informed on a regular basis. As I promised, I have obtained the minister's clearance for a visit to Amberley in the near future.

You will be aware that since late last year much of what I have said on air combat has been the subject of much criticism by Dr Kopp and Mr Goon. Most recently, I briefed industry and the media at the Press Club two weeks ago. My talk, which was conducted without notes or PowerPoint, was very well received by all in attendance. I was not surprised to be heavily criticised by Dr Kopp in the two articles in John Stackhouse's magazine *Heads Up AsiaPacific Aerospace & Defence Newsletter*. I was, however, surprised by the tone of the criticism and the complete lack of understanding of the operational air combat environment. Also, I am not 'the defence bureaucracy', as described by Dr Kopp; I am the Chief of Air Force, with accountability for the people and capabilities in the Air Force.

As Dr Kopp's comments are directly relevant to this debate, I table the two articles that he put in *Heads Up* with my comments for the committee's consideration. The articles are 'How they got it wrong' in issue 305 of *Heads Up* on 23 May 2004 and 'A case of convoluted reasoning' in issue 306, dated 1 June 2004. Having said all of that, I would be delighted for Dr Kopp to come to Williamtown to engage Air Commodore Mark Binskin, the commander of the air combat group, and some of his fighter combat instructors on some of these issues. We clearly have some work to do to give him a better understanding of the FA18. Of course, if the committee requires it, I can arrange for some of our F18 and F111 fighter combat instructors to be at Amberley to discuss some of the F111, F18, Sukhoi and Joint Strike Fighter issues raised.

Having said all of that, I would now like to move on to where we are going in the Air Force. I have been in the job for three years. When I arrived, there was a need to adjust from a large amount of reform that had been conducted over the previous decade or so. Since then, we have been in the business of rebalancing and reshaping the Air Force. What we are about is developing a networked Air Force for the future defence of Australia. We need to develop a system, because essentially the power of the system is greater than the sum of the individual parts. We will exploit communications and information technology and I think, by doing that, we will also improve our situational awareness. We will improve the lethality and precision of the Air Force. We will also improve our survivability, not only through the power of the system but also by exploiting stealth and stand-off technology, so that we can enable our air control shooters to remain passive in the environment of the future. They will be able to receive all the information they need to conduct their mission from the sensors that they are connected to out there in the environment and also from the sensors back here in Australia. In the air control environment, it is really a question of seeing first, shooting first and—obviously—killing first.

If we turn to the strike environment, there we need to be able to use the system to avoid the defences of our adversary. In the experimentation and the modelling we have done, we think we will have a very good capability into the future. Indeed, in the air combat environment of the future, a capable and well-designed network system should always prevail over an adversary that is not supported by a similar system, even though that adversary might possess highly capable platforms. So that is what we are creating, and it will be a much more capable Air Force than we have right now.

I just want to point out a few realities. At the moment, we spend 1.9 per cent of our GDP on defence. That means, in terms of capital investment over the next 10 years, that we are going to spend about $50 billion. That $50 billion has to be spent across the whole Australian Defence Force, so there has to be a balance in how we approach the business of investing in new capability. Our plans at the moment are to invest about $15 billion or so in the new air combat capability. Obviously, that needs to be not only a good capability but also an affordable capability.

I want to point out the need to have sufficient numbers. We cannot go for, necessarily, a Rolls Royce solution and have a very limited number of platforms, a very limited capability, because if we look at the defence of Australia—the need to dominate the sea-air gap in any future contingency—we have to deal with the distances that are part of our geographical environment. We also need to be able to conduct concurrent operations, and the air combat force of the Air Force needs to be able to operate in two areas of operations concurrently. We need to be able to control the air, we need to be able to do strike, right across the spectrum—interdiction, close air support. We also need to be able to do reconnaissance and to use electronic warfare to the required effect.

The white paper states that the F111 and the FA18 should be replaced by one aircraft. We have invested $300 million in getting ourselves involved in the system demonstration and development phase of the Joint Strike Fighter. We have not made a decision at this stage to buy the aircraft. That decision comes later, after we have done a lot more work in 2006. As John Harvey will tell you, we have 30 scientists currently working on that project in the DSTO and we are also heavily involved in developing our concepts for that aircraft in Air Force.

What is important, though, from my perspective is that for the future defence of Australia we must have an air combat capability that has sufficient numbers so that we have the required mass to do all those operations concurrently in two areas of operation. That will also give us the desired combat effect. I would emphasise again that the white paper concluded that we needed up to 100 aircraft. I think that 100 aircraft are what is required for the defence of Australia.

There is a debate going on about the F22 and the F35. I am currently doing a paper on that, as I mentioned earlier on. That paper will be on the public streets in August. But I am firmly convinced that the F35 is the way to go, because everything that I have learnt about the aircraft to date excites me. I think it will give us the capability we need to do all the missions that will be required for the defence of Australia in the future.

I would now like to talk briefly about our current strike capability. We currently have a very good strike capability built around the F111. We have had a lot of problems in recent times, but I am very pleased to say that, with the assistance of the DSTO, industry partners and obviously the elements within Air Force that are part of the F111 community that we have remediated the capability fully after three major challenges to the capability. Obviously, those challenges were the fuel leaks, the fuel tank implosion and of course the wing breakage. The capability is now fully remediated and it is going very well at Amberley. But what we have is very much an ageing aircraft. Some would argue about the definition of ageing, but it is 31 years of age and the cost of the capability continues to increase. I would also stress that the risk of maintaining the capability also continues to increase. On the advice of DSTO, we believe that the risk of capability breakdown will increase past 2010.

Slides were then shown—

Air Marshal Houston—I would now like to show you a slide of the rate of effort that we have had over the years. If you look at the slide you will see that, in the early years—the first five years of operation—the F111 flew at a very high rate of effort. Indeed, we averaged 5,680 hours per annum through the five years from 1974 to 1979. But over the years the rate of effort has gradually gone down. Over the last five years, not including this year, we have been flying around 3,060 hours per year. So we are flying at about 54 per cent of what we flew in the early seventies. The reasons for this are obviously complex, but I will just point out that one of the things that are involved here is that the increasing cost of the capability has to some extent been absorbed in a reducing rate of effort over time. It is more complex than that, but that is certainly one of the factors that I wanted to highlight.

The other fact I want to highlight about the F111 is that we have been surprised in recent years. Back in 2000 we had the fuel leaks followed very quickly by the wing breakage and then the fuel tank explosion. We were not expecting any of those things to occur, and the F111 has surprised us. With aircraft that are 30 years old, surprises are the norm. Indeed, just last week we had a surprise with our Boeing 707s when we found cracks in an area where we had not anticipated them. It is a fairly simple problem with the Boeing 707 and we will be able to repair it in the short term. But the point is that you find things that you were not expecting.

In terms of the cost of the upgrade, you will remember that before the Defence capability review we had planned to upgrade the F111. The cost of the upgrade is shown on this slide. That is against the planned withdrawal date of 2015-20 on the extreme right of the slide. This next slide represents the cost of ownership in cash terms if we had gone ahead with that upgrade. I do not want to go into that in any detail; we can, if you like, later on. The point is that it would require a huge injection of funds to keep the F111 going through to 2020 with the required capability, as was the plan with the white paper. We have decided to withdraw it in 2010 so that essentially we avoid the requirement for that huge investment through the middle of the period.

CHAIR—I will interrupt you for just one moment. Is it the wish of the committee that the initial submission by Air Force be received as evidence and authorised for publication? There being no objection, it is so ordered. My apologies; please continue. We are now able to use the submission in following your presentation.

Air Marshal Houston—I have just a few words about our strike capability post F111. Essentially we are upgrading the Hornet and it is getting a lot of improvements, which I will not go into in detail. Obviously part of that upgrading is to give it Link 16, a full suite of weapons including a follow-on stand-off weapon and also satellite guided munitions. It will also have the latest short-range and medium-range air-to-air missiles. Supported by Wedgetail and air-to-air refuelling, we will have a better air combat system than the one we have now. We will be able to deliver more weapons on target, engage more targets and provide a much better stand-off capability. We will have more precision and obviously we will have much improved networking. At the moment we talk by voice. In this environment we will be able to communicate by data link. That means that information, including pictorial information, will be able to be switched from sensor to platform and between platforms, as required. As I said earlier on, that will improve our situational awareness. It will also enhance our capability over what we have now.

When we move into the JSF, the strike capability will be even better. We talked about that earlier and John Harvey will address that a little later. I might leave my remarks there—except to say that, in terms of risk management, we have a number of hedging strategies in place. If any of the enhancements to the F18 and the enabling capabilities do not arrive by 2010, we will extend the F111 through to 2012. If the JSF is late, we will keep the Hornet. We have a hedging strategy in place, with funding identified for the modification of the Hornet for 43 centre barrel replacements; that is a replacement to the centre fuselage of the F18, which will enable it to be kept going beyond 2015. John Monaghan will now talk a little more about cost.

Air Vice Marshal Monaghan—In addressing costs, I would like to put some context to my remarks. When in 1994 USAF announced its intention to withdraw its fleet of F111s from service, the RAAF—and Defence in general—was ill-prepared to stand alone as the sole operator of the capability. Some of the risks we faced in doing so were quite peculiar to the F111, given its advanced design for its time and the choices that were made in materials, construction processes and design needed at the time but which have burdened that aircraft from then on in its ongoing support and airworthiness challenges. We will get into some of those later, but the choices made for its high-strength steels and alloys for construction, its bonded panel structures, the design choice made for its ejection system and decisions on materials for sealing its fuel tanks have burdened the aircraft and made it a high-cost proposition from the date it entered service.

In partnership with DSTO, a sole-operator program was developed to deal with the knowledge issues that were going to arise for us to stand alone. They involved transferring data, technology and engineering methods from USAF and OEMs. We also charged DSTO with filling some of the knowledge gaps that existed in taking the aeroplane past where the USAF had been. That has involved understanding its structure and ensuring that we can effectively manage its structural integrity through to its life of type. It has involved extensive tear down of a fuselage and it has involved a wing test.

From a technology standpoint, this has been a great success and allowed us to respond to some very challenging problems like the wing test failure in early 2002. I might add that the broader expertise of DSTO has also been invaluable in addressing other problems such as the fuel tank detonation; that was not related to the sole-operator program, but their expertise, the RAAF's expertise and our engineering ability in-country solved that problem.

Another program that was instituted in response to that challenge was the life of type program. That was funded to about $220 million. It enabled us to lay in, at favourable prices, spares, RIs and other pieces of equipment and support that were going to be needed for us through to a life of type in an attempt to contain the cost of standing alone. One of those things, which I think you will see in your visit, is the cold proof load test facility that we have established in Amberley to manage one of those difficult structural problems we face on the aircraft.

The preparations we have taken have allowed us to continue our support to the aircraft and to solve the serious engineering and technical challenges that we have faced. The RAAF, DSTO, Defence and our commercial partners are proud of that effort. But these issues have still had a considerable impact on aircraft availability, as you have heard, and therefore the strike and reconnaissance capability of the F111 aircraft.

In the case of the wing failure, the engineering response could not keep the capability going to the satisfaction of the operators. What we needed was a logistics response—and that logistics response took 21 months to effect. The logistics response was to go into the AMARC, a boneyard for aircraft, and recover something like 27 sets of wings to be brought back here for testing, reconfiguration, fitting and use on the F111 to get it back in the air. That was 21 months of effort that required a massive diversion of our maintenance manpower and effort; it also required an equally massive effort from DSTO engineering and RAAF engineering to try and work out how we could take this thing forward.

We now have a program that gets the aeroplanes flying today. We have intense engineering effort continuing to get us to 2010, and more effort will be required to get us beyond that point. There is a solution in sight, but it has come at some considerable cost. The fuel tank detonation has a similar history. Once again, the F111 fleet was restricted from operations and it took a similar period of time to fully recover. In fact, we are still wondering about its long-term solution: whether we do a replacement of the current sets of cables in the wings or whether we go to some other solution.

These types of events are indicative of the surprises we await in operating ageing aircraft of any type. For the F111 this is a greater risk. We can no longer learn from the experiences of a much larger fleet of aircraft, where problems are likely to occur first. We are the fleet leader on this challenging aircraft, and it is an uncomfortable position. It is easy to dismiss these risks because we cannot tell you what will be the next area of concern. But in these very complex machines the potential to discover age related design issues can only increase. With each major servicing and with every cold proof load test, there is a prospect of learning something new about the structure and basic systems—and, although technically prepared, the response is likely to have the kind of operational impacts we have already seen.

In executing our airworthiness management responsibilities, considering that the rest of the life of the fleet is in prospect, we continue to invest in engineering investigations in areas like corrosion control and ageing wiring. All of this is an attempt to ensure that we do not find out about these issues in flight, as occurred with the fuel tank wiring.

Ageing weapons systems are also afflicted with obsolescence problems, and those of the F111 are no exception. It has been argued that system upgrades through the aircraft's life will address such problems. But this is only partially true. Obsolescence affects all parts of a weapons system down to the smallest bit piece that we use to repair a repairable item, such as an engine, to fix the aircraft, to look after the simulators, to look after our software integration laboratories that run the software on the systems—all parts of the system—and to look after the GSE/ATE used by our contractors to manage the system.

The effort to engineer replacement systems and equipment because of these problems is all part of the cost of support. Ostensibly, as part of capability upgrades we find that, basically for obsolescence reasons, we even have to look after part of the aircraft's architecture in replacement. Then there are the more predictable and easily manageable manifestations of ageing aircraft such as corrosion, treatment of known fatigue areas through inspection and repair and, in the case of the F111, treatment of stress corrosion cracking; this is becoming widespread, particularly in the forward fuselage. These are areas that we have the technical skills and knowledge to manage, but they are managed at a high and, in some areas, growing cost.

The economics of these phenomena, in terms of giving you a rigorous justification for posing growth rates of about five per cent as a reasonable expectation, are not demonstrated simply; yet there is a growing body of research on military aerospace systems that supports that proposition—and we can talk about that more, if you like. In recent times, for the F111, from year to year the number of flying hours able to be generated has fluctuated wildly. There has been ongoing investment in life of type spares, and DSTO has done some terrific work on the TF30 engine that has helped contain costs in an area that traditionally is high risk in ageing platforms. Yet over the same period we have consistently spent in the order of $100 million from the weapons systems sustainment budget excluding life of type purchases without improving the logistics outlook. I am talking here about the money that I spend in sustaining the weapons system itself. In talking about dollars, we can spend a lot of time saying which dollars they are and how they are spent, but I am talking about the dollars I spend in sustaining the weapons system and putting it on line to be used.

Whatever costs would have been consumed in achieving the additional flying hours intended have been absorbed in addressing the technical problems. Looking into the future, the business units that support the aircraft continue to identify a range of new funding pressures to address rising baseline costs, obsolescence and other ageing aircraft effects that will push the expenditure even higher. These experiences are not theoretical and they do not include allowances for the unpredictable or incorporate predicted cost rises of the order of five per cent. These are the costs that we foresee today. They are the cost pressures for the things that we can see now.

In conclusion, I would say that the aircraft by its design, its history and its age is a high-cost platform to support. We are proud of the efforts that we have put in place to be able to support it if we are asked to do so, but I do not think it stands very much examination for us to be able to predict that in the future the cost of doing so will rise. And there is a risk that in the future some unpredicted event will occur that will at best cause us to have a prolonged period of capability reduction and at worst put the future of the capability at risk.

CHAIR—Are there any other statements before I open up proceedings for questions?

Air Marshal Houston—No; but there has been some commentary that the Joint Strike Fighter is not capable in control of the air environment. We would like to show you a video and John Harvey will introduce it.

Air Cdre Harvey—As you are aware, in October 2002 Australia joined the system development and demonstration phase of the Joint Strike Fighter project. At the time the Australian government also reaffirmed that the JSF was expected to replace the air combat capabilities currently provided by the F111 and F18. The JSF is a true fifth-generation multi-role stealth fighter, highly capable in both the strike and air control roles. While there has been some speculation on the agility of the JSF, it will in fact be a highly agile aircraft that is designed to combine the best features of the F16 and the F18. With its combination of advanced sensors, sophisticated data fusion, multi-band communication systems and precision weapons capabilities, the JSF will be a key sensor and shooter in the networked Air Force.

Another key advantage of the JSF and our involvement in its development is the opportunities it provides for Australian industry. To date 12 Australian companies have won 17 contracts for

JSF work. Particularly important is that these contracts have been won up to five years before signing a contract and up to 10 years before operating the aircraft. The work is not just with Australia's fleet of up to 100 aircraft; it is for the entire JSF fleet of potentially 4,000 to 5,000 aircraft worldwide.

Currently we are conducting a three-year detailed analysis risk mitigation phase to confirm that the JSF meets our future air combat requirements. While we are only halfway through the detailed analysis phase, we are very impressed by the capabilities the JSF offers. A key part of our analysis—as Chief of Air Force said before—involves up to 30 DSTO scientists working full time to not only assess the JSF but also contribute to enhancing its capability. We have also recently had RAAF pilots and DSTO scientists in simulated exercises in the US to develop the operational concepts for the aircraft. The following video provides a short insight into the capabilities that the JSF offers and it shows what a true fifth-generation stealth fighter will offer the RAAF and the ADF.

A video was then shown—

Air Cdre Harvey—There are three points I would like to stress from that presentation. It shows the advantage that a truly stealthy fifth-generation aircraft provides as it jumps to the future—the advantages of being multi-role. Above all, I think the key point is that it is not the aircraft itself; it is part of a network system for the future.

CHAIR—I will now open the inquiry to questions.

Mr BEVIS—I am glad that we have the opportunity to have this discussion. I must say that I am a little disappointed and frustrated that it has taken us some six months to get here, but I think we are all concerned to ensure that Australia maintains an air capability that provides us with superiority on a continuous basis into the decade ahead of us.

The F111 issue has come up in the context of maintaining air superiority and the decision announced last year to retire it earlier than had previously been planned. One of the issues that has been raised previously is that for quite a while various committees of the parliament have raised questions about the F111 and have been reassured of its utility and longevity through to 2020 if required; and, indeed, planning has been done on that basis.

The presentation has referred to ageing difficulties. It seems to me that the F111 has not had ageing difficulties in the last 12 months; it is more like 12 years it has been an ageing aircraft. It did not become an ageing aircraft last year. I am therefore interested to understand how it is that these problems that are now referred to were not seen in the same light prior to the last year or so. In that context can I refer you specifically to not just Senate estimates hearings but also the white papers. When I look at the 1997 white paper I can see some of that apprehension reflected in the wording of the white paper. It referred to investment issues. It includes a question about how much longer we retain the aircraft in service. It then went on and said, 'If, as we expect, this proves feasible and cost effective, we will undertake further upgrades of the F111 system.'

If we jump forward three years, the 2000 white paper gave an unequivocal commitment that the fleet would be extended to service between 2015 and 2020 and that there would be upgrades provided. Indeed, there is quite an extensive series of paragraphs detailing that. I assume that

between the 1997 and 2000 white papers, the evaluations and assessments were undertaken that were forecast in the 1997 white paper. They were done. We then have the 2000 white paper that says, 'We'll have the aircraft to 2015-2020.' Can you reconcile these things for me, because I have great difficulty understanding that background with the advice of the last 10 or 12 months.

Air Marshal Houston—First of all, a lot of the problems, which were the surprises that we referred to in our presentation, have occurred post white paper 2000: the wing breakage and the fuel tank explosion, for example. So to a certain extent I suppose that has changed the way we look at the F111. The other thing that we became very much aware of when we did the defence capability review was the sheer cost of keeping this capability going. As we looked forward, there were great logistic challenges with cost and the capital investment required to upgrade the aircraft to take it through to 2020. On top of that, we were getting some information that suggested that there would be challenges in getting it through to 2020 in terms of risk. On balance, we looked at the capability that is fielded and the cost involved and then what the alternatives might be.

As a consequence of the wing breakage—and when that happened I was chief—I wondered, 'What are we going to do about this?' We very quickly came up with a scheme to use the wings from AMARC. To a certain extent we were very fortunate there, because the wings were available in the boneyard. We had previously operated the long wings, and short wings were available in the boneyard so we were able to resort to that. We did not have a permanent failure of the capability, but it did impact on the capability for a substantial period of time. We did not fly the required rate of effort and the availability of the aircraft was simply not there. The point I wanted to make was that, when that happened, we looked at alternatives and started to look at the F18 as an alternative to the F111 if the capability could not be remediated. As it has happened, the capability has been fully remediated. A lot of people have done wonderful work. We have the capability working better now than it has since about 1996 or thereabouts. It is going great guns at the moment. But we have been through a very traumatic time, and we have put a hell of a lot of resources into the remediation program. We now know that we have a viable alternative that can take us through the period between retirement and the introduction to service of the Joint Strike Fighter. The Joint Strike Fighter will obviously replace both the F18 and the F111.

Mr BEVIS—I have two problems with that. One is that in 2002 the committee was told by the then VCDF Des Mueller, on the F111s—and I am quoting from the transcript—that DSDR advice was that they are of the opinion that 'at this point the airframe could be managed through to the period 2015-2020'. When the question of wing tips was raised in the Senate estimates on 3 June 2002, there were certainly none of the dire expectations that we are now presented with. Indeed, your evidence there said amongst other things that the prognosis is that we will be able to remediate the wing problem very easily and relatively cheaply.

Air Marshal Houston—Yes, that is right. If you remember, the wing failure happened in about February of 2002. I was giving evidence about four months afterwards. We had a remediation program in place. We had the first wings into Amberley—they were being fitted to the aircraft—and we started that program where, one by one, we got the jets back online. So it was all working. I use this opportunity to praise DSTO, Boeing and the Air Force people involved for doing a fantastic job in a very short space of time, because it was a huge challenge—and, of course, the DMO. I should not forget the DMO. I seem to regard them as part

of Air Force anyway. With regard to those issues about airworthiness, we have an expert here I would like to call on who can address that. Dr Clark can address that for you.

Dr Clark—I support fully the comments that have been made by my Air Force colleagues here and I can expand on some of the detail in terms of the technological input the DSTO has made. Certainly the history of the aircraft has been one of providing us with intermittent surprises—early in life there were surprises, and we have had the several events that Air Vice Marshal Monaghan has referred to. At that stage in 2002, I think we were all feeling very relieved that there seemed to be a way ahead to remediate the unforeseen cracking problem. In fact, I do recall we were asked before that wing failed how we foresaw the future, and DSTO—as it would say it normally has done and continues to do—said, 'We can see no technological challenges that we can't find the solution for.' I really must qualify that. In the background to that, we are very aware of the surprises that arise with ageing aircraft, when they get into their third, fourth and fifth decades. I can, of course, quote examples of that if need be.

Then we had the wing failure, and that caused serious concern. It was completely unpredicted. We were assessing the wing for a potential weakness in that area, and sure enough that weakness was there, but we found manufacturing problems which had not been suspected and which posed an immediate threat to the fleet. Thankfully, we were able to access these wings overseas, we did so and the way ahead seemed clear. DSTO is at this stage still evaluating the quality of those wings because of arisings in that program.

We are testing an F-model wing to see what we can make of the USAF history of usage. At the time, we believed that those wings would provide us with excellent solutions for the outer wing region, and we believed that they had had such limited service that the inner wing would not be a problem. As of the last few months we now know, of course, that the USAF data was not all that clear. When we assessed it further, we found that those wings have in fact been used very heavily and the inner wing is not as strong in life as we had hoped. We are now addressing that with a further test. At the moment, we are operating the wings. We have a basis for operating the wings. Contingent on that test and other developments in DSTO, we should be able to push those wings out, we hope, with good results, to 2010. If we want to push them further, and again subject to satisfactory resolution of these emerging issues on usage, then we will need another program. DSTO's position is: if that is needed, we can do it.

Mr PRICE—Why did Lieutenant General Mueller rely on you to reassure this committee that the F111 could go for its time of life to 2015-20, and now Air Marshal Houston says it is on DSTO advice that we are withdrawing it? This is all within two years.

Air Marshal Houston—Can I just—

Mr PRICE—Could I just get the DSTO response and then, sure, you can come in if you want to.

Dr Clark—When the questions come to us the DSTO responds in terms of the technological challenges of providing a robust technological solution. Our position is still that we see a path through to keep this aircraft flying to 2020. We do not see any evidence of insuperable problems that we are now aware of. As time goes on, new problems arise. This is the nature of ageing aircraft: surprises pop up, and you track them down and you chase them. DSTO are still

confident that we can address these issues. The concerns that really are emerging are ones of the fact that we are into this process of chasing problems, that we now have concerns about the usage data we have received from the USAF and its interpretation, and we are attacking that with appropriate research and development capability. We believe we see a way through for the future. But the overriding picture is one of repeated problems—the deeper we go into the problem, the more these arise. I stress that some of these are going on as we speak.

We had a recent discussion about the USAF wing-lifing data, and it is of some concern, but we have a management strategy in place. In a technological sense we believe we can meet the challenges. The difficulty is that some of these challenges present very serious logistical and availability issues for the Air Force. It is that interface that is important. DSTO are restricting ourselves to the technological challenges, and the advice that comes through the system is that we can find technological solutions but that the interpretation in terms of fleet implementation is not something we are pronouncing upon.

Air Vice Marshal Monaghan—What is being presented to the committee now is the bowels of the operation of an airworthiness system that pretty much can be repeated across many of our aeroplanes. You are being exposed to the detailed judgments that are being made on a daily basis as we plod our way forward. It was my advice to you that there was a way forward and that with sufficient work we would get to where we needed to be. It is also DSTO's advice to you, and it was my advice to Lieutenant General Mueller that there was a way forward and that the problems would be solved. You are being exposed to one issue which is being followed through to its entrails and it will be put to bed. We remain confident that that issue will be resolved. I could give you another list of issues that are being managed in a similar way on the aeroplane. It goes back to us being the sole operator and to us dealing at a technological level that quite often we are not required to operate at with this kind of aircraft.

The final point that I would add is that there is even more to this story than that. One of the solutions that we are looking for is a quite technically challenging safety-by-inspection solution to a broad area of build quality issues and other issues in the centre part of the wing. We are investigating with the help of Boeing quite advanced NDI techniques which would have a high enough probability of detection of cracks in the wing such that we could use inspections at regular intervals to ensure the safety of that wing. We are hopeful that by the end of this year that technical piece of work will be in place and we will be able to return some of the F111 C-model wings to service. There is a path forward; Lieutenant General Mueller was reporting there was a path forward. What you are being exposed to is the really complex technical work that needs to be exercised to bring that to fruition.

Mr PRICE—Could I have the date of the advice from DSTO that was relied on? Was it in a paper? What was it?

Air Vice Marshal Monaghan—I certainly do not have the history of the toing-and-froing between DGTA and DSTO over the wing failure.

Mr PRICE—I am sorry. No—on the decision to withdraw.

Air Vice Marshal Monaghan—I am sorry. I do not think you have advice from DSTO on a decision to withdraw.

Air Marshal Houston—The airworthiness process is a very dynamic process. There is constant interaction within the airworthiness system and between the DG technical airworthiness, who works for me. He works hand in glove with each gentleman here on not just the F111 but all issues to do with technical airworthiness right across the whole fleet. Indeed in the last couple of weeks there has been a lot of attention on our 707s, so it is a dynamic process that goes on all the time. It is not just one piece of paper that comes in. It happens every day; it is a normal process. It is a process that works very well.

Senator FERGUSON—I take the point that Mr Price and Mr Bevis made about white papers that were written in 1997 and 2000. There are two issues I want to raise. First, I seem to remember that when those white papers were written one of the reasons the projection of the F111 was included was that there was no suitable replacement at that time, or not one that would do the job that the new JSF could do. Second, I accept the point that you can keep things flying—things can be fixed—but it is a matter of whether it becomes economical to keep fixing them and whether we would not be better using the capital expenditure that will be required to keep them flying for the new aircraft that we are looking to buy. I just want you to comment on those two issues.

Air Marshal Houston—Over the years the Royal Australian Air Force has operated many wonderful aeroplanes. The F111 was a great buy. It has been unmatched in this region for 30 years. Indeed, even now, through the next few years, it will continue to be highly credible and a great strike capability. There comes a time with all platforms where the costs of ownership start to get to the point where you look at it and say, 'How much capability am I getting for this cost?' A decision has to be made that it is time to pull it and replace it with a new capability which, in general terms, is usually cheaper to support than the one it replaces. The way things are looking with the Joint Strike Fighter, it will be much easier and much cheaper to maintain than legacy systems. To some extent we see this with the F111 and the FA18. It is easier to maintain an FA18 than it is an F111, because it is a more modern aircraft. The reality is that there comes a time when you have to withdraw an aircraft. When I look at the amount of money that I have to plan with through to 10 years, keeping the F111 going really distorts the force structure of Air Force, given that what we are transitioning into is a networked air force for the future. Making the F111 compatible with the networked system can be done, but it will be an expensive investment.

Senator FERGUSON—The first part of my question was: when the white papers were written in 1997 and 2000 was there a suitable aircraft available? The decision to keep the F111 flying may have partly been based on the fact that they did not see a suitable alternative. We know you can still keep the F111 flying for as long as you like, but it is a matter of whether it is economical and in the best interests of the air force to do so.

Air Marshal Houston—There is no aircraft available in the world today that has the same characteristics as an F111. Big bombers are not being produced anymore. The only aircraft that are being produced now are of the multirole nature—the Joint Strike Fighter, and F22s are now the dominance fighter. My colleague, John Jumper, and I have talked about it. He wants to turn the F22 into a multirole aircraft. The only aircraft that was potentially available at that time was the Joint Strike Fighter, but we did not know much about it back in 1997. We knew it was coming, but we did not know precisely what its characteristics would be. So I think it is fair to say that at that stage there was no obvious replacement for the F111. As the JSF development

program has continued, and we have monitored it closely, we obviously are now fully involved with that.

Mr BEAZLEY—As you know from the briefing that we had a bit earlier, we are seized of the fact that this is the core of the defence of the country. We can make mistakes in Army, we can make mistakes in Navy, we can correct those mistakes and in the end they are not lethal, as far as this country is concerned, but this is lethal. If we get this wrong—not you gentlemen generally—basically we sell the country out, those of us who happen to be the decision makers, so there is a lot at stake in getting this absolutely right.

I suppose what comes as a surprise to those of us who have watched the process through is the timetable here. We were not at all concerned about a leisurely review of the Joint Strike Fighter when it was being selected in the context of maintaining the capability that we had until 2020. If this Joint Strike Fighter turns up in 2012 it will be a miracle. It will be the first ever. That may well happen. Sooner or later that has to happen, and this may be the program in which that occurs. I am not going to open a book on it. That did not worry any of us here, I do not think, because we assumed that the F111 was going to be there until 2020 and that there will be upgrades of the F18 and the rest. With the AWACS coming in and better refuellers, the system would be maintained effectively in a way that gives us dominance. I am prepared to make a bet on the Joint Strike Fighter program for 2020. I think that is a comfortable number, but 2012 is not.

This issue is not only technical; it is also psychological. The F111 has been critical for the psychological dominance that we have had in the region. This is now the only region in the world in which there is an arms race, in which people are acquiring new capabilities at a rapid rate of knots and learning how to use them. We are unique in this country in that we alone, amongst powers of our status, among nations of a basic European background, have to conduct our defence planning simultaneously and very substantially in an environment across the board not only at the low level of violence in terms of terrorism but at the high level of violence in terms of a capability attack on this country.

We should start to look at what we could do with the F111—and what it would cost—to better change our options with regard to ensuring that we maintain that capability while we get the Joint Strike Fighter properly settled down and integrated. You may not be able to do it here—in which case you can take it on notice—but I would like to see a briefing on the costs of keeping the program going until 2012: what we could do to it and what you have taken out of the program in concluding it by 2010 instead of 2020. If you had to take it out, for example, to 2015 and maintain some capability in the aircraft to deal with the systems which are coming into the region around us, what would the costs look like, if we were determined to go down that road? Because we will not make a decision on the Joint Strike Fighter for a couple of years yet—

Air Marshal Houston—Absolutely.

Mr BEAZLEY—I would like to get some view on the trade-offs between what you might be able to do with regard to changes to the Hornets and the cost of that, if you were doing these other things to the F111s and not changing the Hornets on the basis of having taken the F111s out prior to the Joint Strike Fighter coming in. You might give us a bit of a 'heads up' on all of that now or you might want to do that on notice.

Air Marshal Houston—I would like to respond initially. First of all, I accept the fact that we have a great capability, which has a psychological effect and so on. But essentially, when we had the challenge presented by the wing breakage, as I said earlier, we looked at alternatives to the F111 and we looked closely at the FA18. What we have planned now is the provision of a strike capability, post F111, which will actually be better than the strike capability that we have right now, presented by the F111. The reason for that is that we will have the FA18, which will be, as part of its multi-role function, a strike aircraft. It will be upgraded with all it needs to enable it to perform the strike role. With the enabling air-to-air refuellers and with the support of the system of which Wedgetail is the centrepiece we will have more capability than we have now. We will have more lethality and a better survivability as a consequence of being part of that system. So, whilst I accept the fact that the F111 has that psychological effect, the FA18 alternative does give us a viable strike capability. It is a strike capability that is better than the one the F111 gives us now—and, indeed, it is one that will give us the capability we need through that period until the joint strike fighter arrives.

On the subject of the joint strike fighter, the US Air Force have similar problems to us at the moment. They have a lot of ageing air combat aircraft and they have an urgent need for the joint strike fighter to come in on time. I think there will be a lot of resources put in to getting the joint strike fighter to arrive in a reasonable time frame, as by then the US Air Force will be parking legacy aircraft, because they will have run out of fatigue life. Alternatively, they will have to embark on major refurbishment programs to keep their legacy aircraft going.

Mr BEAZLEY—I take it that your calculation about the greater effectiveness of the FA18 program, when compared to what you initially intended to do in relation to the F111—before the program changed—would be based on the number of aircraft you put in the air and the fact that you have in-flight refuelling capabilities for the FA18, rather than on the characteristics of an individual FA18 up against a restructured F111?

Air Marshal Houston—The other thing that I think is pertinent here is that the F111 has been great over the last period of time and will be, certainly in the next few years, but in the evolving regional environment we are going to be facing, as you correctly indicated, an arms race in the region. One of the features of that arms race is more look-down, shoot-down air combat aircraft—aircraft like the Sukhoi 30. In that environment, if we are going against targets defended by those sorts of aircraft, we have to be able to escort the F111. We have to be able to defend it. It cannot defend itself in that environment. It is imperative that you understand that. In other words, the F18s have to go along as well. The air-to-air refuelling capability is a vital enabler and, of course, the airborne early warning and control aircraft are also vital in that environment.

Mr BEAZLEY—If you configured the FA18 for that strike role, would you not also be flying FA18 escorts with those FA18s, given the changed environment?

Air Marshal Houston—No. I will get Geoff Brown to talk about his experience in commanding the forces in the Middle East recently. Essentially, the FA18 can carry weapons and air-to-air weapons at the same time. We do that routinely, we do it all the time and we did it in the Middle East on Operation Falconer.

Group Capt. Brown—I think it is substantially a question of what the threat is and the task you have. As you say, sometimes you would provide an escort to the aircraft that are carrying weapons as well. It really depends on the task. Sometimes you could let them go in by themselves.

Mr BEAZLEY—But, if you assumed that you had Su-30s with an AWACS support in the region, you would not send the FA18s in purely in a strike figuration, you would escort them, wouldn't you?

Group Capt. Brown—Yes—not against an AWACS backed force, but I do not think we see that at the moment. Our advantage will be that we will have the best AEW&C system in the world in two years time. That will give the FA18 force a significant advantage.

Mr BEAZLEY—You obviously know more than we do about it, and this is not an argument against going down the road of the Joint Strike Fighter—and it is true that there is not much else around on that—but isn't it the case that there are a lot of disputes between the other potential operators of the Joint Strike Fighter and the Air Force? Isn't it a fact that the Navy is worried about the characteristics of the version they want—that the weight problems have not been resolved? Isn't it possible that they may move away from it, if those issues are not satisfactorily answered? In those circumstances, the Air Force might find itself with a stand-alone program, all of this impacting on the timing of the delivery of these things.

Air Marshal Houston—There are a lot of things going on in the United States at the moment. I have recently met very senior and prominent Americans, and the F22 program is in dispute. There are a lot of people in the United States who think the F22—which was designed for the Cold War—is designed for a past era and that they should stop the program and invest all the money in the Joint Strike Fighter; other people in the congress strongly support the F22. So there are lots of things happening politically in the United States. I suppose the election coming up creates a little more uncertainty. But the fact remains that the US has always had a high-low mix. Going back to the 1970s and 1980s, the mix they chose then was the F15 as the air-dominance aircraft and the F16 as the aircraft to give the numbers. That combination has worked very well for the US.

I think the US Air Force need around 1,500 Joint Strike Fighters. Originally they were going for the conventional take-off and landing aircraft. I guess I was the first Australian to hear, from John Jumper, that they were also going to buy some VSTOLs to replace the A-10. That may have an impact on the number of CTOL aircraft—conventional take-off and landing aircraft. In terms of the Joint Strike Fighter, the US Air Force have to have something. The F22 is regarded as very expensive, even for the United States.

The USAF would like numbers in the order of over 300. Congress is insisting on lower numbers. With all their responsibilities and ambitions, you cannot operate with a fighter force which has only, say, 200 aircraft. They need another 1,500 or so aircraft to fill out all their wings. I think that is going to be the Joint Strike Fighter. It is going to be the conventional take-off and landing aircraft. That is the one that has the smallest number of problems. The weight issue is a problem with the VSTOL aircraft. Essentially, the conventional take-off and landing aircraft is proceeding along reasonably okay.

Air Cdre Harvey—I have just come back from a series of meetings in the US. There are the three variants of the aircraft, as we said. The undersecretary of acquisition technology and logistics, Mr Mike Wynne, was at the last meeting I went to. The atmosphere in all three services is very positive. They all need the aircraft. It has to go ahead. The CTOL aircraft is much less sensitive to weight and that is pressing ahead quite well. The carrier variant has an approach speed and they are working through weight issues on that. The STOVL is much more sensitive to weight, but they have a way forward with that as well. It is very challenging. In terms of dates, the first aircraft will fly in mid-2006. The first aircraft will be available for USAF service in about 2009 or 2010. It is a big, challenging project, but they need it and it has to work. They are pressing ahead.

Mr BEAZLEY—Could you take the questions that I asked in terms of the F111 program on notice and provide us with answers for those

Air Marshal Houston—Yes.

Mr BEAZLEY—When you do provide that information, could you also give us a bit of a heads up on the comparative costs between the F22 and what we are looking at in relation to the Joint Strike Fighter?

Air Marshal Houston—In terms of the comparison between the F22 and F35, would you be happy to get that in August? I am actually working closely with Aldo, Hugh White and ASPI on a paper that will be published with ASPI. I think that paper will satisfy your needs. Would that be okay?

Mr BEAZLEY—Sure.

Mr CAMERON THOMPSON—Air Marshal Houston, you have quoted the estimated increase in cost of the F111 as being five or six per cent. That does not seem like a lot to me. In hospital budgets, that would seem miniscule, compared with their average yearly increase. How does that compare with, say, the increasing operating costs of the F18s? How far above the norm is it?

Air Marshal Houston—This is a very complex area. In preparation for this, we did a lot of work in looking at the cost of the F111 through time. It is very hard to come up with a definitive figure that says, 'It is this amount,' because the way you account for the aircraft changes over time. We have to ask what impact the arrival of the F111G has on the program, and so on and so forth. We know the actual cost is increasing. As Air Vice Marshal Monaghan said, there are studies in the United States that suggest costs related to ageing aircraft increase at a particular rate, but it all depends on the aircraft. The other day I was speaking to Boeing people, and I understand that a figure of 18 per cent has been placed on the KC135s that the US Air Force operates. I do not know. Simply put, I want to do more work on determining the cost of the F111 over time—and what it would cost into the future—because I think there is a lot of territory we have not had a close look at yet.

Mr CAMERON THOMPSON—But five per cent is our estimate at the moment, and that does not sound like a lot.

Air Marshal Houston—If you have a look, you need to include the cost of the upgrades that we require to basically make the aircraft capable. I would like to go away, satisfy Mr Beazley's requirement and come back to you with a cost. I do not think it is as simple as five per cent. We are looking at increasing costs through the years. We may get another surprise. We also sustain costs in terms of loss of rate of effort, loss of availability and loss of capability. It is not just a simple fact of looking into the future and saying, 'It's possibly about five per cent.' How do you cost the aircraft sitting on the ground for six months?

Mr CAMERON THOMPSON—I note that in the last year it was six per cent, and that was at the time of all the problems.

Air Marshal Houston—The figure of six per cent was based on the cost of the aircraft and the flying hours cost. It was derived from the increase in flying cost per hour through the previous few years. In terms of what the cost will be in the future, we think it will be increasing, but essentially I want to do more work and come back to the committee to give the committee a fair view of what that cost would be in a definitive way.

Air Vice Marshal Monaghan—I would like to deal with this five per cent number, and I would like to deal with it in the terms of my opening statement. The kind of research that sits behind ageing aircraft is economic research. It is not technical research. References to bathtub curves and reliability rates are not the basis of the research that we see. It is economic research, and I will give you the breadth of the research. You take a picture of the items identified in the entire use inventory and then you calculate repair costs against those items over time related to age, and that shows a trend. It is absolutely impossible to take otherwise that kind of data, which they do across an entire US inventory to draw some conclusions about what their strategies might be to contain such cost growth, which is real dollars going out of the door and they are trying to discover the source of that.

With respect to a year by year comparison of cash going out the door on the F111, it really does not relate to that research. The fact that we spent an extra $20 million on life of type spares this year or the fact that we diverted maintenance away from actually delivering flying hours into the fleet to re-covering wings makes the economic analysis absolutely unsustainable across one fleet in the way in which we are trying to do it. It is an academically arguable set of numbers, and it is argued. Within the US military they have arguments between their accounting office and the services that are drawing out this data about what it means: does it mean that we should be doing a better job of through-life support to contain those costs? What I would go back and say is that the actual dollars flowing into this fleet are large. They are large because of the nature of the aeroplane it is, and they will continue to be large. We do not have any budgeting process that has a magic figure of five per cent that the CFO of Defence would let me get away with in terms of forecasting the future budgets. It is used more in a risk assessment fashion about what might happen in the support of this aircraft into the future.

Mr BEAZLEY—Can you factor into the costs when you do them access to the boneyard, which we seem so uniquely to have?

Air Vice Marshal Monaghan—That is a wonderful asset and the excess defence articles scheme that has allowed us to stock up on some spares is a great asset, and DSTO's research on

the engine has been a great asset—and with all of those good things happening, the costs have not gone down.

Air Marshal Houston—The other thing that I want to put into the costing is the reduction in rate of effort over time and the loss of availability when we have a problem. We do not actually physically cost that. We should, because I do not have it available for what I have got to do.

ACTING CHAIR (Mr Price)—I need to apologise to everyone as we are now running three-quarters of an hour later. There will be a brief question from Mr Byrne and a brief question from Senator Macdonald.

Mr BYRNE—Air Vice Marshal, I want to actually ask a couple of questions—but they will be short, Chair. They relate to pages 6 and 7 of your submission. They relate in particular to your use of APC3s as antiship weapons after the F111s are made redundant. Is there any other air force in the world that, having reduced its supersonic strike fighter force, would put in what is predominantly a surveillance craft to be a key part of its maritime defence strategy?

Air Marshal Houston—The P3 has operated for as long as I can remember with the Harpoon precision guided munition. It has been armed with that for the maritime environment. One of the roles of the P3 is anti-surface warfare using the Harpoon missile. It has been that way for 20 years.

Mr BYRNE—You are elevating that. That is fine in a support role. I have asked you two questions. One is this: is there any other air force in the world, given that they are withdrawing a fighter of that capability, which is replacing it with a craft like that?

Air Marshal Houston—In terms of the question about replacement, we are not replacing it. What we are about in the Air Force is making the most of the expensive platforms that we have invested in—

Mr BYRNE—The FA18, even in your submission, will not have that Harpoon capacity. You are going to be upgrading that. When you take the FA18s offline to upgrade them, I presume from your paper you are going to be installing that capacity. The only one that will have that capability is the Orion.

Air Marshal Houston—That is not true. Right now we can fire the Harpoon from the F111 or the P3 and the capability is similar with both. We have the capacity to fire it from the FA18. We are restoring the full capability to fire the Harpoon from the FA18 as well. The US Navy arm their P3s with the Slam missile. That is the land attack missile.

Senator SANDY MACDONALD—I wanted to ask about the capability of the F111 apart from its precision attack capability—the F111 RF aircraft. How important is that capability and how would it be continued post 2010? Is it a capability that is not required or is it serviced in some other ways?

Air Marshal Houston—Every aircraft will have a reconnaissance capability. That is part and parcel of the Joint Strike Fighter. I can get John Harvey to talk about that. But in terms of the

period from 2010 through to the introduction of the Joint Strike Fighter I do not think we have anything at this time.

ACTING CHAIR—Air Marshal Houston, I think you on behalf of the committee. I express a degree of disappointment we did not get some of the material to read before the presentation but I realise that sometimes that is a lineball decision. The committee has not made any decision but I forewarn you that this is an area in which the committee wants to be satisfied that all the right decisions are being made. The time allocated this morning seems to have been wildly optimistic. There may be the necessity—or the subcommittee may desire—to in fact have you back to fully explore all those key issues that have been raised this morning, and a lot that have not been raised in detail with you, so the committee can be satisfied.

Air Marshal Houston—Thank you. It might be a good idea to engage with my office on what you want at Amberley. I know you want to go round—

ACTING CHAIR—Amberley is going to provide another opportunity. However, this morning was just too damned short. All the subcommittee members would have liked to have explored a lot of the stuff in much greater detail. We have a responsibility to do that.

Air Marshal Houston—There were a number of areas. I can see where the points of focus were. Perhaps before you go to Amberley we could have a session and then go up to Amberley—whatever you require, anyway.

ACTING CHAIR—It is in the hands of the committee. They will make a decision. We will try to work our way through.

Air Marshal Houston—Thank you very much.

ACTING CHAIR—I thank everyone for appearing this morning. Would a member like to move that submission No. 3 from Dr Carlo Kopp be taken as evidence in the review of the 2003 Defence annual report and be authorised for publication? Senator Ferguson has moved that and Mr Byrne has seconded it. There being no objection, it is so ordered. I would be grateful if a member would move that the confidential documents No. 1 and No. 2 from Peter Goon to the review of the 2002-03 Defence annual report be received as confidential exhibits. Thank you, Senator Macdonald and Senator Ferguson.

[10.35 a.m.]

KOPP, Dr Carlo, (Private capacity)

GOON, Mr Peter Anthony, (Private capacity)

ACTING CHAIR—I welcome our next two witnesses. Although the subcommittee does not require you to give evidence on oath, I advise you that these hearings are legal proceedings of the parliament and should therefore have the same standing as proceedings of the respective houses. Would you like to make an opening statement to the committee?

Dr Kopp—Yes, please; it would be our pleasure to do so. Australia will face a very difficult period over the coming two decades as it confronts the realities of large and ongoing growth in regional military capabilities, especially in modern air power, precision guided munition and missile capabilities. The influx of large quantities of very modern and high quality Russian combat aircraft and weapons is changing Australia's strategic landscape. Many regional nations are now developing the capability to project air and missile power into Australia's area of interest. There is no precedent for this since 1942. Led by China and India, this competitive Russian weapons shopping spree is driving the baseline capability of regional air power to unprecedented levels. To remain strategically competitive in this region, the Royal Australian Air Force must maintain its numerical strength and increase its potency, especially its ability to project power over large distances, as aimed for in the Defence 2000 white paper.

It is during such a critical period in our nation's history that we are confronted with some extraordinary decisions made by the leadership of the Department of Defence and presented to the government of the day. The first of these was the idea that the Royal Australian Air Force can fulfil its very diverse future needs in air strike and air combat operations by using a single type of combat aircraft—moreover, given current preferences, a combat aircraft designed primarily as a small battlefield strike fighter with secondary air combat capabilities.

While the decision to shortlist the Joint Strike Fighter is yet to become a contractual commitment, the absence of a competitive, concurrent and detailed evaluation of alternatives, such as the more capable FA22 Raptor multirole fighter is very troubling. This presents the prospect of a one horse race in which the sole contender could prove in time to be a lame draught horse, not the thoroughbred required.

The second extraordinary decision made by the Department of Defence was to effectively cease ongoing block upgrades vital to maintaining the F111's capabilities and retire Australia's F111 fleet a decade earlier than planned. The Defence senior leadership group made a range of public statements on this issue and provided evidence to this committee. Few of these statements agree with known facts or accepted knowledge in this domain, a good example being statements on future costs and reliability. We do take issue with a number of statements made by previous witnesses.

In January this year, we presented a submission to this committee which challenged a number of these statements made by the Defence senior leadership group. The submission was a detailed

forensic analysis which was intended to test these statements against hard technical data and previously published materials. We have both been professionally immersed in military aviation for more than 2½ decades and have experience and skills in many areas where the Department of Defence lacks suitably qualified and experienced personnel. I have been publishing as a defence analyst for 25 years in Australia and overseas. My research papers dealing with technical air power issues have been published by the RAAF and the US Air Force. I hold a visiting research fellowship in air power and military strategy with the University of New South Wales. After 15 years in industry as a design engineer and systems integrator, including work in reliability engineering, I completed a doctorate and, since 2000, hold an academic position in the hard sciences. My doctoral work dealt with airborne networking, which is the technological foundation of network centric warfare. I am very happy to talk about networks. I am a member of the American Institute of Aeronautics and Astronautics, the Institute of Electrical and Electronic Engineers, the Association of Old Crows and remain a registered professional engineer.

Mr Peter Goon served in the RAAF through the 1970s and 1980s as an engineering officer, was posted to Amberley as a maintenance and project engineer on the F111 and then to headquarters support command as the airworthiness engineer on the F111. He completed study at the US Naval Test Pilot School, graduating as a flight test engineer. He then did two back to back tours at ARDU in Adelaide, principally working on the instrumented F111 and precision guidance munitions clearance programs. Peter left the RAAF to establish Australian Flight Test Services Pty Ltd, where he remains the director. Mr Goon is an authorised person under the civil aviation safety regulations and the registered inventor and holder of a number of patents, STCs and type approvals for aeronautical products and modifications. He has been the holder of an air operators certificate, an aircraft maintenance organisation approval and operated a range of aircraft. He was a founding director of the Defence Teaming Centre Inc. He was a member of the Defence Industry Policy Consultative Forum, which was an initiative of the current Team Australia policy for Defence and industry. He is a member of the Society of Flight Test Engineers, one of the founding members of the Australian chapter of the International Test and Evaluation Association, Flight Test Society of Australia and a professional engineer. We offer the committee experience and insights which in many areas cannot be provided by the now limited pool of skills within the Department of Defence. We do so as these matters are of vital national importance.

The department alleged late last year that the F111 was fragile and that a medium to high risk of loss of capability existed for reasons of aircraft age. No robust or compelling evidence exists to support such a claim and, conversely, the United States Air Force intends to operate a decade older B52 bombers and aerodynamically and structurally similar B1B bombers until 2040, which is basically another four decades from this date.

The department alleged late last year that a range of since corrected problems in the F111 fleet, known to result from constrained and underresourced maintenance management, were in fact age related. This is not true and engineering data proves the contrary. The department alleged late last year that the F111 would be exhibiting a significant cost growth over time, which would increase progressively as each year passes, and we have heard these observations reiterated today. This is very hard to support. We in fact can say that the converse has tended to be true for a number of ageing aircraft. Engineering data that is available at this stage would

indicate that the reliability of the F111 is improving, and the support costs in many key areas of the aircraft are actually declining as engineering support improves.

ACTING CHAIR—Dr Kopp, we have been very unkind to you in terms of time—

Dr Kopp—Yes.

ACTING CHAIR—and I apologise for that. Is there much more to go? We could take it as an exhibit. I know you want to get it on the record, so that is fair enough.

Dr Kopp—Yes. I could get through it with another five minutes if that is acceptable to the committee.

ACTING CHAIR—Members of the committee, what are your wishes?

Senator FERGUSON—We have had 10 minutes of job application to start with! There is the problem.

ACTING CHAIR—Please proceed.

Dr Kopp—Thank you. We were attempting to establish our bona fides! The department then alleged that no loss of strike capability would arise from retirement of the F111s, despite the mathematical impossibility of this being so. Removing a third of the RAAF's combat fleet cannot be offset by putting new bombs and missiles on the remaining, much smaller aircraft—unless the laws of physics have been repealed.

More recently, the department shifted its position on strike capability by alleging that the removal of the F111 actually results in an increase in RAAF strike capability. This is deceptive in so far as it does not account for the impact of the very same new generation weapons—and indeed aerial refuelling—upon the capability of the F111; ignores the survivability limitations of the FA18 in many situations; ignores the impact of reducing FA18 numbers on overall air combat capability; and ignores other demands upon aerial refuelling. The department also alleged:

> ... fitting the F111 into the networked air force of the future … would be an incredibly expensive undertaking for an aircraft that is basically sixties technology.

This claim is patently absurd and was made despite the fact that hundreds of millions of dollars have been invested in state of the art digital avionics upgrades and despite the ease of integrating Link 16 and improved data modem radio modems and networking software into the F111 avionics system—they are currently being installed. The avionic upgrade now being performed on the F111 includes the Mil-Std-1760 bus which permits addition of all of the latest US weapons at minimal extra cost.

Size matters in network centric warfare, and the F111's weapon payload and persistence make it an ideal vehicle for such war-fighting techniques. The single biggest force structure change in the US Air Force resulting from network centric warfare has been increased investment in larger platforms, as these have persistence—a prerequisite for effectiveness in the information age.

The department further alleged that the FA18 would provide a more survivable strike capability than the F111—this despite the inferior speed of the FA18, which is vital to the evasion of hostile fighters; despite the inferior low-altitude penetration capability of the FA18, vital to evading many missile and gun defences; and despite the demonstrable inferiority of the FA18 against the Russian Sukhoi fighters in beyond visual range missile combat. And I will dispute assertions made by the Department of Defence on this.

It would appear that the reason for early F111 retirement evolves over time, as unsupportable reasons are publicly discredited. To date the department has failed to produce a single strategically or technically convincing reason for F111 early retirement, let alone its replacement in the original 2020 time frame. To place this in context, the US Air Force plans to fly the technologically similar B1B bomber until 2040 to avoid the expense of replacement with new aircraft. Upgrading assets of the F111's generation is seen to be a viable strategy in the United States, yet in Australia policy appears to centre on the more expensive idea of replacement with new and also smaller aircraft.

Early retirement of the F111 destroys numerous valuable opportunities for the RAAF while hobbling it strategically. The first opportunity arises from deferring an expensive replacement of the F111 with new aircraft, be they Joint Strike Fighters, the FA22 or even the now increasingly likely FB22. Replacing F111s well after 2020 shifts several billion dollars beyond the current Defence Capability Plan and results in lower buy prices of fifth generation fighters and more choice in fighter types. This is unbeatable risk mitigation.

The second opportunity arises from the option of reducing the operational FA18 Hornet fleet size to preserve fatigue life—and that is a major problem in its own right—and converting one of the FA18 squadrons to fly the F111 instead. Rather than rebarrel most of the strategically nonviable FA18 fleet without a long-term return on investment, this investment is put into more durable F111 air frames which provide more capability per dollar. Even upgraded, the FA18 remains outclassed by the Sukhois. Refurbished mothballed F111s are the cheapest high-performance combat aircraft available in the current marketplace, and they are uniquely available to Australia.

The third opportunity arises from the extant systems integration software development and ageing aircraft engineering capability centred on the F111. This provides a platform for the domestic development and maintenance of critical high-technology expertise in this area which can be applied to other ADF platforms. Software and systems designs developed for network-centric capability in the F111 could be transplanted into other ADF platforms, saving considerable outlays across the ADF force structure.

The fourth opportunity arises from the superb supersonic aerodynamics of the F111, making it a viable candidate for a supersonic cruise engine upgrade intended to enhance survivability, long-range strike productivity, supportability and indeed operating costs. Such an upgrade is now being evaluated in the US for the larger B1B bomber—in concept, alike to a B52 sized F111—for all of the same reasons which apply to the F111.

Evidence from a wide range of sources and observed US Air Force bomber fleet policies clearly indicates that the early retirement of the F111 is a serious blunder. It will emasculate the RAAF during a strategically challenging period, destroy a critical part of the nation's technology

base and vastly narrow acquisition options for future governments, forcing earlier buys of more expensive replacement aircraft. The arguments put by Defence to support their case are at best questionable and at worst may appear to be misleading or deceptive. The Australian community has every right to expect Defence to provide intellectually robust and coherent reasons for policy decisions of this ilk, not incoherent and shifting arguments unsupported by hard evidence or technical data. As recent media reports indicate, Defence is neither omniscient nor infallible, and the advice it tenders to parliament and the executive government may or may not be correct. That concludes my opening statement.

Mr CAMERON THOMPSON—Thank you, Dr Kopp. I have heard what you are saying. Reading the various papers and things that you have provided, I wonder whether, realistically, raising the prospect of a supercruising F111 is all a bit pie in the sky, compared to the necessity for us to provide a capability going forward, given the problems that have emerged with the F111. Promoting the idea that we can create some kind of 'F111S', some kind of super F111, is really just so far out there. You could go down that track for 20 years and find in the end that you cannot deliver it. Isn't that a little bit of punting on nothing? Isn't it better to go with the vast weight of engineering and aeronautical experience which is centred on the US and those companies over there, as well as the US Air Force, all the authorities over there and our own experts, who are saying that we have a plan in mind here and it is far more bankable than the sort of thing you are talking about?

Dr Kopp—I do not think I really agree with that proposition. The retrofit of engines into aircraft of the F111's generation is not an unusually difficult engineering task; it has been done for a range of aircraft. In fact, the F14, which is equipped with the very same engine as the F111, the TF30 engine, was retrofitted with the F110 engine, which would provide a limited supersonic cruise capability.

To our knowledge, this engine was actually offered to the RAAF as a retrofit option during the early 1990s. The US air force had planned to put this engine in, and initial design work had been done in the US because conversion kits for the F14 already existed. They allowed you to take an off-the-shelf F110 engine and basically put it into an engine bay that was designed for the TF30. I do not see that there are particularly unusual technological obstacles in doing this.

Mr Goon—Similarly, Mr Thompson, RFIs, or responses to requests for information, have just been returned to the USAF, our strong aeronautic and aerospace broadly skilled ally, in relation to exactly that on the B1B bomber. Boeing has put in a response to a request for a regional strategic long-range strike capability, and that response is to take the B1B and put the Raptor engine, the F119 engine, into it and turn it into a super-cruising, long-range, large bomber. In fact the technology is aptly suited to Australia and Australia's capabilities. If we refer back to the white paper, one of the strategic needs that was recognised in our industry was our capability to modify, upgrade and enhance existing platforms or existing technology from overseas. In fact that was seen as a strategic capability in some regards unique to but also very important to Australia. The kinds of things that had been proposed in the evolved F111 papers—and I presume that is what you are referring to—are well within the capabilities of Australian industry and in fact do offer as a viable alternative force structure a means of cost effectively responding to Defence's capability needs, or our capability needs, but using our own industry.

Mr CAMERON THOMPSON—I get that, but we heard what Mr Beazley said earlier about how important it is that this be got right—

Mr Goon—Correct.

Mr CAMERON THOMPSON—and yet you are proposing to go against all the weight of world opinion about development in this way and develop something in our own backyard that would somehow be a world beater. I think that is a hell of a punt.

Mr Goon—No, we are not proposing that at all. In fact the evolved F111, if we wish to talk about that in the context of this meeting, is about getting a greater capability by focusing on the true fifth generation fighter, which is the F22. It is a means whereby we can cost effectively achieve what has been referred to as an extremely expensive platform—which, again, we dispute on the basis of the figures that we have been able to derive from our colleagues in the US—and at the same time have the numbers that Air Marshal Houston referred to earlier today, getting up to the figure of 100 platforms, whilst still having an enhanced capability in terms of both strike and full multi-role fighter capability.

Senator FERGUSON—Dr Kopp, much of the statement that you made is in direct contradiction to the evidence that was given to us by Air Force this morning. Why should we believe you and not them?

Dr Kopp—Yes, that is a very good question. The issue really revolves around particular types of expertise and prior expertise. The Department of Defence have a particular mix of skills within the organisation.

Senator FERGUSON—I think you said 'a limited variety of skills'.

Dr Kopp—They do have a limited variety of skills.

Senator SANDY MACDONALD—'A limited pool of talent', I think were the words used.

Dr Kopp—Yes.

Mr Goon—It is generally agreed amongst the industry and, in fact, in a large section of the Department of Defence, that over the last 10 years the downsizing that has occurred—when I was in uniform, we had 23,000 people; we are now down to 13,000—and the resulting outsourcing to enable Defence to continue to operate by linking closely with industry has resulted in a significant de-skilling of the organisation. Much of that skill has appropriately moved across to industry to provide that support area. But the net result is that we now have a very shallow pool of skills within the organisation to fill a very broad range of requirements. The net result is that invariably we are asking people in Defence, particularly in the senior levels, to do very demanding jobs in very frenetic environments which they do not have the experience, competency, skills or training to do. They are doing them to the best of their ability; there is no argument about that. But, coupled with the tempo and frenetic nature of their activities, that is extremely challenging.

Senator FERGUSON—It is very easy to say that there is general agreement; nobody can challenge that because you have not said who agrees.

Mr Goon—If one refers to the Senate estimates reports, the report done on the acquisition process and various parliamentary reports you see that that comes out quite strongly. It comes out quite strongly in the Kinnaird report as well.

Senator FERGUSON—Without being too cynical, it sounds to me as though you might not have received any of the outsourcing.

Mr Goon—In fact, I did. As a company, I received quite a deal of that outsourcing. For some 15 years my company provided good service to Defence, and continues to do so.

Senator FERGUSON—Dr Kopp, you have written an article to which there has been a response, which you have probably seen. Did you get the tabled document today?

Dr Kopp—Yes.

Senator FERGUSON—In that response the things that you say have been questioned and have been responded to. I want to pick up on a couple of the things that you said. The Air Force says quite openly that you have made inaccurate statements. Would you care to respond as to why you think they have said they were inaccurate statements, in particular the statement at the top of the second page, to do with the Sukhois, where the Air Force say it is an inaccurate statement.

Dr Kopp—Is this the statement:

Since the Sukhoi has a decisive BVR radar/weapons range advantage over the heavily loaded and slower F/A-18A ...

Senator FERGUSON—Yes. You said the Sukhoi 'wins every time' and the Air Force say that is an inaccurate statement—and they are doing the tests.

Dr Kopp—Yes. I dispute what the Air Force have said here. I can show you here I have technical literature for the radar on the FA18 that talks about key parameters for the radar tube and the transmitter. Here I have technical literature from the Russian manufacturer of the radar.

Senator FERGUSON—You have the technical literature, but do you have any practical experience with the Air Force? Have you worked with the Air Force? It is all very well to come up with technology; they are actually doing it in practice.

Dr Kopp—The difference is that they have no experience in flying against the Sukhoi. This has been an issue that I have canvassed with Air Force people perhaps over last five years—to get some direct exposure to the Sukhoi. They have no exposure to the Sukhoi. In fact, the first exposure that any Western air force has had in recent times has been the Cope India exercise, which was earlier this year, when the United States sent its latest variant of F15C Eagle aircraft to India and they flew against the Indian Sukhoi. We are still waiting for fully detailed disclosures on what variants of Russian radars they had on those aircraft. But what did occur at

that point in time was that the Sukhois came out more than often best in a contest with an aircraft that is generally acknowledged and widely acknowledged to be much better than our FA18s.

Senator FERGUSON—They are wonderful words—'generally acknowledged' and 'widely acknowledged'—but I think we need to be more specific than that. The difference between what you say and what the Air Force say is that if they are right and you are wrong then you lose nothing but your self-esteem, but if you are right and they are wrong then the taxpayer pays in the long run. That is why they have to get it right, and we have to make sure that they get it right.

Dr Kopp—Indeed.

Senator FERGUSON—What you are asking us to do is accept the things that you say. I notice that in your response in January you talk about findings. I would have said they were opinions not findings, because you are doing the findings yourself—they come from you and Mr Goon. There was a long list of about 18 or 19 findings—I do not have them in front of me—and some other comments. But in fact the Air Force and the department are responsible to the parliament, they are responsible to the government and they are open to questioning all the time and have to come up with answers to us. Are you suggesting that, although we can ask for outside information so that we can make some judgments of our own, we should say, 'We're sorry, Air Force, somebody else says you're wrong, so you must be wrong'? Is that what you are asking us to do?

Mr Goon—Not at all. In fact, all we are asking for are responses to those questions and responses to the points that we have made. What we are endeavouring to do is to encourage public debate.

Senator FERGUSON—But there are responses.

Mr BEVIS—We just got them this morning. It might have been helpful if we had them six months ago.

Mr Goon—With due respect, we are yet to receive responses dating back to contributions made to Defence collaboratively in response to the strategic policy for Defence and industry in 1998. Defence asked industry and academia to come forward with innovative cost-effective solutions for their capability needs. We have yet to receive responses to those submissions that we made, in the same way as we have yet to see any responses to the questions or the findings that we submitted to this committee, as you have. Admittedly I was not privy to the confidential briefing, but sitting here this morning in the public briefing I saw no answers to any of the points that were raised in the forensic analysis that we submitted to your committee back in January.

Senator FERGUSON—But we are not obliged to give you responses to yours.

Mr Goon—I am not saying responses to me; I am just saying responses to the submission that we provided to the committee. Admittedly there was a plethora of information put forward, but in that information and in the words that were spoken I saw no reference to any of the comments, findings or points that we put in our submission.

Mr BEVIS—I actually want to thank you for taking the trouble of making the submission. This is not a Senate estimates hearing where we are involved in seeking information only from the department and the system. This is part of a public inquiry, and it is important for the processes of the parliament that we get, and have available to us, a range of information. By the very nature of the organisation of Defence, it is not often easy to get people with some skill and experience outside of the system to provide that input. I am grateful for it and regret that we do not have the time today to go through it properly.

I want to raise one issue with you that deals with the F111 and the question of its future use. In earlier evidence at a hearing that you commented on we were advised as a committee by the Chief of the Defence Force that, if a whole series of things did not fall into place as anticipated, we would still have options with the F111. I am not sure that that is still the intention of Defence, I must say, having received only a couple of hours ago the written submission which sets out a series of requirements in respect of the F111 retirement. I note, for example , that the acquisition of the JSF or whatever it is that we get—although it seems to be the JSF—is not listed as one of the issues on which the retirement of the F111 is contingent.

Your comment was that, if we are going to have options with the F111, it requires certain preconditions to be put in place and, as I understand it, that includes the planned upgrades as at 2000—that is, the upgrades that were planned to be undertaken in the 2000 white paper. I would be interested in your elaboration of that. Given that government and Air Force are not planning to do that at the moment, what would be required if in a couple of years time there was a decision that we actually wanted to extend the life of the F111 past the 2010 date?

Mr Goon—Let me answer the latter part of your question, and I will hand over to my colleague to talk about the upgrades and the capability. Certainly the first thing would be to stop the sale of the stockholdings of spare parts. The second thing would be to ensure the continuation of the ageing aircraft program and also the support of the major servicing programs, which I understand are, as a result of the decision on 7 November, in the process of being wound back. Admittedly, that is information coming out from the working level at Amberley. It is something I presume you would be able to look into when you visit Amberley.

Because there has been an intention since 7 November to retire the aircraft early, by 2010, a process would be put in train for that to happen. Normally in that situation—certainly in my experience of the Mirage aircraft and other aircraft I have seen in the fleet—the wind-down starts about two years before the planned withdrawal date, including physical wind-down on servicing and physical wind-back on funding and spare parts provisioning. My understanding is that that has actually started on the F111. In fact, it was actually in train before the decision on 7 November. So I would say a review would need to be done on the current planned program for wind back on the servicing maintenance and spare support to ensure that, if we do get to 2010 and there is a need decided by the Air Force to extend it, that can in fact happen.

Mr BEVIS—I have one other question. I should say I do not think any of this is a beauty contest; it is about trying to get some information. It is easy to understand that old aircraft cost more. Old cars cost more and we all have cars, so I understand this. There is fatigue and all the rest of it. That makes sense. But I was interested to read some material—I think it was in one of the ASPI documents—that referred to the increased costs of running new aircraft and gave as an example the C130J, which costs more than the earlier version, and cited the principal cause of

that as being the 130J's greater reliance on technology, software and the like. A new JSF will also have much greater dependence on technology. The presentation we saw certainly gave us that impression. I do not know if there is a general yardstick for this or whether every case is separate and distinct. Is there any reason for us to automatically assume that, because it is a new aircraft, it will be cheaper? The ASPI explanation of the C130J tells me that that is not always the case. Is there some advice you can give about how you balance those things? I know what is still on the drawing boards as a JSF plane, but is there anything around in the industry that might give us some indicators on that?

Dr Kopp—The issue of ageing aircraft was raised by the defence department's witnesses here. They talked a lot about it. It is a complex issue; there is no question about that. One of my engineering colleagues who works in ageing aircraft programs made the observation to me that the instant an aircraft rolls out of the production line it becomes an ageing aircraft. That is a physical inevitability. I think the analogy of looking after your car is not an unreasonable one.

The issue with all aircraft, new and ageing, is really: what kind of management policy do you have in how you operate that aircraft? You could follow a reactive management policy or a pre-emptive management policy. Until recently, for instance, the Air Force with the F111 was really following what we would call a reactive policy. In other words, when a problem crops up they panic, say 'How do we fix it?', fix it and end up spending a lot of money. The introduction of an ageing aircraft program on the F111 changes that. That is because it gives them an opportunity and a mechanism via which they can gather data, look at failure rates and attempt to be pre-emptive.

In other words, rather than have to respond to a surprise, wherever possible you identify what could become a surprise, identify the fact that this is likely to become a problem, do a bit of work ahead and, if necessary, go in and pre-emptively replace those components in the fleet. This has been done for a range of platforms. The Americans are now doing this with the B52 and the B1B. They have made numerous public statements in relation to both aircraft, where they have said, 'We will plan to do a wing rebuild at so many hours on this aircraft. When the aircraft reaches however many hours, we will start pulling the wings off the aircraft and replacing skin panels, sections, stringers or other components.'

A lot of the difficulty that the Air Force got itself into with the F111—and there is a fairly complex and diverse range of reasons why they got into that situation—was the fact that they had pursued a reactive maintenance policy on this aircraft for far too long. There were some efforts made during the 1990s to get ageing aircraft program type activities going. We had one air commodore, who I think is no longer in the Air Force—

Mr Goon—No, he is not.

Dr Kopp—He actually went to the trouble of bringing several sets of younger F111 F-wings over from the United States to be trialled on the F111 aircraft in the event that a surprise arose. This is a fact that I have not seen publicly disclosed by the Air Force. Certainly, the key issue with all of these aircraft is that it really boils down to the maintenance policy and how you think about maintaining these aircraft. The idea of using a reactive policy is fine if you have got aircraft that last 10, 15 or 20 years. That is the way we did business during World War Internet, but during World War II the aircraft's life cycle might have been two years. During the 1950s,

most aircraft had a life cycle of maybe five years, possibly 10 years. The B52 is perhaps unique. That was designed in the early 1950s, and the last models that were built in the early 1960s are now planned to fly until they are 80 or 90 years old. How is that possible? It is possible by following a rigorous maintenance policy that is designed to identify problems before they arise, and deal with them.

What concerns me very much about the evidence that the defence department witnesses presented today is that they are still speaking in terms of surprises. What this suggests to me is that at a fundamental, let us say, engineering strategy level they have not yet been able to adapt to the idea of ageing aircraft programs and the idea of what you would call pre-emptive maintenance policies. There is no question about it that we can operate the F111 for a very long time—and, indeed, as was the comment made by the defence department witnesses: at what cost? The cost issue is really going to be driven by whether you follow a pre-emptive maintenance policy or a reactive maintenance policy.

Mr Goon—If I may interject: in the main, I agree with what Dr Kopp is saying except for one point—and I must, in fact, leap to the defence of my former service. I believe that, particularly in relation to the F111, the RAAF has learnt to adapt from a reactive maintenance policy to an ageing aircraft policy, and the evidence is in the glowing comments made by the Chief of Air Force this morning and also by the data that has been presented. There is no doubt there have been problems with the F111 in the mid to latter part of the nineties. That, in part, has been due to the downsizing and the frenetic activities in Defence associated with that process. But in the mid-nineties, the engineers and the managers who are responsible for the aircraft saw this coming. I used to work on the F111 as a maintenance engineer—I used to work as an airworthiness engineer—and back in those days we were reactive. We spent our time stomping out bushfires. The trouble was our boots were only size 9s, so they were not enough to stomp out the embers; we needed size 14s. We always had the capability to support the aircraft; we never really had the capacity. That capacity was, in fact, being further eroded during the nineties due to outsourcing. However, RAAF, along with its industry partners, quite appropriately set up the Weapon Systems Business Unit up there at Amberley. They do have both the engineering capability and capacity, in conjunction with the RAAF personnel and the DSTO. We are seeing the fruits of those labours—the planning that was put in place in the early nineties.

This is the thing that I am having some difficulty coming to terms with about the decision to retire the aircraft early. The planning has been done and the investment has been made in the sole operator program and in the testing programs, which have, in themselves, borne fruit. Referring to the wing breakage that was mentioned this morning, people say, 'That wasn't expected.' The question has then got to be asked, 'Why were we testing it?' We are talking about a full-scale fatigue test article here. We were testing it to see how far it would go. We were testing to see if there were any problems, and the tests were a success—the plans were a success. The only problem there was that we started the testing late. I can recall that when I was in support command back in the late seventies we wanted to start fatigue testing—back in those days—but, priorities being what they were, money went to other points. However, when we did recognise the need for us to take over the mantle of supporting the aircraft totally as a sole operator, those programs were put in place, and they have been successful. The things that are now happening up at Amberley in relation to the serviceability, supportability, availability and reliability of that aircraft are the result of the good planning by defence personnel—and by DSTO and industry—back in the late nineties.

Getting back to your specific question, Mr Bevis, regarding the costs associated with ageing aircraft, what we are seeing in ageing aircraft programs in the civil sector—and, similarly, when you translate that over into the military sector—is that the costs of supporting the aircraft are actually coming down. It is not as it has been represented this morning, because what we are doing in addressing an ageing aircraft program is drilling into the reliability of the equipment and addressing that from an engineering perspective and a scientific perspective.

Senator FERGUSON—So you disagree with DSTO? You do not support what they say?

Mr Goon—I do not support what was said here today. The reason for that is that I have read the draft DSTO reports. I have read the reports on the structures, and I have spoken to the people involved in the sole operator program. What they say is quite different to what was said here today. Similarly, what I am finding from discussions with colleagues working on the aircraft at Amberley is quite different to what has been said here today. So, yes, I do.

Senator FERGUSON—I cannot find exactly where I read this, so correct me if I am wrong, but I understand that you are of the view that a low-flying F111 fitted with a stand-off weapon would be superior to an FA18 equipped with the same weapon?

Dr Kopp—Yes.

Senator FERGUSON—Why?

Dr Kopp—There are a number of reasons. They have to do with how you penetrate hostile defences and what type of threat you are going up against. They also have to do with the economies of delivering these weapons. If we start with the economy argument, that is a relatively simple one. If you are launching one F111 that is carrying four weapons, you launch from your airfield, take off to a cruise altitude of perhaps 25,000 feet—which an FA18 would do as well—and fly perhaps 800 or 900 nautical miles. You then descend to a very low altitude, approach your launch point and punch off these four missiles, which then fly out to their respective targets and destroy them. If you want to perform the same type of sortie with an FA18, delivering the same number of weapons, you have to launch two F18s, with either two or three external fuel tanks and two missiles each. You then have to launch an aerial refuelling tanker. You then have to fly that package of tanker and F18s together out however many hundred nautical miles. More than likely, the distance will be limited by the extent to which you are prepared to expose that tanker to hostile aircraft. You probably will not want the tanker to get closer than about 250 nautical miles from the target area or area of interest. You then have to have both F18s punch off their respective missiles to hit targets, and the whole package flies home.

Mr BYRNE—From what altitude?

Dr Kopp—With an F18, you could launch it from cruise altitude, but you could also launch it from low altitude. The big difference is that with the F111 you can go down to a very low altitude. You have got a terrain following radar that allows you to set it to 1,000 feet or 800 feet—down to 200 feet. That is very important in terms of penetrating air defences that are ground based—surface-to-air missiles primarily. I might add that statistically surface-to-air

missiles are by far the most lethal threats against any strike aircraft. We have case studies going back to the Vietnam War, and nothing has changed in that respect.

From a simple cost perspective, if you are launching two F18s and a tanker, it will cost you more money in burnt kerosene and in maintenance man hours. It will cost you more money in crew hours, because you have got to carry the costs of the crew of that aerial refuelling tanker. I am very deeply concerned about a lot of the statements Defence have made about costs, because they do not discuss costs in an operational context. What does it cost to put that bomb or that missile onto a particular target? Defence like to break these things down into little pieces and then complain that a part of the puzzle seems to be costing too much, rather than looking at an overall system and saying, 'In order for us to go and get these bombs or missiles onto a target, what is it going to cost us in terms of total expense?'

Senator FERGUSON—You are sending the F111 on its own, aren't you?

Dr Kopp—I will extend on this. I have simply looked at the economics of the bomb delivery itself, making no assumptions about the threat environment that we are looking at.

Senator FERGUSON—Don't you think you should?

Dr Kopp—I will get to that. That is a very good question. When we look at threat environments, there are essentially three categories of threat that we might be looking at in the region. The first category would be a surface-to-air missile defence, and there are a range of ways in which you can defeat a surface-to-air missile defence. A stand-off weapon that has significant range will very often be able to do that. Where the weapon has a shorter range, it may or may not. It is always to your advantage, if you are going against a surface-to-air missile system, to be able to launch your weapons from a lower altitude, for the very simple reason that the earth is curved and the radar cannot see around corners—in other words, you can surprise your opponent. The F18 does not have a terrain following radar, so when you are dealing with that category or class of threat you are limited in terms of how low you can fly the aircraft at high speed, particularly under adverse weather conditions, which the F111s cope with very easily.

In terms of delivering heavy munitions such as smart bombs or guided bombs, there will be some targets that you cannot effectively kill using a stand-off missile, because the weapon is simply not heavy enough and does not have enough punch. To attack it with an F111, you would come in at 200 feet and toss the weapon. Weapons that are now in development and will be deployed in the time lines of interest will include glide bombs such as the JDAM ER and the small diameter bomb. If you toss a weapon like that from low altitude you will get 10—perhaps 20—miles of stand-off range, so you sneak in under the radar.

Senator FERGUSON—What speed would you be dropping that bomb off at?

Dr Kopp—A typical release speed for an aircraft like an F111—at least according to the figures I am familiar with—would be perhaps 550 knots. You would be doing so from a very low altitude. That is compared with a cruise speed for the F111 that would be somewhere between 430 and perhaps 450 knots.

Senator FERGUSON—What is the tactical advantage of such a small speed difference. What is the advantage of being able to deliver it at 550 instead of 450 knots?

Dr Kopp—What you are aiming to do there is to minimise the amount of time that you are exposing the aircraft to threat. For instance, an F18 that is attempting to penetrate at low level, to get in below a radar guided air defence, is not only slower than an F111 at a low altitude like that, but is also, when you are trying to sustain a very high speed with a fairly large weapon load, limited by what we call dynamic air pressure. I cannot give you an exact figure for an F18 flown in that regime, because nobody really does it very much.

Senator FERGUSON—But there is little or no tactical advantage because of speed in that differential, is there?

Dr Kopp—I would disagree with that. I think there is a tactical advantage in speed. A combination of speed and very low altitude minimises your exposure time. If you are exposed to enemy defences for a minute, as compared to being exposed to enemy defences for 80 seconds, that gives you an additional 20 seconds for a hostile missile to complete an engagement against you.

Senator FERGUSON—What about stand-off attacks? There is little or no advantage in stand-off attacks, is there?

Dr Kopp—In a stand-off attack it really depends on what kind of long-range radar capability the opponent has. You could just as well launch from an F111 at a medium altitude, if you had a stand-off weapon like a cruise missile. Under those circumstances you would be most concerned about a fighter threat. The advantage the F111 has over the FA18 is that you can carry, for a significantly greater distance, in a cruise configuration, basically twice as many weapons, without the support of aerial refuelling. This means that the F111 allows you to get the weapons from A to B—and to the point where you can release them—at a lower cost.

Senator FERGUSON—If it is on its own.

Mr BYRNE—What is the rate of fuel burn in an F111 when it starts getting to attack, compared to that of an FA18? I think an FA18 carries about three times as much fuel as an F111. When it starts coming to attack speed, what is an F111's rate of fuel burn compared to an FA18?

Dr Kopp—What altitude are you interested in, in the first place?

Mr BYRNE—It is a general question. It is not meant to be a trick question.

Dr Kopp—Fuel burn for most of these fighters when they are in cruise configuration varies—this is at a cruise altitude of perhaps 25,000 feet. Figures will vary and it will depend largely on the drag of the munitions that you are carrying. The figures that I have seen for an F111 have been typically between 6,500, possibly a bit more for a draggier munition. The figures that I have seen for an F18 have ranged between 5,500 pounds per hour for an aircraft that is lightly loaded with air-to-air weapons and as high as 8,500 pounds per hour for an aircraft that is heavily loaded with draggy air-to-ground weapons. So I do not think there is a very simple answer to that question.

Mr BYRNE—Perhaps I can preface that question. I have read in a document that was provided by the Air Force that as an F111 accelerates to attack speed the rate of fuel burn is substantially increased compared to an FA18, so it is using much more fuel as it comes in to attack. I stand to be corrected by Air Force on that.

Dr Kopp—I am a little perplexed by what the Air Force have observed in this document, insofar as they seem to be suggesting that you would fly the F111 at low altitude for the whole duration of this sortie. In practice, if you have a stand-off weapon that gives you 200 nautical miles of range or more, or even 100 nautical miles of range—and the weapons that are being looked at at this point in time under the follow-on stand-off weapon program are weapons in this class—in a great many circumstances this permits you to fly both aircraft in at your optimal cruise altitude of 25,000 to 35,000 feet, at an optimal fuel burn. One has to distinguish between an aircraft's ability to efficiently carry a load of weapons across a given distance and its performance once you are getting very close to the target—once you are within, perhaps, the last 50 miles of the target. Once you are within the last 50 miles of the target, you have to be moving faster and you have to accommodate what the hostile defences are. It also is a function of what weapons you are using.

Stand-off weapons always give you an advantage in this respect, but there is a price to pay. For instance, a laser guided bomb or a GPS guided satellite aided bomb of the variety that you can drop from a distance of three to five miles away or toss from low altitude to that distance would perhaps cost you $US10,000 or $US20,000. The most expensive ones in that category might be $US50,000 or $US60,000. You have to compare this against the cost of one of these stand-off weapons. Stand-off weapons and cruise missiles today typically vary in cost between about $US400,000 per round and as much as $1 million or more for some of the larger cruise missiles. It is very easy to say, 'Yes, we will use these stand-off weapons and we can resolve any survivability issues that the F18 has'—or, indeed, the F111 has—'in terms of surface-to-air missile defences.' The issue here is: can we afford to keep raw stocks that allow us to sustain operations for what might be two weeks of high-intensity combat? The answer is no.

Mr BYRNE—I think, though, that the Air Force would raise the point that the F111 would go lower for far longer at an attack speed. So, going back to the discussion about fuel, they would be using commensurately more fuel to get to the target.

Dr Kopp—I do not accept the proposition. I think the argument that the Air Force have put forward in this document is in fact misleading because it implies that the F111 would cover the whole duration of that sortie at that particular fuel burn.

Senator SANDY MACDONALD—Dr Kopp, given the capability of the Su-27 and the Su-30 with their look-down, shoot-down capability, what sort of survivability would the F111 have? I do not know, but I would say that the models of survivability would be such that very few F111s would survive without air fighter support. I would like your view on that.

Dr Kopp—First I think we have to quantify the conditions under which you are encountering a Sukhoi. Is that Sukhoi being launched off the ground as a ground launched interceptor when you are coming in with your F111 or is that Sukhoi waiting for you, orbiting at 30,000 feet to try to catch you? The second question we have to ask is: what weapon are you going to be shooting?

I have never been an advocate of flying F111s necessarily without escorts. I have rather taken the view that—

Senator SANDY MACDONALD—Until very recent times that would have been the only possibility, because without air-to-air refuelling there would frequently have been no air fighter support.

Dr Kopp—The United States today, and in fact for perhaps the last 15 years, always fly escorts for virtually all conventional bombers. The only issue is how many escorts you have to put up. Do you have to put up a very large number of escorts—do you have to fly close escort—or do you put up a very modest number of escorts? I have major issues with the claim that the FA18, for instance, can self-escort. I believe that that is only true when you are flying the FA18 against a patently inferior aircraft. I also dispute what the Department of Defence have been saying about the survivability of the FA18 head-to-head against the Sukhoi, especially if it is supported by an AWACS. I bring to the committee's attention the fact that the Russians are selling on their Sukhois today intraflight fighter data links of the variety that you saw presented earlier today as being a special or somehow unique feature of the JSF. It is not a unique feature.

Senator SANDY MACDONALD—I think that, if you are making the point that the Sukhoi is so superior that it overpowers the FA18, there is absolutely no survivability possible for an F111 unescorted.

Dr Kopp—I would take the view that, if you are going to fly unescorted an F111 or any other aircraft that does not have a significant performance advantage against a Sukhoi and you put it in close proximity to the Sukhoi, the prospects are very good that you will get killed.

Senator SANDY MACDONALD—That is the point I am making.

Dr Kopp—Yes. The issue here is really that, if you are going to be delivering bombs onto a target—whether you are going to be delivering them via FA18 or via F111—you will in the end have to apportion some number of your fighters to protect your tankers, to protect your AWACS and basically to sweep the area clear of any fighter aircraft that might be interfering with your bomb-carrying aircraft.

The self-escort model, for instance, has been used quite extensively. They started using it during World War II, and what would happen very frequently is that a fighter and self-escort regime, when confronted with a hostile fighter, would have to jettison its bombs. Why? Because it would lose all of its performance. So you are presented with a situation where a fighter, in order to engage in air-to-air combat to defend itself, in effect will lose its capacity to perform its bombing mission. This is what we in the trade call a 'mission kill'. The Vietnamese used to do this deliberately by bouncing American F105 fighters, which were frequently flown without escorts or with a modest amount of escort, simply to force them to drop their bombs or weapons before they could get to the target so that they could evade.

Senator SANDY MACDONALD—I am no expert on these things, but from what I have read about the deployment of the Hornet in Iraq they did have multi-role missions and they did it very effectively.

Dr Kopp—That might well be true, but you had no air threat of any substance. The Iraqi air force basically did not contest. Under circumstances where you are flying against a nonexistent opponent—in fact, the very few aircraft that the Iraqis had were not particularly effective types of aircraft. The most serviceable aircraft that they would have had would probably have been the MiG21, and a very small number of them. That is an aircraft that the Hornet was designed to outclass from the outset. So it is all very well for the Air Force to say, 'We've done very well in flying multi-role missions in Iraq,' but you have had all of these, let us say, very bored American F15 pilots orbiting around, waiting for any MiG to be seen to kill it. So I do not believe that there is any particular substance to that argument, Senator.

ACTING CHAIR—From my own perspective, I am very concerned about this issue of a gap—that is, a decision is made for the Joint Strike Fighter but it is not delivered and we might have some gap. In extending the life of the F111 you have already suggested that we should review the sale of spares. I think your second suggestion was to ensure that the ageing program continue. Is that correct?

Dr Kopp—That is correct.

ACTING CHAIR—Are there any other views that you wish to put to the committee about ensuring that the F111 remains an option at that time, should there be a gap?

Mr Goon—It comes down to the comparison of the gap: the basis of the gap and whether you are comparing apples with oranges. Certainly we would recommend the continuation of the upgrade programs as planned post the white paper, which would ensure that the F111 will remain strategically competitive and capable if the RAAF does decide to do that or there is a requirement to extend it beyond the planned withdrawal date. Again, looking at the capability gap, the analysis that we did was basically to compare apples with apples. We compared the same weapons systems capabilities on the F111 with those that will be carried on the FA18. In terms of the ongoing maintenance and ongoing support of the aircraft, we would recommend the continuation of the update programs that were planned post the white paper. Dr Kopp will now talk in more detail about the capability gap issue.

Dr Kopp—In looking at the capability gap it is a question of how you define the capability. I have made available to the committee some slides and I would direct you in particular to the slides on pages 2 and 3, where I have used the measure of throw weight. That is a conventional and well-accepted measure that has been used for decades. The reason we in the analytical community like to use throw weight as a measure is that it is a measure that encapsulates the distance over which the aircraft can carry the weapons, the number or the size of the weapons and the number of aircraft. That is one measure you can use for strike capability.

Another measure you could use is firepower, which is simply counting the total number of weapons that you can lift with a fleet of aircraft. You would use this to make comparisons between two respective opponents in a particular contest. What we have done both for the number of available aircraft and for total fleet numbers is to look at the parameters of throw weight and firepower and totalled up what type of strike capability would be available across the whole RAAF fleet were it committed to strike operations. That is what you see in the first column on the left-hand side of the slide.

That is a capability that was essentially planned for after the white paper. I am making some very basic assumptions here about the weapons being used—that we are using 2000 pounds weapons. That is a safe assumption under these circumstances because it covers both stand-off weapons, such as the follow-on stand-off weapon, and satellite-guided and laser-guided bombs.

What has raised much concern with us is that, when you remove the F111 from the force structure, even with the availability of tanking, the total number of weapons that you can deliver across the whole RAAF fleet to a given distance with the total number of aircraft is significantly reduced. This is simply mathematically unavoidable. I am particularly concerned, for instance, about the plot that Defence presented today—I think it has been widely described as the 'blood chart'—because it is not comparing what it is that we would have had were we to have followed the original plan for retaining the F111 and performing all these upgrades as compared—

Senator FERGUSON—Did you say 'the plot'?

Dr Kopp—I think it was described as the 'blood chart' in the press, because it was presented in red.

Senator FERGUSON—I do not mean about what the press said; I only know what was said here this morning.

Dr Kopp—That is this particular chart. Defence in this particular chart have not looked at the total strike capability across the whole of the RAAF fleet; they have only segmented out the strike capability to a distance of 1,000 nautical miles. They are also comparing that to current capability, which does not really include the impact of aerial refuelling. The end result is that, if you look at the strike capability that is depicted in this chart between 2004 and 2007 and the strike capability between 2011 and 2014, there is not a very large difference in the height of the blue curve of the chart. This is for a very good reason. Even making a large number of very optimistic assumptions, the strike capability that they will have downstream during that period is not really going to be significantly different from what they can derive from the available number of aircraft in recent years and with no aerial refuelling support.

What concerns me with this whole chart—and the whole approach that Defence have taken to modelling this thing—is that rather than looking at what it is that we would have had were we to have followed the plans in the Defence white paper, they have gone out and looked at what we have now, which does not really reflect what was planned to be done under the white paper, and compared that with what it is that they believe they will end up with once they equip Hornets for strike. If I had access to more detailed information about the assumptions that they have made in here I would be able to drill into this a lot deeper and establish the accuracy of that curve between 2011 and 2012.

ACTING CHAIR—Thank you for your presence here today. Irrespective of how the subcommittee concludes the matters raised in your submission and evidence today, they have been provoking and have made us want to explore the issues. I want to place on the record my thanks to you for that. You will be sent a copy of the transcript of evidence. Senator Ferguson has requested that we allow five minutes for Air Vice Marshal Clarke to speak.

[11.50 a.m.]

CLARKE, Air Vice Marshal Kerry Francis, Head of Capability Systems, Royal Australian Air Force

Air Vice Marshal Clarke—In closing, I want to say that the F111 has been a great aircraft and has made a very positive contribution to our nation's defence. Age is catching up with it and we have had significant aircraft failures in recent years. We can keep it, but at what cost? We believe, and government has accepted, that it is better to choose our moment to retire the capability rather than have it removed from us catastrophically.

The JSF, if chosen, will be the most flexible, affordable combat capability we can have in air defence and ground support and in maritime attack as well. The transition to the JSF will be carefully managed. For example, our decision to retire the F111 is contingent on a number of conditions such as the AEW&C being successfully introduced, our new air-to-air refuellers being introduced and a range of Hornet upgrades, specifically on ESWP and data links, being successfully completed. We intend to have advanced bombing capability for the FA18 and we intend that the integration of the stand-off weapon onto the FA18 and P3 also be completed before the decision to withdraw the F111 is confirmed. When those conditions have been met we can allow the F111—or 'the pig', as it is more colloquially known—to retire gracefully at the end of the decade.

We take our responsibility to defend the nation very seriously. We also take careful responsibility for the lives of our aircrew. The conditional decision to retire the F111 at the end of the decade is prudent on both national security grounds and managing the risk to our aircrew in peace and in conflict. It will give us another step into the future networked Air Force. It is a considered, prudent and warranted decision. Thank you very much.

Resolved (on motion by **Senator Ferguson**):

That this subcommittee authorises publication, including publication on the parliamentary database, of the proof transcript of the evidence given before it at public hearing this day.

Subcommittee adjourned at 11.53 a.m.