

THE PATIENCE OF SOLOMON

JSF facing last hurdles before Cabinet confirms first tranche order of 72 aircraft

Far from advancing clarity in the Australian Government's position in relation to confirming an order for Lockheed Martin's Joint Strike Fighter (JSF), the 2009 Defence White Paper merely confirmed a well known fact – that the F/A-18A/B 'Hornet' fleet would be replaced by a first tranche JSF order of "not fewer than 72 aircraft" to form up the three operational squadrons first envisaged in the 2004 Defence Capability Plan, by way of phases 2A/2B of project Air 6000.

■ Canberra Bureau Report

The 2009 Defence White Paper took a moderate step forward in defining Australia's future combat air power, by stating the Government had decided it will acquire "around 100 F-35 Joint Strike Fighters, along with supporting systems and weapons," as replacements for the current mid-1970s vintage F/A-18A/B 'Hornet' fleet.

According to DWP'09, the first stage (Phase 2A/B) of project Air 6000 will acquire three operational squadrons, comprising "not fewer than 72 aircraft." A decision on the acquisition of the remaining aircraft (phase 2C) will be advanced in conjunction with a decision on withdrawal of the F/A-18F 'Super Hornet' fleet, and will thus be timed to "ensure that no gap in Australia's overall air combat capability occurs."

The 2009/10 budget indicates phases 2A and 2B of project Air 6000 are scheduled to receive 'second pass' consideration over the coming financial year – most probably between June and August – with a formal order expected in August. Should this end up being the case, the RAAF would take delivery of its first F-35s in the US in 2014, and after the achievement of international flight clearances, would see an initial JSF squadron becoming operational in Australia in 2015.

Satisfaction of the above schedule depends on the JSF becoming available in the United States, with a 20 May report from the US Government Accountability Office (GAO) taking a

predictable line in warning of immaturity in the test & evaluation stage, and suggesting that delays in aircraft development – yet to be publicly declared – may end up meaning that Australia would get its new combat fighter aircraft substantially later than currently scheduled.

According to the GAO, the JSF program is now entering its most challenging phase, with Lockheed Martin at a crossroads – working hard to deliver the remaining test assets, significantly stepping up flight testing, beginning the verification of mission system capabilities, maturing manufacturing processes, and quickly ramping up production of operational aircraft.

US Secretary of Defense, Robert Gates, on 6 April advised media he would be proposing to President Obama that JSF purchases be increased – from the 14 aircraft approved in FY2009, to 30 in FY 2010 – with corresponding funding increases from US\$6.8b to \$11.2b. The change implies the administration would buy 513 F-35s over its five-year defense plan, and ultimately 2,443 for the USAF, USMC and US Navy.

The new plan (upon cancellation of the F-22 'Raptor' program) proposes to significantly increase annual JSF procure-

ment rates, ordering 28 more aircraft sooner than the number reported to Congress in April 2008. It will also further require increased annual procurement funding over the next six years (FY2010 through 2015), however, the GAO says officials "have not assessed its net effect on total program costs through completion of JSF acquisition."

Significantly for the RAAF, the GAO projects total development costs to increase between US\$2.4b and \$7.4b, and the schedule for completing system development to be extended from one to three years. Such assessments were made in late-2008 by the JSF Program Office, and by a joint team of Office of the Secretary of Defense (OSD), Air Force, and Navy officials.

Overruns on both the aircraft and engine contracts, delays in manufacturing test aircraft, and the need for a longer, more robust flight test program were identified by the GAO as primary cost drivers.

The new defense budget just submitted requests \$3.6b for fiscal year 2010 Joint Strike Fighter development costs – about \$200m more than the program office estimated for 2010 – but about \$700m less than the joint team's estimate.

The request did not include funding for the alternate GE/Rolls-Royce F136 engine program directed by the Congress – which nevertheless has a strong record of funding retention, albeit often at the expense of the mainstream fighter program itself.

The GAO's report observes that the production of JSF de-

velopment test aircraft is taking "more time, money and effort than planned." Officials alternatively believe that they can work through these problems and deliver the nine remaining test aircraft (four have so far been delivered) by early-2010. By that time, says a concerned GAO, the US Department of Defense may have already ordered as many as 58 production aircraft, "when only 9% of the flight test program will have been completed."

The GAO similarly projects that when the Department of Defense has procured 273 aircraft, only 88% of development flight-testing will have been completed. Manufacturing inefficiencies and parts shortages are said to be continuing to delay completion and delivery of development test aircraft needed for flight-testing.

Further, Lockheed Martin is said to have "not yet demonstrated mature manufacturing processes, or an ability to produce aircraft consistently at currently planned annual rates." Hence, the GAO believes the US Department's plan to accelerate procurement in the near term "adds considerable risk and will be difficult to achieve." Performance data for two major cost areas – wing assembly and mate and delivery – are said to indicate even more substantial cost growth.

The JSF Program Office developed a new test plan in the spring of 2008, and this is said to have extended the development period by one year, better aligned test resources and availability dates, and lessened the overlap between development and operational testing. While improved, the GAO says the new plan "still leaves insufficient room for error discovery, rework, and recovery from down time should test assets become grounded or unavailable."



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With 22.9 million lines of software code (7.5 million lines are on the aircraft itself, while the remainder are associated with logistics, training and other supporting systems), three aircraft variants, and multi-mission development, the GAO says the JSF program has “a high chance of encountering many unforeseen problems during flight-testing.” Only about 2% of JSF development flight-testing is said to have been completed by November 2008.

Hence, the expected ramp up in flight-testing is set to occur in FY2010 through 2012 – leaving very little room for rectifications if the RAAF is indeed to take acceptance in the US of its first aircraft in 2014.

The GAO goes on to state that only 17% of test points are to be verified through flight-testing, with the rest of the aircraft’s capabilities to be verified through laboratories, the Cooperative Avionics Test Bed (CATBird) platform, and subject-matter analysis. According to the GAO, the ability of the JSF program’s simulation labs to substitute for flight-testing “has not yet been demonstrated.”

The latest report states that given many problems in past pro-

grams were not discovered until flight-testing, the JSF program “is likely to experience considerable cost growth as it steps up its flight testing and makes the necessary technical and design corrections.”

Still, while the program has been able to complete key ground tests and demonstrate basic aircraft flying capabilities, the GAO says it “continues to experience flight-testing delays.” In 2009 and early fiscal year 2010 the program plans to begin flight testing six development test aircraft, including the first two aircraft dedicated to mission system testing. A fully integrated, mission-capable aircraft is thus not expected to enter flight testing until 2012.

The GAO had earlier (12 March) released its fifth (and last under a FY2005 authorisation) report looking into the JSF program. Aptly entitled – ‘Accelerating Procurement before Completing Development Increases the Government’s Financial Risk’ – the report consolidated the GAO’s regular theme of recommending that President Obama should not seek to move the program into full-rate production until the more substantive physical

components of the aircraft’s flight test program were completed.

The GAO said it remained concerned at the large component of simulation-based testing underpinning major revised program advancement decisions, and noted that “only 17% is to be verified through (physical) flight testing.”

In a small concession to the contribution of modern technology to aircraft development, the GAO conceded that “while the labs appear more prolific, integrated, and capable than those used in legacy programs, the ability to substitute for flight testing has not yet been demonstrated. Significant overlap of development, test, and production schedules results in the Department of Defense making substantial investments before flight testing proves that the JSF will perform as expected.”

To enhance congressional oversight and increase the likelihood of more successful program outcomes, the GAO recommended that the Under Secretary of Defense for Acquisition, Technology & Logistics move to generate a new report on the JSF’s contracting strategy for presentation

to Congressional defence committees by 1 October 2009.

It also sought clarification on the remaining program risks; the strategy for managing and mitigating such risks; and plans for transitioning to fixed-price contracts for production, including time frames and relevant governing criteria.

The GAO report raised further concern that the Department of Defense was to procure hundreds of aircraft on cost-reimbursement contracts, thus “magnifying the financial risk to the US Government. Ongoing manufacturing inefficiencies and parts problems have significantly delayed the delivery of test assets. The prime contractor has extended manufacturing schedules three times, and delivered two (of 13) test aircraft ... officials expect to deliver all test aircraft by 2010 (when) the Department of Defense plans to have purchased 62 operation aircraft, and will be ramping up procurement.”

Visiting Australia 1 April, Lockheed Martin’s Chairman and CEO, Bob Stevens referred to an anticipated firming up of JSF orders following an early-May partner CEOs meeting, which would review (and canvass target platform acquisition costs) in regard to the concept of a JSF ‘consortium buy’, and the offering of a fixed price moving forward in return for firm commitments from program partners to purchase defined quantities of aircraft.

Lockheed Martin reported 3 April its receipt of a US\$265m contract to start work on 28 additional Joint Strike Fighters (JSF), comprising Lot 4 of the program’s low-rate initial production (LRIP) phase.

The subject contract is designated to apply to long-lead materials for 12 USAF conventional take-off and landing (CTOL) aircraft, 14 US Marine Corps short take-off and landing (STOVL) variants, one US Navy (F-35C) carrier variant, and one CTOL variant for the Netherlands. Three more US Navy F-35Cs are said to have also been approved as part of the buy, with one additional aircraft pending.



LOCKHEED MARTIN PHOTO

SIMULATION VERSUS REALITY: Lockheed Martin is claiming historically significant advances in the utilisation of simulation, and the testing of sensors and systems on surrogate aircraft such as the Cooperative Avionics Test Bed (CATBird), as working to rapidly retire risk in regard to systems integration and validation on the Joint Strike Fighter. The US Government Accountability Office (GAO), however, prefers validation boxes to be ticked only after physical tests have been undertaken, and has thus recommended to the new Obama Administration that the shift to full rate fighter production be deferred until the bulk of the physical testing program is retired.

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