DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE COMMITTEE ON ARMED SERVICES

SUBCOMMITTEE ON AIRLAND FORCES

UNITED STATES SENATE

SUBJECT: Air Force Tactical Aviation Modernization Program

STATEMENT OF: DR. LAWRENCE DELANEY
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MARCH 22, 2000

Mr. Chairman and members of the Committee, thank you for this opportunity to appear before you to discuss the Air Force's tactical aviation modernization program. To maintain its viability, our Air Force needs to be modernized as technology and the threat evolves. The Air Force's current time-phased modernization effort is rooted in the Air Force's core competencies and is an affordable balance between readiness and modernization of the aerospace force. Within our modernization efforts, the tactical aviation modernization program is based upon a high-low mix of the F-22 and Joint Strike Fighter (JSF) aircraft to provide the most combat capable, efficient, and lethal air forces possible with the resources allocated. In this mix, the F-22 provides the high capability force to attack enemy aircraft and highly defended, high value targets, while the lower cost JSF, purchased in large numbers, provides the bulk of the attack force.

CURRENT FORCE MODERNIZATION

F-15/F-16 HIGH/LOW MIX

Today we use the F-15C and the F-16 to provide a synergistic high-low capability mix ensuring air superiority and satisfying the other competencies provided by our TACAIR force structure. This high-low mix has allowed us to maintain the air dominance required to protect our troops and enable our Precision Engagement strike forces freedom to attack.

F-15

The F-15C/D will remain the Air Force's lead air superiority fighter until the F-22 is operational. It is being upgraded to add increased reliability and enhanced capabilities. These upgrades include the APG-63(V)1 radar providing greatly improved reliability; the APG-63(V)2 Advanced Electronically Scanned Array (AESA) radar providing improved performance; the Joint Helmet Mounted Cueing System (JHMCS) and AIM-9X missile providing a first shot/first kill capability in the within visual-range arena; enhanced combat identification for beyond visual range identification of airborne targets. Forty-eight F-15C/Ds deployed in support of Operation Allied Force and shot down four MiGs.

F-16

One hundred F-16 Block 40/50 aircraft participated in Operation Allied Force and delivered over 4,000 bombs on target. The principal lessons learned were the need for Night Vision Goggle (NVG)-compatible aircraft lighting, improved precision targeting pod capability, and an air-to-air interrogator. Kosovo also reconfirmed the need for the present major modernization programs for the Block 40 and 50 aircraft covered under the Common Configuration Implementation Program (CCIP). CCIP includes a new aircraft computer, color displays, JHMCS, AIM-9X, Link-16, and NVG-compatible aircraft lighting. The new aircraft computer increases capacity and

throughput and solves diminishing manufacturing source problems while enabling the use of future weapons systems. Color displays will present aircraft and combat information to the pilot more effectively for easier interpretation as compared to the present monochrome displays. The JHMCS provides the off-boresight missile targeting capability to employ the AIM-9X, the future high off-boresight air-to-air missile. Link-16 will provide the pilot improved combat situational awareness and NVG-compatible aircraft lighting will provide a permanent modification to the aircraft to allow the unencumbered use of NVGs. Additionally, the Block 50s will receive an air-to-air interrogator capability and the ability to carry both a targeting pod and the HARM targeting system pod to better conduct the suppression and destruction of enemy air defense (SEAD/DEAD) missions. One of the major modification programs for the F-16 Block 25-32 aircraft, principally flown by Air National Guard (ANG) and Reserve, is known as Combat Upgrade Plan Integration Details (CUPID). CUPID consists of four separate upgrade programs: Global Positioning System integration, countermeasure systems mechanization, Situation Awareness Data Link (SADL), and NVG-compatible aircraft lighting. Global Positioning System integration will provide for accurate navigation and the ability to later integrate smart INS-GPS munitions such as JDAM, JSOW, and JASSM. The improved Counter-Measure System mechanization will enhance the self-protection capability. SADL will provide the pilot improved combat situational awareness. NVG-compatible aircraft lighting will enhance the aircraft's night combat role.

We are also continuing to purchase targeting pods for our Block 25-32 aircraft to increase our day/night precision weapons capabilities with laser guided munitions on these aircraft. This will be important as we rely on our total force to fill EAF responsibilities worldwide.

FUTURE MODERNIZATION

F-22/JSF HIGH/LOW MIX

The Air Force's highest long-term priority is our time-phased modernization plan for replacing the current fighter fleet. Our plan has been carefully tailored to ensure the Air Force can affordably recapitalize the fighter force, and maintain the high/low mix to effectively provide the air dominance required to protect our troops and enabling our Precision Engagement strike forces. The F-22 and JSF high/low force mix optimally balances affordability, force structure, and capabilities. This high/low mix is the most cost-effective fiscal and operational solution to Air Force fighter modernization. Our comprehensive force modernization strategy requires keeping F-22 on its current schedule to ensure JSF can affordably replace the F-16 and A-10 prior to the end of their service life.

The F-22 and JSF aircraft designs build on common enabling technologies— stealth, precision, fused information, and supportability. The balance of these technical attributes is driven by their mission and affordability. The time-phased modernization plan allows JSF to leverage F-22 investments and lessons learned to increase capability while minimizing cost.

The F-22 is the high end of the mix—focused on dominant capability to ensure control of the skies—the Joint Force Commander's essential first step. By taking advantage of supercruise, integrated avionics, stealth, and maneuverability, the F-22 will be able to roam the entire battlespace.

The JSF is the low-end of the mix—a balance of affordability and capability allows procurement of greater numbers to perform a variety of missions and sustain the tempo required to support both peacetime and wartime demands while simultaneously decreasing life-cycle costs.

The JSF is designed as a stealthy multi-role fighter, with superior air-to-ground precision engagement capabilities and relatively low cost.

F-22 Program

I am pleased to provide an update on the progress of the F-22 Air Dominance Fighter program. This update will include: a requirements overview, changes in acquisition strategy since the Air Force's testimony last year, flight and ground test accomplishments, improvements in air vehicle manufacturing, integrated avionics development, the impacts of the Department of Defense Appropriation Act for Fiscal Year 2000, progress in development and production cost control. We will also highlight program successes throughout 1999 and our current focus to meet the challenges ahead.

The F-22 Raptor is the replacement for the F-15. The F-22 will dominate the vertical battlespace of the 21st Century with its revolutionary combination of stealth, supercruise, maneuverability, and integrated avionics. The F-22, armed with the AIM-9X infrared short range air-to-air missile, an improved AIM-120 AMRAAM missile, and the Joint Direct Attack Munition will be able to destroy threats to our forces in the air and on the ground when it enters service in December 2005.

The revolutionary F-22 is optimized for the air-to-air environment, providing air dominance across the future battlespace using a combination of stealth, supercruise, agility, and integrated avionics. This deadly combination allows the F-22 to penetrate and suppress the most lethal ground-based and airborne systems of the next century. The F-22 will roam the battlespace, enabling all other air platforms and theater forces to operate unhampered from enemy air attacks. The F-22 will provide the air dominance required to enable the JSF to perform its mission against current and impending threats with greater effectiveness. The F-22 and JSF are intended to be

complementary, not interchangeable. Domination of the air ensures the complementary JSF and other strike assets are able to perform their missions with increased effectiveness while remaining affordable, supporting Joint Vision 2010's concepts of Dominant Maneuver, Precision Engagement and Full Dimensional Protection.

The Fiscal Year 2000 Appropriations Act directed a delay to the LRIP decision while allowing the procurement of additional test aircraft for Follow-on Operational Test and Evaluation. This action preserves the overall development and production schedules while retaining the program's affordability within the cost caps. In the next year, the F-22 team will clearly prove the technical performance of the F-22 weapon system through demonstration of critical test milestones and marked progress in meeting program affordability goals.

Underpinning F-22 development is the thesis that testing verifies results of previous modeling and simulation, thereby confirming system design and performance. This verification involves both flight and ground test activity. With more than ten percent of the flight-testing complete, the F-22 continues to meet or exceed all performance expectations. In 1999, the aircraft achieved the following firsts:

- Sustained flight above 50,000 feet
- Weapons bay open testing for both main and side weapons bays
- Supercruise (Mach 1.5+)
- Angle of attack greater than 60 degrees with engine thrust vectoring

To verify the attainment of all program objectives, aircraft ground testing is as important as flight test. This includes dedicated logistics test and evaluation, aircraft modifications, and ground tests needed to continue to expand the flight envelope. Progress in completing the logistics test points has been outstanding. In 1999, this included the first block of low observable

maintenance that demonstrated the ability of the Air Force to organically maintain the F-22. By the end of 1999, nearly one-third of the logistics test points will have been completed, providing confidence in the ability to complete all logistics tests well in advance of the first operational aircraft delivery.

In addition to aircraft ground testing, engine and aircraft subcomponent testing is also used to verify performance and durability. The amount of subcomponent testing and modeling completed easily makes the F-22 the most tested system ever developed by the Air Force (Figure 1).

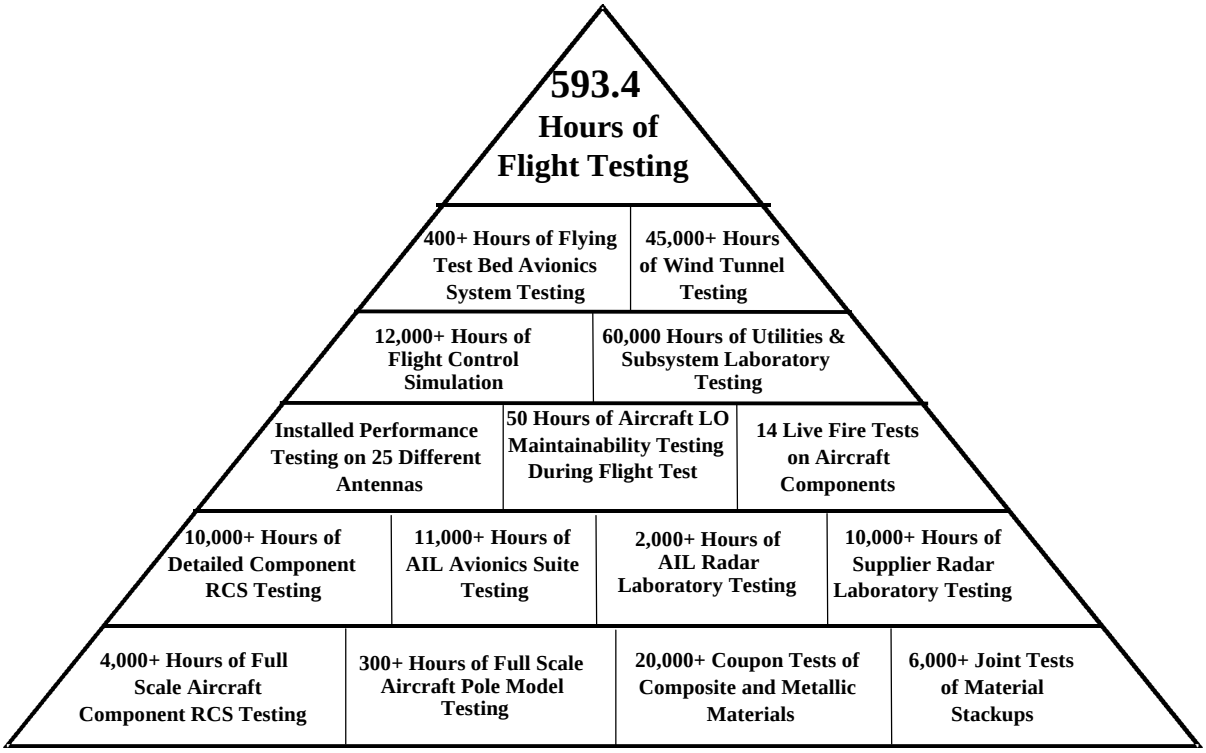


Figure 1. F-22 Testing to Date

Highlights from 1999 include demonstrating engine maturity to enable certification for engine full flight release—clearing the engine for the full aircraft flight envelope. Another highlight was the verification of the aircraft's low observable signature on a full-size aircraft

model. These tests were conducted using actual flight qualified hardware on the F-22 pole model. Finally, a full-size F-22 static test article was tested to 100 percent of predicted flight loads in a test rig at the Lockheed Martin Georgia facility.

In summary, F-22 continues to execute a remarkably successful test program. And, we have an even more exciting program ahead next year. Four additional test aircraft will join the Edwards test force, including the first block 2 aircraft (4003) and the first avionics test aircraft (4004). By the end of 2000, the F-22 test team will have demonstrated additional capabilities to include: Initiation of radar cross-section flight testing, high angle-of-attack testing with weapons bay doors open, and initial separation tests with AIM-9 and AIM-120 missiles.

Our number one manufacturing improvement area this past year is the wing. Difficulties with the manufacture of a key casting in the wings resulted in late deliveries of wings to final assembly. This in turn impacted the delivery schedules of EMD aircraft through aircraft number seven. Currently, the wing recovery program is a remarkable success story: a second source for castings has been qualified, machining process problems have been corrected, and wing deliveries have been on time to the recovery schedule which supports overall EMD test objectives. The recovery schedule for wing deliveries will result in an aircraft production rate of four aircraft in 2000, a rate that will not be seen again until production ramps up in 2002. An F-22 Airframe Schedule Integration Team (ASIT) created in March 1999 continues to review and assess the executability of aircraft delivery schedules to support the EMD program. Delivery of critical path assemblies (forward, mid, & aft fuselages and wings) to ASIT planning has been exceptional through February 2000.

A second aircraft production issue was the potential for the aft fuselage forward boom to buckle, which surfaced as an issue during the structural strength analysis. Analysis of the problem

determined the fix for the EMD aircraft could be incorporated on the production line with only a 2-week impact to EMD delivery schedules. A Boeing Seattle team was sent to the Lockheed Martin production line in Georgia to perform the repair. The team completed their work ahead of schedule and the affected aircraft have been cleared for the full flight envelope. For the aircraft not in the production line, starting with the first PRTV Lot, a manufacturing change to the affected panels eliminates the buckling strength concern.

A third challenge has been the recent problem with the aircraft flaperon, the inboard movable trailing edge of the wing, during static ground test. A rib within the flaperon delaminated while exceeding its load capability. The rib delamination was not catastrophic but resulted in a weakening of the structure. The F-22 team has developed a solution and is replacing the original composite rib with a titanium one. Flaperons from Aircraft 4001 and 4002 have been shipped back to Lockheed Marietta for repair, and both aircraft are undergoing dedicated logistics testing while repairs are accomplished. Repairs are projected to be complete by the end of March, at which time flight testing will resume. Flaperons for Aircraft 4003 will be sent back to Lockheed Marietta for retrofit in the near future, and all subsequent aircraft will be delivered with the new titanium rib. The flaperon fix will not have a long-term impact on F-22 production or completion of EMD.

Overall, the aircraft manufacturing process has continued to mature in 1999 as minor problems are discovered and corrected prior to formal production. This is consistent with the objective of an EMD program to uncover such problems early and correct them prior to fielding the weapon system. The F-22 manufacturing program is proceeding well through development challenges, challenges that are remarkably few for a program that seeks such revolutionary change in system performance.

Integrated avionics is a critical technical challenge for the F-22. The combining of the inputs from on and off-board sensors into a single comprehensive display will provide the pilot with an unprecedented level of situational awareness and a key advantage in a tactical engagement. To meet this development challenge, the F-22 program employs a variety of ground and flight test hardware in order to incrementally achieve maturity on the integrated avionics software. At last year's testimony, the program was tracking to the R-19 software development schedule. Since that time, the schedule has been updated to reflect program changes and we are now using schedule R-20.1 that was established in December 1999. The major changes from the R-19 to the R-20 schedule included a split delivery of Block 2 software to the Flying Test Bed (FTB), a slip in Block 3.0 and 3.1 integration due to the Block 2 slip, and the addition of Block 4.0 software. The major change from R-20 to R-20.1 was moving forward the delivery date of Block 3.0 software from December 2000 to October 2000. This was done to ensure enough schedule margin to meet the requirement of Block 3.0 first flight and initiation of Block 3.0 functionality prior to LRIP contract award. Figure 2 depicts the major changes between R-19 and R-20.1 schedules.

Software Release	R-19 OFP Schedule	R-20 OFP Schedule	R-20.1 OFP Schedule	Flight Test Need Date	Margin
Block 0 - Flying in 2 Test Birds ✓ U&S / VMS					Delivered
Block 1.0 - In Flying Test Bed. ✓ CIP / Radar / Mission Avionics S/W					Delivered
Block 1.1 - First Avionics Software Load for 4004 ✓ Basic CNI	5/28/99	5/28/99	5/28/99	7/20/99 Power-On	Delivered 5/26/99
Block 1.2 - Updates to FCS and VMS	1/15/00	1/15/00	12/4/99	12/4/99	Delivered 12/3/99
Block 2.0 - Flying Test Bed Only (Risk Reduction Software Release) ✓ Radar/CNI/EW Integration ✓ Initial Sensor Fusion ✓ Full Weapons Integration	8/1/99	8/1/99 - Single CIP 10/1/99 - Dual CIP	8/1/99 - Single CIP 10/22/99 - Dual CIP		Delivered Initial Delivery 7/26/99 Final Delivery 10/21/99
Block 3S - Flying Test Bed Release ✓ "Sensor Physics"	6/12/00	6/12/00	6/12/00	6/12/00	0 Months
Block 3.0 - Flight Test Aircraft ✓ Full Sensor Fusion	11/20/00	12/4/00	10/30/00	1/01	+ 2 Months
Block 3.1 - Flight Test Aircraft ✓ Block 3.1.0 IFDL / Secure Comm ✓ Block 3.1.1 JDAM / JTIDS	5/4/01	6/19/01	6/19/01 10/22/01	6/01 3/02	0 Months +4 Months

*Common Integrated Processor

Figure 2. F-22 Avionics Software Deliveries

This plan provides a logical sequence of software development from design through flight testing on the F-22. Use of the Avionics Integration Laboratory (AIL) to determine software operability is followed by checkout in the F-22 FTB to verify in flight performance prior to delivery to the test aircraft. The AIL is a contractor facility located at Boeing in Seattle, Washington. The AIL incorporates actual F-22 hardware in a ground test environment to determine software and hardware operability and compatibility. The FTB is a modified Boeing 757 incorporating an F-22 forward section housing an APG-77 radar and a roof mounted F-22 sensor wing. A simulated F-22 cockpit is installed in the aft cabin of the 757 in order to evaluate the software with the actual controls and displays. The aft cabin has workstations for 30 software engineers and technicians, who evaluate avionics, identify anomalies and, in some cases, even address anomalies in flight.

Block 0 software is currently flying on the F-22 flight test aircraft today. This software provides the basic flight controls for the aircraft.

Block 1 software, consisting of approximately 750K lines of code, represents approximately 45 percent of the total avionics software. Block 1 introduces radar and enhanced communications, navigation, and identification (CNI) capabilities to the test team. The initial release of Block 1.1 software was made to the production line May 26, 1999—7 weeks ahead of the first "power-on" testing of aircraft 4004. An enhanced version of the Block 1 software, version 1.2, was delivered to aircraft 4004 on 4 December 1999 in preparation for the first flight of the aircraft in May 2000.

Block 2 software, which completes the radar, CNI and EW integration, is currently testing in the FTB. Block 2 software consists of approximately 1.4M lines of code representing approximately 70 percent of the total avionics software effort.

In order to gain early insight into the performance of the aircraft sensors, an additional software block was added in the R-19 schedule. This block, identified as Block 3S, is currently in testing at the AIL and initiates the sensor fusion and sensor tasking key to the F-22 performance. Our current projections show no slip to the Blocks 2 and 3S schedules.

The Block 3.0 software, currently in software coding, will provide the full sensor fusion and weapons integration for the F-22. This software block will consist of 1.8M lines of code. Congressional direction prevents the awarding of an LRIP contract prior to first flight of the Block 3.0 software in an F-22.

Again, avionics remains our key technological challenge area. The team has done a magnificent job in supporting critical FTB and aircraft need dates and maintaining critical program milestones. Continued diligent use of the phased software development approach will provide an

unmatched level of software maturity at first flight while optimizing both cost and schedule for avionics development. Team performance over the past year clearly demonstrates that it is taking the necessary actions to protect critical avionics need dates in the development program and ensuring avionics testing proceeds on schedule.

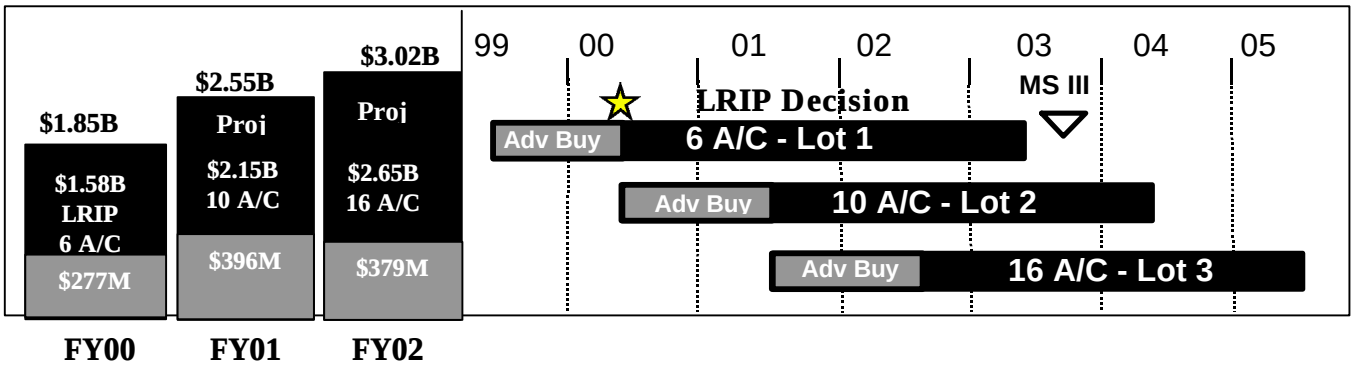
The FY00 Appropriations Act (Public Law 106-79) provided full funding of $1.2B for F-22 EMD in FY00. As part of an Appropriations Committee compromise, the procurement funding request was reduced by $1.85B and an additional $1.3B was added to the F-22 RDT&E account for the acquisition of up to 6 additional test aircraft (PRTV II), advanced procurement of 10 Lot 1 production aircraft and for termination liability. This funding may not be used for acquisition of more than 17 flight-capable test vehicles of which 11 are already on contract. Of the funds provided, a maximum of $277.1M may be used for advanced procurement of 10 F-22. In addition, $300M of the $1.3B is set aside for termination liability. This $300M can be used for other program requirements, after 1 October 2000, if the program is not terminated.

The FY00 Appropriations Act prohibits awarding an LRIP contract until first flight of an F-22 aircraft with Block 3.0 software has been conducted, the Secretary of Defense certifies to Congressional defense committees that exit criteria for LRIP have been completed, and DOT&E submits a report assessing the adequacy of testing to measure and predict the performance of the F-22's avionics systems, stealth characteristics, and its weapons delivery systems.

The impacts of the FY00 Appropriation Act will have a minimal impact on the current F-22 cost and schedule (Figure 3). Since the Act provides $1.3B in RDT&E funding for the next 6 aircraft, these aircraft will be purchased using an incremental approach. Contracts for the six PRTV II aircraft and advanced buy for 10 aircraft in the first production lot were awarded on 30 December 1999. Additional funding of $404M in FY01 and $148M in FY02 will be required to

complete the 6 aircraft PRTV II buy—this will make up the difference in the $1.85B requested in FY00 and the $1.3B appropriated. The additional funding required in FY01 is contingent on the $300M being available for "other program requirements if the program is not terminated." A Low Rate Initial Production decision for Lot 1 (10 aircraft) is planned for December 2000 following completion of the CY2000 criteria and Appropriations language requirements.

FY00 PB



FY00 Appropriations Law/PBD 632

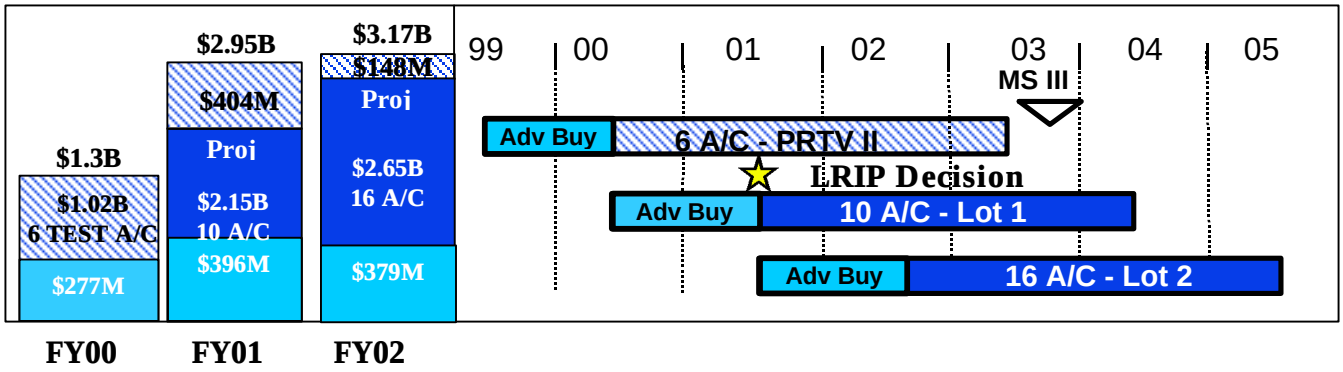


Figure 3. Impacts of the FY00 Appropriations Act

Cost control is a critical focus with the F-22 team. The Air Force and F-22 contractors are committed to deliver the F-22 within the Congressionally mandated cost caps. The Air Force and contractor team initiated cost reduction programs in both the development and production phases of the program in 1997 at the conclusion of the Joint Estimating Team (JET). These efforts have achieved cost reductions, which is key to keeping the development and production costs within the cost caps.

In the March 1999 Government Accounting Office (GAO) report entitled, "F-22 Aircraft—Issues in Achieving Engineering and Manufacturing Development Goals," the GAO reported $667M in projected EMD cost growth. This number was developed by the F-22 team

and represented the F-22 program office and contractor estimate of future program cost risks. The challenge for the team was to deliver essential combat capability within the EMD cost cap. In December 1998 the Undersecretary of Defense for Acquisition and Technology approved an Air Force plan to accommodate the projected future development risks within the EMD cost cap. The plan involved a combination of development cost reduction initiatives, scrubbing development costs, application of existing management reserves, and deferral of non-essential combat capability.

Since the approval of these initiatives, the Air Force program office and the contractor team have continued to closely monitor the progress on both the realization of the cost risks and the achievement of the cost savings. As of January 2000, $275M of the cost risks had been realized. Despite this realization of cost risk, the Air Force Cost Analysis Improvement Group (AFCAIG) determined the EMD program could be completed within the cost cap.

Key to this positive evaluation has been the better-than-expected achievement of cost savings. Figure 4 shows the program has achieved greater than 110 percent of the savings expected and is continuing to explore additional cost savings to offset any future unknown risks. One of the reasons for the greater than expected savings is due to a government management reserve of $130M. We make every effort to ensure that the program's funding is stable. About 2.5 percent of the department's research and development budget is allocated to Small Business Innovative Research. Whenever a development program is capped, we exempt it from having to pay these type allocations. And that has generated another $130M worth of management reserve for our program manager to use as we complete the development program.

Management Actions	Proposed Savings March 99	Actual Savings to Date
Contractor Mgm't Reserve	$0.18B	$0.18B
External Stores Deferral	$0.14B	$0.14B
Test Infrastructure	$0.11B	$0.11B
Lab Infrastructure	$0.10B	$0.10B
Gov't Cost Reductions	$0.05B	$0.05B
Dev Cost Reduction Programs	$0.08B	$0.15B
Gov't Mgn't Reserve		$0.13B
Total Offsets	$0.66B	$0.86B

Figure 4. F-22 EMD program cost reduction status

As a further cost control measure, the F-22 program recently consolidated the various test budgets into a single program test budget under the direct control of the F-22 program directors. None of the test funds can be reallocated to other development tasks without their explicit approval. By taking this step, we have ensured the test program retains the funding required to fully test the weapon systems functionality without the test funds being used for other development work. We remain committed to completing all of the current test program and this step will ensure we have the funds required.

The EMD cost savings demonstrate the creative things the program can do to reduce costs. We continue to push these initiatives because they represent cost savings in the remaining development program. In summary, the F-22 team is continuing to pursue a wide range of options to achieve the cost savings necessary to deliver the full combat capability within the EMD cost cap.

Likewise, the AFCAIG estimated the F-22 production program could be completed within the Congressionally-imposed cost cap ($39.7B in Then Year Dollars (TY$)) by continuously

pursuing production cost reductions as part of a series of initiatives referred to as Production Cost Reduction Plans (PCRPs). The Air Force reviews the PCRP program every month. Our methodology is quite simple: review the plans to confirm the required investments have been made, that scheduled milestones have been met, and the basis of estimate remains valid. The PCRP status is shown in Figure 5. We do have examples in areas that exceed initial savings forecasts as well as examples of a few initiatives being discontinued in favor of projects offering even greater savings potential. Early results indicate the production cost reduction initiatives are performing according to plan and over half of these initiatives have been incorporated into the baseline cost estimate.

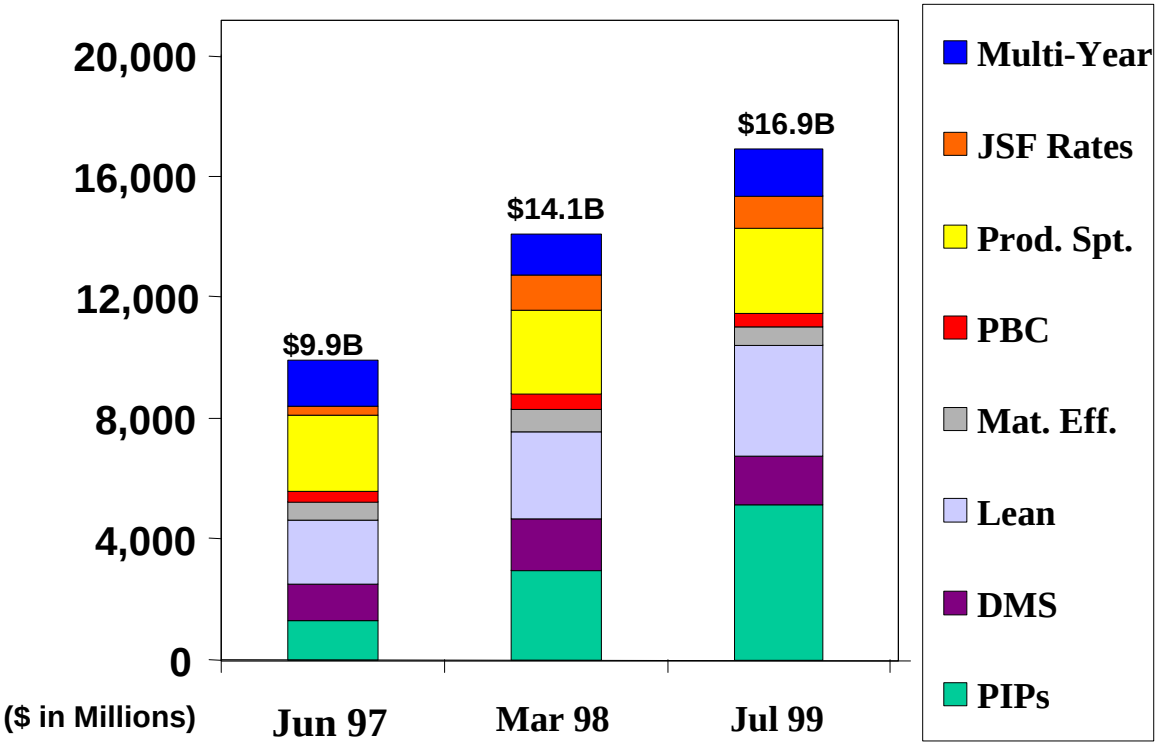


Figure 5. Production Cost Reduction Plan Status

Examples of ongoing PCRPs include:

- A Lockheed initiative to consolidate parts procurement through a central procurement activity in Fort Worth, Texas. The original plan called for procurement of 2000 parts

with estimated savings of $177K per aircraft. To date, 987 parts out of the total of 2000 have been procured and the documented savings are $136K per aircraft. If we achieve similar results in the remaining 1000 parts, actual savings could be substantially higher than the initial projections.

- Converting the current two-unit system of Sanders and Kaiser heads down display devices to a single Kaiser device. The consolidation reduces the procurement costs by an average $580K per aircraft based on existing procurement quotes.

The F-22 has a dynamic production program and we do terminate or redirect efforts if they fail to yield sufficient savings or the business case otherwise fails to develop. One such example was a planned producibility improvement investment of $800K for a second source redesign of an electric fuel pump. The possibility of competition provided the incentive for the original supplier to reduce the production quote by $25M. This enabled the program to invest the $800K in other opportunities.

In the end, the important performance measure is the final negotiated contract price. In this case, we have very encouraging results from the PRTV I and II contracts for aircraft and engines. In each case, we met the goals established for contract prices and agreed to firm fixed price contracts for these procurements. That relates directly to the contractor's confidence to deliver a product that meets the Air Force and DoD affordability objectives.

Other measurement criteria are also in place to assess progress in meeting affordability objectives. One is a target price curve (TPC) to measure the recurring cost to build aircraft and engines. The TPC established a mechanism to measure cost savings and allow payment for contractor cost savings investments and a return on their investment to ensure an affordable production program. The TPC provides a $113M incentive to the contractor to reduce the

average cost per unit during LRIP (applies to Lot 1 through Lot 3) and establishes the starting point for affordable multi-year procurement (Lots 4-8 and 9-12).

The Air Force conducts a monthly execution review to examine cost, performance, and schedule, and the Undersecretary of Defense for Acquisition and Technology holds a quarterly review as we proceed to the LRIP DAB in December 2000. In addition, all our information is available for oversight by the GAO and all responsible oversight agencies.

A strike by the Society of Professional Engineering Employees in Aerospace (SPEEA), representing the engineering, scientific, technical, and professional staff at Boeing Aerospace, began on 9 Feb 00. Approximately 508 SPEEA members were assigned to the F-22. Roughly 35% of the Boeing engineering and technical work force for the F-22 program remained on the job during the strike. On 19 Mar 00, SPEEA members approved a new three-year contract. Cost and schedule impacts to the F-22 program as a result of the strike are being assessed.

The F-22 team has responded to the challenge of the strike by prioritizing work done by the available engineering resources and by supplementing the current Boeing technical staff with engineering support from Lockheed Martin. The first priority was completion of avionics integration lab testing of the Block 1.2 operational flight program which was completed on 28 Feb 00 for aircraft 4004, the first avionics aircraft. Attention is now turning to avionics Block 3S. Integration testing has resumed and the program plans to complete this testing by mid-May in order to begin integration testing of Block 3.0 software.

Four of the ten CY00 DAB LRIP criteria have the potential of being impacted by the Boeing strike:

- First flight of an F-22 aircraft incorporating Block 3.0 software as directed in the FY00 Appropriations Language is now at a higher risk

- Completion of Critical Design Review for Avionics Block 3.1 Software
- Completion of Static Structural Testing
- Initiate fatigue life testing with the goal of completing 40% of first fatigue life

The F-22 team believes it is premature to declare that the program will not be able to accomplish the CY00 DAB LRIP exit criteria. The team is fully committed to exhausting all options to accomplish the CY00 DAB LRIP exit criteria, but recognizes that there is an increased risk.

Looking at the entire program, our primary focus this summer is to demonstrate producibility by delivering to schedule and affordability by ensuring development costs remain within the EMD caps. We do not want to discount the effort required to meet the challenges ahead, and we want to assure this committee that every member of the F-22 team knows the yardstick for the year and remains committed to a successful LRIP DAB in December 2000.

Not everyone has agreed the F-22 team can meet the technical, cost, and schedule challenges ahead. However in 1999, the team had a clear yardstick by which to measure its performance and once again met the challenge. Next year we take head-on the challenge of avionics development, demonstrated producibility, and continuing cost control. The F-22 team is committed and working hard to again succeed in meeting the challenge.

JSF

The Joint Strike Fighter (JSF) is the “low end” of our high/low affordable fighter mix philosophy—ensuring sufficient quantities of very capable attack aircraft to give the U.S. dominant force across the spectrum of conflicts. The JSF program will develop and field a

highly—common family of next-generation strike fighter aircraft for the Air Force, Navy, Marine Corps, and our allies. It will be capable of carrying a wide array of weapons to include JDAM, AMRAAM, and JSOW internally; and JASSM, AIM-9X, and others externally. With superior precision engagement capability and relatively low cost, the JSF complements the F-22 in the high-low mix. The JSF will be designed as a stealthy, multi-role fighter reliant on the enabling force of the air dominant F-22. The JSF's affordable balance of survivability, lethality, and supportability will bring Precision Engagement to the future battlespace while reducing development, procurement, and operations and support costs.

The JSF program is a model acquisition reform program, structured from the beginning as DoD's focal point for defining an affordable family of next generation multi-role strike fighters. To achieve this goal, the JSF program is facilitating the Services' development of fully validated, affordable operational requirements, while lowering risk. This is being accomplished by investing in and demonstrating key leveraging technologies and making cost and operational performance trades whenever possible prior to the start of EMD. Using Cost as an Independent Variable (CAIV) as a new way of doing business has proven to be successful. The prime contractors are clearly focused on meeting warfighter requirements while maintaining an affordable cost. They have made many significant trades since the program's inception, such as single-engine versus twin-engine and single-seat versus a two-seat cockpit.

The JSF program is on track to supply over 3,000 multi-role strike fighters to the Air Force, Navy, Marines, United Kingdom, and other interested allies. Delivery of the first production JSF is scheduled for 2007. Maintaining this current schedule will ensure optimal balance between affordably replacing aging aircraft and providing the warfighter the required force structure. The JSF program's approved acquisition strategy provides for the introduction of

an alternate engine (AE) during production. The Services anticipate to reap the benefits of competition in the engine sector will yield improved reliability and operational flexibility. The Air Force endorses the current AE program as it balances near-term affordability in development with operational benefits in production. We also continue to aggressively work fielding advanced munitions to be used on all our weapon platforms that will further enhance the range and precision of our precision engagement capabilities.

Current program emphasis is on facilitating the evolution of fully validated and affordable joint operational requirements, demonstrating cost-leveraging technologies and concepts, and completing the Concept Demonstration Phase. First flights of the contractor demonstration aircraft are scheduled for the spring of 2000. The Engineering and Manufacturing Development phase will begin in FY01.

With regard to the impact of the Boeing strike on JSF, specific details are competition sensitive. However, we are very pleased that Boeing has settled the strike.

The JSF program is committed to ensuring our warfighters get a combat capable aircraft at an affordable cost. By achieving cost goals, the Services will be able to maintain the force structure required to support our national security goals and national military strategy.

THE NET RESULT

The F-22 and JSF programs are complementary and both must be maintained to field an effective and affordable fighter force. The F-22 and JSF are needed to replace the F-15, F-16, and A-10 when these systems reach the end of their service life. The F-22 and JSF will ensure we

maintain technological superiority and our tactical air forces are not forced to fight a war of attrition.

The F-22 program is on track to meeting all performance parameters within the cost cap. The program continues to meet or exceed all user requirements. Senior Air Force and industry leaders are confident the F-22 program will meet its production cost target and remain within its cost cap provided the program funding remains stable. The warfighter will receive the F-22's revolutionary capabilities on time at an affordable cost, thus ensuring air dominance for future conflicts.

The JSF affordable family of next generation multi-role strike fighters is making cost and operational performance trades whenever possible prior to the start of EMD. This ensures warfighters get the best aircraft at an affordable cost to maintain the required force structure and support national security goals and national military strategies.

The American people have come to expect the Air Force to dominate the sky. This is based in large part that no American service soldier has been killed by an enemy aircraft since the Korean War. As long as the United States is able to dominate its enemies, the United States can achieve its objectives with minimal casualties. While some have said that the cost of current fighter modernization programs is high, the cost of not having air dominance is unaffordable. In order for the United States to maintain aerospace superiority in the next century we must field the F-22 and JSF.

The Air Force's tactical aviation modernization program is only a part of our overall efforts to build the world's most respected Aerospace Force. We are enhancing our expeditionary capabilities by balancing investments across the core competencies. Our focus is improving the Air Force's ability to project power rapidly, precisely, and globally. The Air Force's unique

aerospace superiority, global attack, precision engagement capability, supported by information superiority, rapid global mobility, and agile combat support, produce a force capable of delivering decisive combat power when needed.