Lightweight FIGHTER AIRCRAFT

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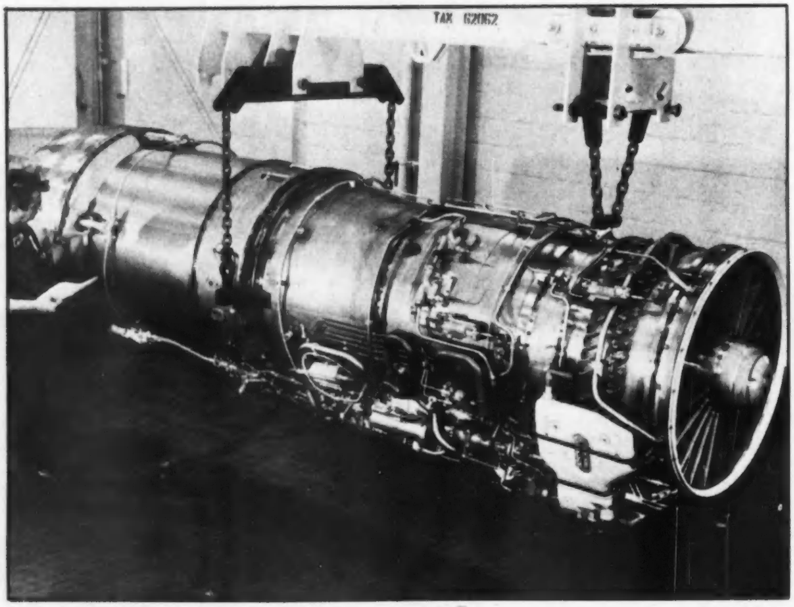
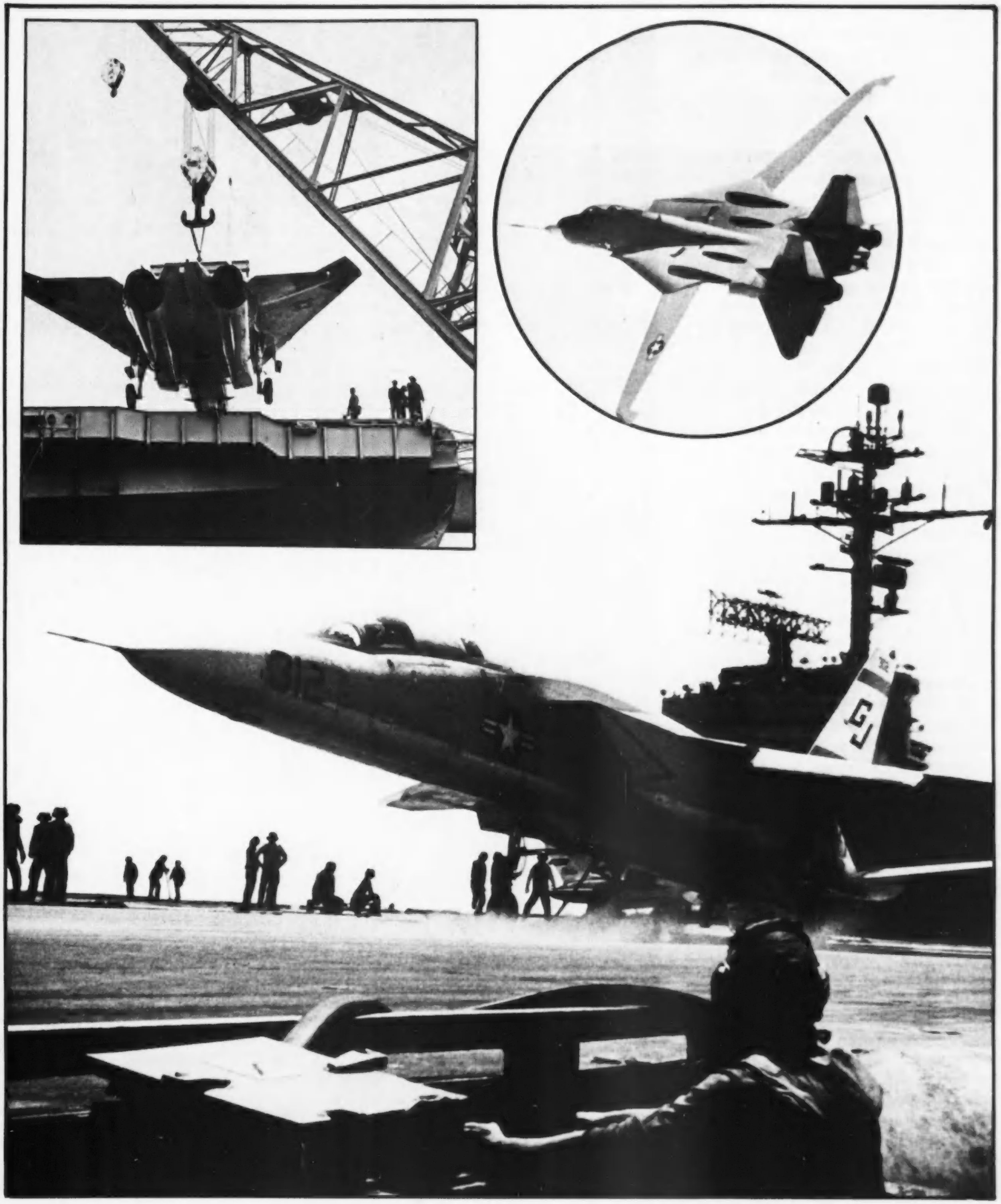


The Lightweight Fighter Aircraft Program is a result of the turn away from the complex and costly top-of-line Air Force F-15 (photos this page) and the Navy's F-14 (page 3) aircraft.

To satisfy the requirement for replacement of our aging F-4 fighter forces which begins in the early 1980s—and for which developments must be initiated now—we feel that we must explore concepts which turn away from increasingly complex and costly top-of-the-line fighter aircraft as exemplified by the Navy F-14 and Air Force F-15 and seek less expensive complements to these capabilities. The new Lightweight Fighter Programs are the result. Using advanced technology originating in the highly successful Air Force YF-16 and YF-17 prototype competition, we have achieved designs which combine the attributes of low cost and extraordinary performance and which—when used with the more costly end of the mix—will attain our objective of much greater overall force effectiveness for a given dollar investment.

I wish to stress that we are placing major emphasis in these programs on the attainment of new levels of reliability and low costs of ownership. These costs of maintenance and operations, over a 15-20 year life cycle, dominate in magnitude initial acquisition costs and it is here that great savings can be achieved and fighting readiness can be enhanced.

In January of this year the Air Force announced the selection of the General Dynamics YF-16 as its choice for a lightweight air combat fighter. This followed many months of flight test and evaluation of the prototypes. During the subsequent DSARC process the final detailed F-16 configuration was defined and rigorous reliability and maintainability criteria were established.



Unique aerial planform photograph of the Northrop YF-17 air combat fighter prototype (left) is essentially identical to the company's wind tunnel test model taken nearly a year before the advanced aircraft's first flight in June 1974. Wind tunnel testing is designed to demonstrate and prove an aircraft's aerodynamic charteristics prior to actual flight testing.

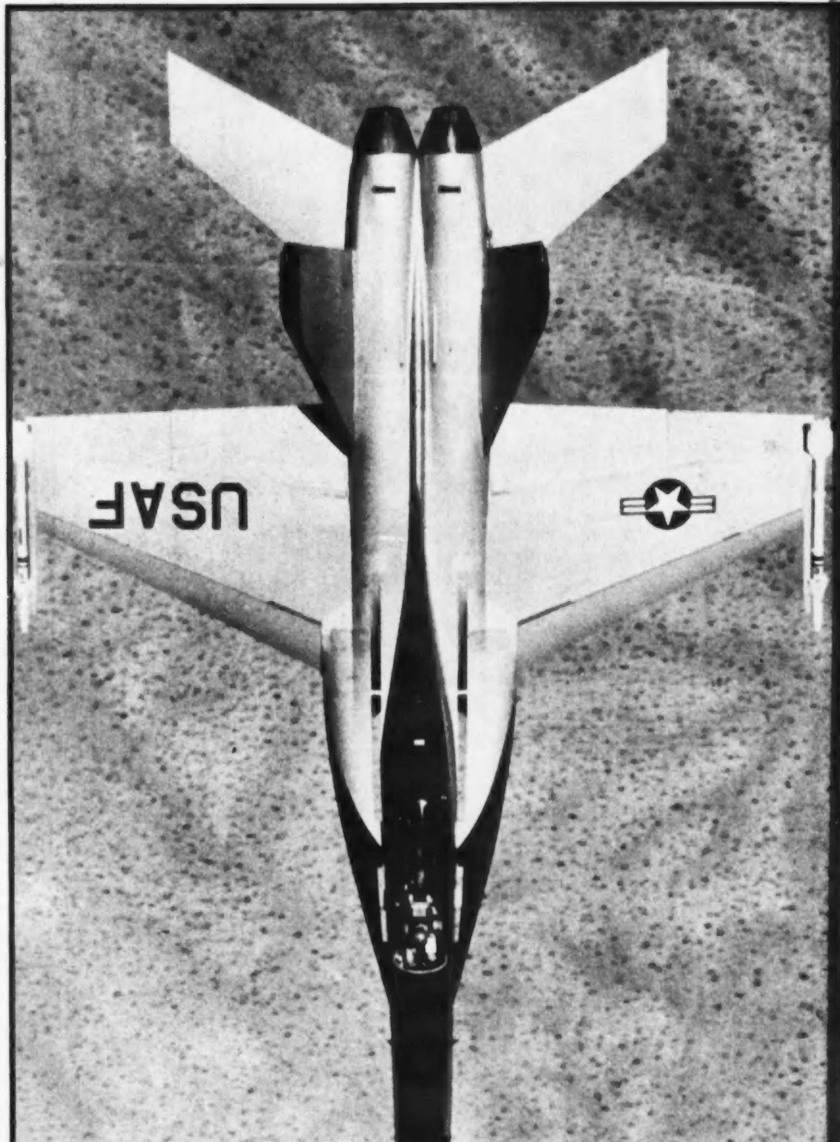
The avionics development schedule was uncoupled from that of the aircraft. If the reliability goals for the full avionics system are not substantiated, F-16s with an austere avionics package will be produced. A unit fly-away cost of $4.5 million was established (FY 75 dollars, 650 aircraft at a maximum rate 10/month with learning to 15/month).

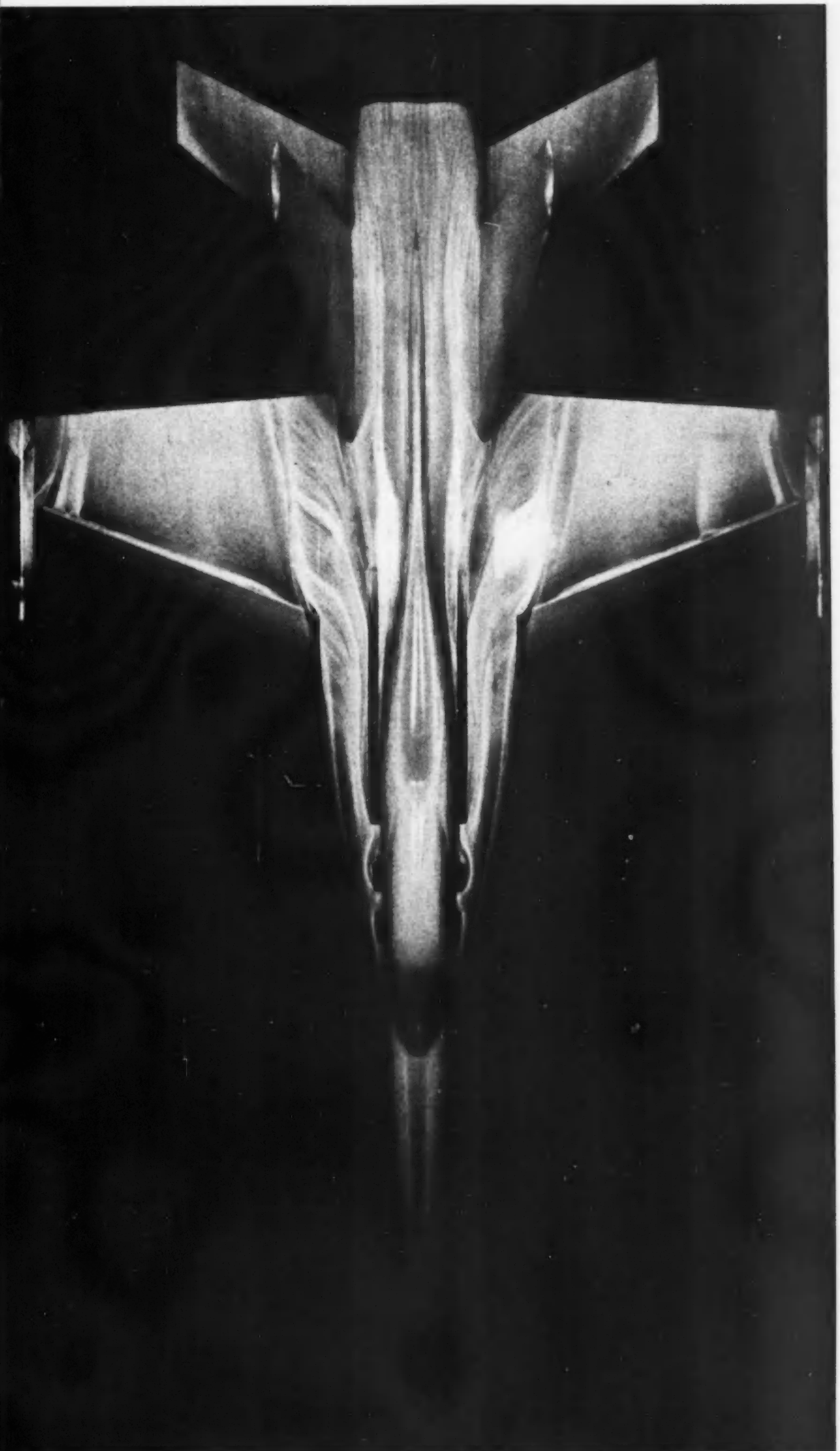
The F-16 program is a minimum risk and minimum overall cost program; it achieves important commonality with the F-15 through use of a common turbo-fan Pratt and Whitney engine having excellent fuel consumption characteristics; it will bring in a remarkable new level of capability at acquisition and ownership costs that will permit us to arrest the decline in numbers of tactical aircraft. Its foreign sales potential is substantial, as is indicated by the serious thought currently being given by the consortium of four European nations who consider the F-16 to be a leading candidate as a replacement for their aging F-104s.

Now I would like to address the Navy Air Combat Fighter program and events leading to the selection of the McDonnell Douglas/Northrop design.

An objective of both the Defense Department and the Congress was to explore means of achieving the maximum practical level of commonality between the Navy and Air Force lightweight fighters. The goal was reduced cost through reduced development costs, by common purchase from a larger production base and more common logistics support. In accordance with this objective, industrial teams of LTV/General Dynamics and McDonnell Douglas/Northrop submitted Navy designs based on the YF-16 and YF-17 prototypes, respectively.

These Navy derivatives were considered while the Air Force source selection was going on, with strong participation by both Services. In January, it was evident that none of the modifications satisfied the Navy carrier compatibility requirements and that it would take additional months





Unique aerial planform photograph of the Northrop YF-17 air combat fighter prototype (left) is essentially identical to the company's wind tunnel test model taken nearly a year before the advanced aircraft's first flight in June 1974. Wind tunnel testing is designed to demonstrate and prove an aircraft's aerodynamic charteristics prior to actual flight testing.

Dr. Malcolm R. Currie became director of Defense Research and Engineering in June 1973.

He was born in Spokane, Washington on March 13, 1927, and received his advanced education at the University of California at Berkeley. After serving in the U.S. Navy from 1944 through 1947, Dr. Currie earned his A.B. degree in physics in 1949; his M.S. in electrical engineering in 1951; and his Ph.D. in electrical engineering in 1954. He attended the executive program, Graduate School of Management at the University of California at Los Angeles in 1964.

Dr. Currie began working for Hughes Aircraft Company in 1954. During this employment at Hughes Aircraft he served as a member of the technical staff (1954-1957); manager of the Microwave Tube Department (1957-1959); director of the Physics Laboratory, Hughes Research Laboratories (1960-1962); associate director, Hughes Research Laboratories (1962-1964); corporate vice president, Hughes Aircraft Company and director, Hughes Research Laboratories (1964-1965); and corporate vice president and general manager, Research and Development Division, Hughes Aircraft Company (1965-1969).

In 1969 he became vice president, Research and Development, Beckman Instruments, Inc.

Dr. Currie was elected by Eta Kappa Nu as the "Nation's Outstanding Young Electrical Engineer in 1958," and was named as one of the "Five Outstanding Young Men in California" for 1960 by the California Chamber of Commerce. His many honors also include election to the National Academy of Engineering ". . . for major innovation in electron devices and contributions to systems research and development . . ."

of effort to develop designs suitable to the Navy with the probable outcome still in doubt. Furthermore, it was evident that the cost savings to the Air Force in going with their F-16 selection were such that, regardless of the eventual Navy selection, there would be no appreciable cost advantage to the Government by the Air Force adoption of the F-17 derivative in the event this was the Navy's choice. This was supported by the Chairman of the OSD Cost Analysis Improvement Group (CAIG) and by the DSARC principals. The decision to proceed with the F-16 program was therefore taken.

In the intervening time, three derivatives of the YF-16 have been studied extensively by the Navy. None of these derivatives was found suitable for carrier operations. Two of the three designs involved very significant scaling as well as new engine development in which most commonality with the F-16, and hence the cost benefits, were lost. The third design was inadequate from a performance viewpoint and was therefore not acceptable.

The Navy derivative of the YF-17 incorporates a modified version of the original General Electric J101 turbojet engine in which the bypass ratio has been increased and the thrust increased by about 17 per cent over the engine proposed for the Air Force evaluation.

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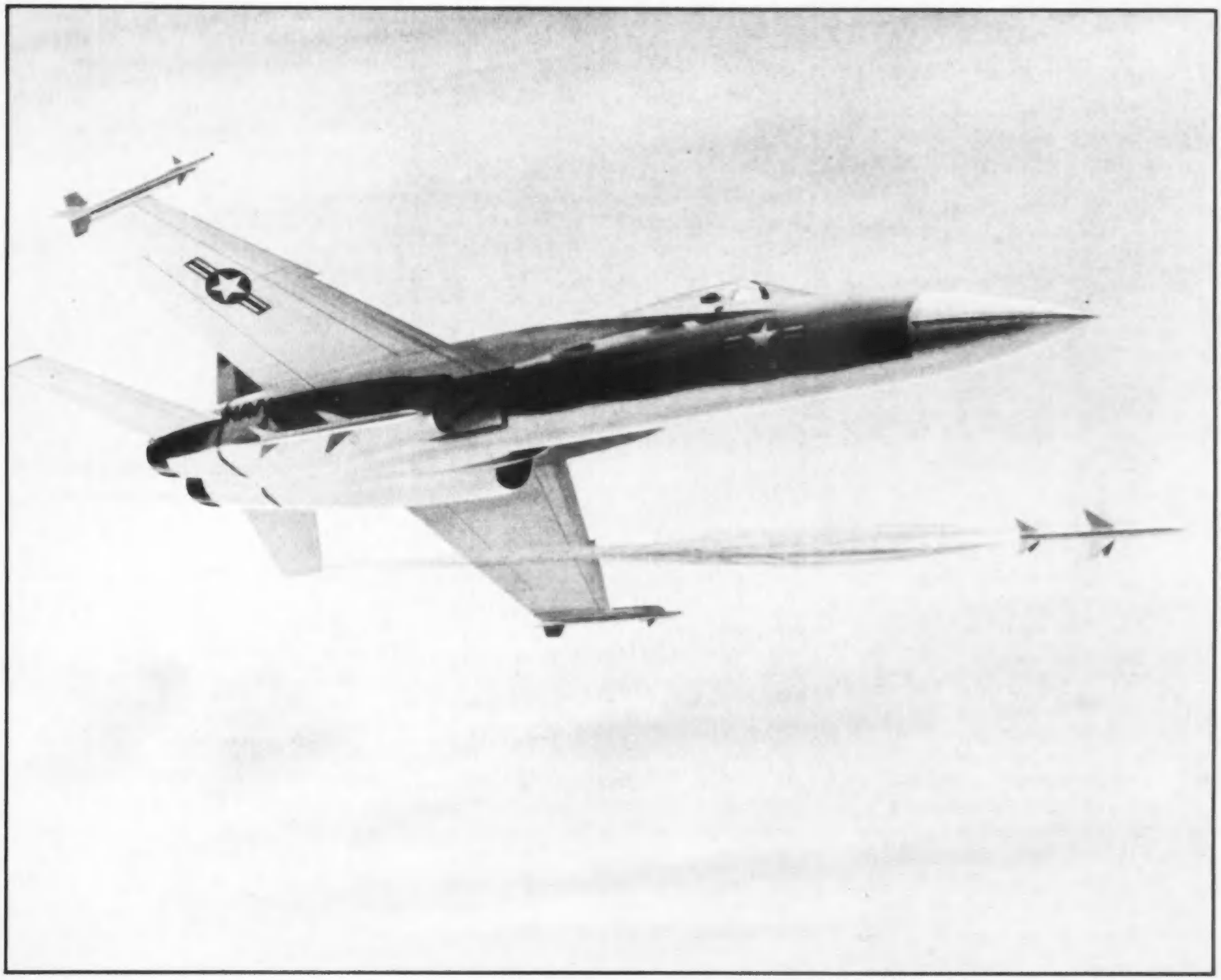
The new turbo-fan engine is designated the F404 and has improved fuel efficiency over the original design. The resulting aircraft will meet the safety and suitability requirements for carrier operations and meets or exceeds the stringent operational performance requirements. Although it builds directly on the YF-17 prototype, it is sufficiently different in terms of engines and structural details for carrier use that it has been given the new designation of F-18.

During the months ahead the final avionics configuration will be defined and test programs, schedule, reliability programs, and rigorous cost objectives will be established. This will lead to a DSARC review in late summer for approval of full scale development of the Navy F-18 Air Combat Fighter.

I would now like to discuss more completely the question of cost on these programs. This is a major driving factor in our considerations. In comparing costs of various alternatives, there often is considerable difficulty in ensuring that we are making a true comparison based on the same ground rules. We have 15-year life cycle cost numbers, unit fly-away numbers, unit production numbers and various other ways of characterizing our costs—each appropriate for different comparisons. I believe it is appropriate to simply focus on the total life cycle costs, from this day forward, of the various alternative approaches. It is not enough to try to minimize research and development costs alone. It is not enough to try to minimize procurement costs alone. What is important is the total cost of ownership of any major system over a good portion of its entire lifespan. Moreover, costs that have already been incurred are not pertinent in today's considerations.

When looked at on this basis, both the F-16 and F-18 proposed by the Services must offer substantial cost savings in procurement and operation and maintenance to compete with the F-15s and F-14s currently in production, since with the new aircraft we still have the research and development



An artist's concept of the Navy's F-18 air combat fighter. The F-18 and the Air Force's F-16 are expected to provide a stimulus to keep costs down on the F-14 and F-15, while the existence of the F-14 and F-15 assures that the costs of the F-16 and F-18 cannot increase very much.

and production start-up costs ahead of us.

We have made independent comparative cost analyses in OSD. Let me discuss two ways of looking at this comparison. First, how many aircraft do we need to buy before there is a crossover on the 15-year life cycle cost? By that I mean, how many F-16s, for example, do I need to buy before the total 15-year life cycle cost of these aircraft are equal to life cycle costs associated with buying and operating an equal number of F-15s. The second way of making this comparison is to estimate the cost difference, over 15 years, of buying the planned number of aircraft. In these comparisons we have attempted to use the same ground rules between programs and to insure that the assumptions made are fair and rational.

If we look at the F-15 vs. F-16, the OSD estimate is that the crossover occurs between 100 and 200 aircraft. Thus, any number of aircraft purchased over 200 provides a clear life cycle cost advantage to the Air Force by buying F-16s.

If we look at the total cost of the projected 650 aircraft buy of the Air Force, it is estimated that the savings are about $3 billion (out of approximately $12 billion 15 year costs). With this large saving it is

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apparent that it would take a substantial change in our assumptions before the F-16 would not show a clear cost advantage over the F-15.

In considering the F-14 vs. F-18, the CAIG calculates that the crossover point is at 200-250 aircraft. If we assume that the Navy will purchase 800 of these aircraft (as assumed in the source selection evaluation), a 15 year savings of better than $4 billion would be realized when compared to a comparable number of F-14s. If one looks at only the F-4 fighter inventory requirements of approximately 600 aircraft, the 15-year savings would be between $2 and $3 billion (out of an approximately $12 billion total life cycle cost). It is possible that a late version of the F-18 may also replace the Navy's A-7 fleet in the late 1980s.

Again the margin is sufficiently large that the conclusion that the F-18 will provide substantial savings over the continued buy of F-14s is unaffected by minor changes in the assumption or method of calculation.

In both the Air Force and the Navy programs, one can further modify these analyses by assuming "stripped" versions of the F-14 and F-15 having more austere avionics. However, with the substantial advantages that I have just indicated, there is no rational stripped package of avionics which brings the conclusion into question.

There are two other very significant points to be made in the development of the F-16 and F-18. One is the importance of having options in future defense planning. One great benefit of the high-low mix approach is that having both types of aircraft in production simultaneously provides us the opportunity to increase or decrease the production of either in proportion to changes in the emerging threat.

Second, we have found that there is nothing so effective in holding cost down as the existence of on-going competition between manufacturers. Development of the F-16 and F-18 provides a stimulus to keep costs down on the F-14 and F-15, while the existence of the F-14 and F-15 assures that the costs of the F-16 and F-18 cannot increase very much. Moreover, both the F-16 and F-18 in some measure compete with one another—while also providing two important options for additional foreign sales. To be able to achieve this level of competition in our fighter aircraft is a situation we have not had for over 20 years—and it is now available with virtually no increase in the overall cost of ownership. This is an opportunity for the American business tradition to work by itself—I feel the pay-off will be substantial.

I feel that we have been successful in meeting our management objectives and fulfilling our responsibilities to the Congress. The need for replacing the aging F-4 fighter force in both Services will be urgent a few years from now in the 1980 period. This cannot be accomplished with the F-15 and F-14 designs without an acceptable diminution of the size of our tactical air forces. We have come forward with two superb aircraft based directly on prototype hardware demonstrations. Very importantly, both Services agree that their operational requirements have been met and they enthusiastically support the programs. The goal of major cost savings both in acquisition and over a 15 year life will be met. An important new trend has been established in bringing to reality the high-low force mix concept. As is well known, these programs have the full support of Secretary of Defense James R. Schlesinger and Deputy Secretary of Defense William P. Clements, Jr. For the F-18, this selection is a necessary initial step. We now proceed with the normal DSARC management process in scrubbing down the avionics and in establishing rigorous cost targets prior to initiating full scale development this summer.

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