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# HISTORY OF THE AFFTC, VOL 1 F-16 CHAPTER – PAGES 3-24

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AFFTC HISTORY OFFICE

AIR FORCE FLIGHT TEST CENTER  
EDWARDS AIR FORCE BASE,  
CALIFORNIA

1 JUL 73 – 30 JUN 74

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### Lightweight Fighters

This test program was noteworthy--for its forward-looking innovations as well as for the difficulties it caused.

Among those innovations was the use of a single test plan for each fighter by a fully integrated test team made up of Systems Command, contractor, using command, and supporting command people.<sup>1/</sup> Another was the fact of its being the first example of "advanced prototyping" since that type of contract was revived by Deputy Secretary of Defense David Packard in 1971--or at least it was that type until 29 April 1974 when Dr. James R. Schlesinger, the Secretary of Defense then, turned the program into a competition between the two fighters involved to become the Air Force's "air combat fighter" and supplement the F-15 in a "high-low" mix. It was out of this change that the difficulties grew.

Advanced prototyping in general had three objectives: (1) to explore emerging technologies, (2) to reduce the risks of full-scale development, and (3) to provide the Air Force with a variety of options available to be applied to future hardware needs.<sup>2/</sup> It gave the contractors broad goals, not rigid specifications and schedules. In the case of the lightweight fighter, the Air Force said simply in its request for proposals that the aircraft would be expected to

*exhibit exceptional maneuvering and handling characteristics; use limited avionics for communications, navigation and fire control, emphasizing advanced technology and at the same time remain light in weight and low in cost.*

1. Letter, AFFTC/DOA to 6510 ABGp/OI; Subj: U. S. Air Force History; 25 Nov 74.
2. "Competitors or Companions?"; Government Executive magazine; April 1974.

From the Air Force's standpoint, there were two major goals: to assess the potential operational utility of such a fighter, and to evaluate the advanced technology features. The advantage to the contractors was that they were being allowed to work out some of their own ideas under their own initiative, and get paid for it.<sup>3/</sup> With this kind of prototype program, the role of the Flight Test Center would be primarily to evaluate those new ideas.

When, however, the program was changed into a competition for the two aircraft to become the Air Force's new "air combat fighter" with a source selection by March 1975 (later moved forward to January to accommodate a selection by four NATO air forces), it meant a compression of the test schedule. Because it also meant that the lightweight fighter test force would now go into a full-scale development program after selection of the winner, Flight Test Center managers were concerned that the original resources would not be adequate.<sup>4/</sup> The technology demonstration and competition were to emphasize flying characteristics primarily (flight controls, stability and control, performance, air combat maneuvering, a structural demonstration, some systems); the full-scale development would bring with it an increased emphasis on systems testing. Brig. Gen. Robert A. Rushworth, the Flight Test Center commander, informed Systems Command headquarters that the center would need "an increase in manning over that presently authorized for the LWF\* and for a much longer period of time."<sup>5/</sup>

3. Speech by Mr. John L. McLucas, Secretary of the Air Force; to Panama City, Florida, Chamber of Commerce; Sep 1974.

4. Interview with Mr. Fred N. Stoliker, AFFTC/CA; 1 Nov 74.

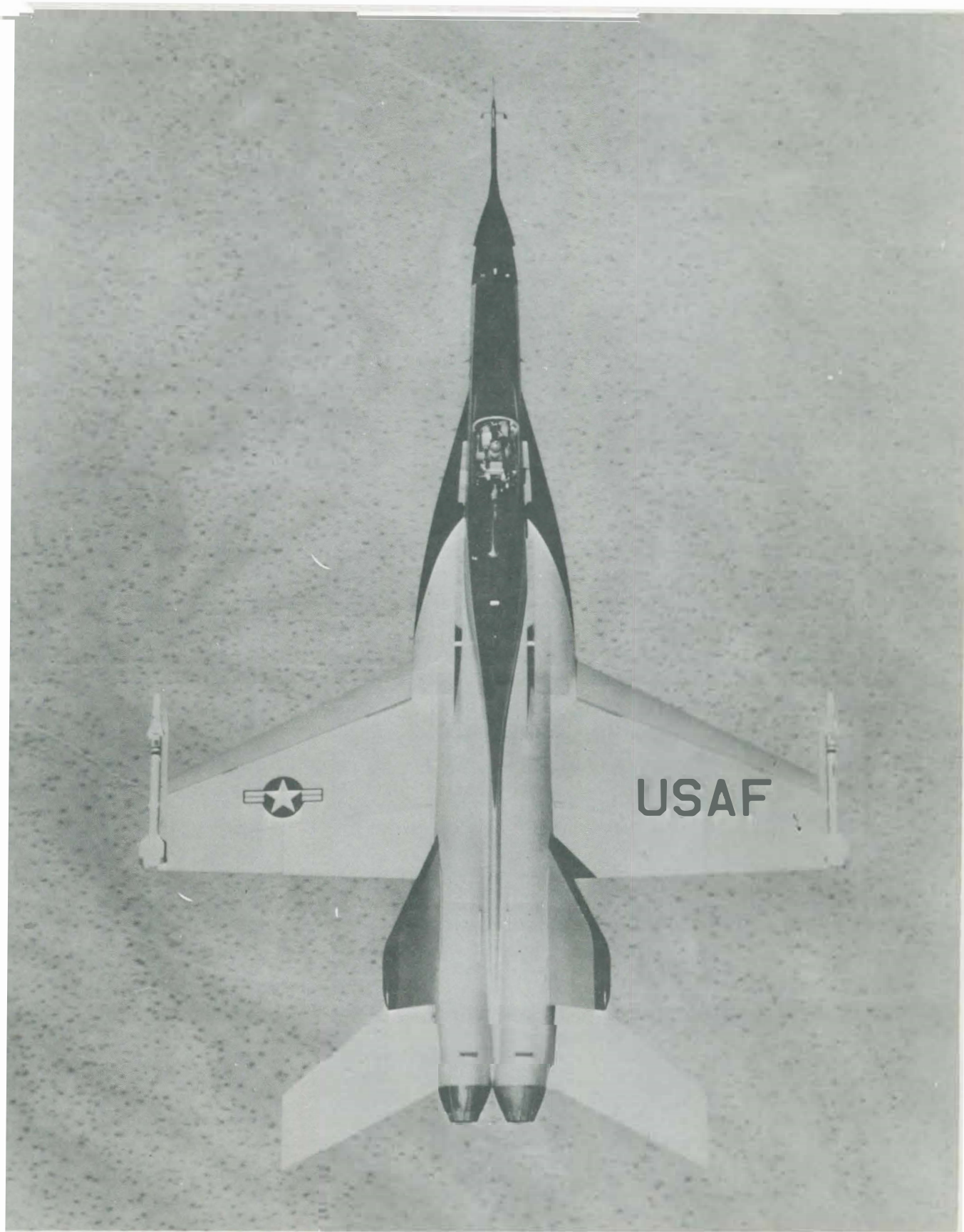
5. Msg., AFFTC/CA/CC to AFSC/MD/SD/XR; Subj: FY-76 AFFTC Manpower/Funding Posture; 18 Jul 74.

\* lightweight fighter.

Background. The two lightweight fighter prototypes were the General Dynamics YF-16 and the Northrop YF-17. The first was a single-seat, single-engine, single-tail supersonic fighter weighing about 22,000 lbs. with internal fuel, M61 gun, and two AIM-9 missiles. It was powered by the Pratt and Whitney F100 turbofan engine, which produced over 25,000 lbs. of (uninstalled) thrust in full afterburner. The YF-16 was small, 47 feet long with a wing span of 30 feet. The YF-17 was a single-seat, twin-engine aircraft with a takeoff weight of 23,000 lbs.; it also had the M61 20-mm cannon and AIM-9 missiles. Larger than the YF-16, it had a wingspan of 38 feet and was 56 feet long. The YF-17's two YJ101 engines produced a combined thrust of over 28,000 lbs. Thus the thrust-to-weight ratio was about the same for the two aircraft.

The features of the YF-16 that were conceived to meet the Air Force's requirements of high lift, high maneuverability, and exceptional handling were these:

- o Forebody strakes and blended wing-body to augment wing lift, especially at high angles of attack
- o Electronic, computerized flight control system, or "fly by wire"
- o Side-stick controller mounted on right console
- o Automatic maneuvering flaps
- o Pilot's seat pitched 30 degrees aft and raised heel-rests for greater g-tolerance
- o Engine inlet mounted under the fuselage well aft of the nose, where the forward portion of the fuselage tended to straighten the air-flow and maintain good inlet-pressure recovery during high angle-of-attack flight.



The YF-17 flies over the desert near Edwards.  
Note the open slots between the fuselage and the strakes.

- o Low wing loading
- o Relaxed static stability
- o High thrust-to-weight ratio.

A description of the YF-16's design features in more technical detail was given in the flight test plan:

*The prototype airplane incorporates technology features of vortex control, variable wing camber, blended wing-body, high "g" cockpit, and "fly by wire" flight control system.*

*The airplane design emphasizes controllability and spin resistance at high angles of attack through the transonic speed range. The wing and tail surfaces are very thin and feature moderate aft sweep. Variable wing camber is provided by wing leading edge flaps that can be deflected either automatically or manually to improve aerodynamic performance over a wide range of angle of attack and speed. Vortex control is provided by sharp leading edge strakes along the fuselage forebody. The trailing-edge-mounted flaperons combine aileron and landing flap functions. The horizontal tail has a small amount of negative dihedral and provides standard pitch control and roll control through differential deflection. The large vertical tail, augmented by twin ventral fins mounted on the lower aft fuselage, is designed to provide very high directional stability. The flight control surfaces are activated hydraulically by dual 3000 psi hydraulic systems. Control surface deflections are commanded by the pilot with a side stick controller through the quadrex electronic "fly by wire" system. Speed brakes are located at the aft end of the fuselage to minimize buffeting and aircraft reaction.6/*

The features of the YF-17 designed to meet the same requirements were:

- o Strakes which nearly doubled wing lift and channelled airflow more directly into the engines during high angle-of-attack flight
- o Slots in the wing root to divert fuselage boundary-layer air

6. Plan, "LWF Prototype Program USAF/General Dynamics YF-16 Flight Test Program Plan"; 12 Oct 73.

- o Canted twin vertical tails
- o Placement of the horizontal tail below the wing
- o Leading- and trailing-edge flaps
- o Extensive use of graphite composite material.

The flight plan described the features as follows:

*The design is optimized to provide good flying qualities throughout the flight envelope with emphasis on high lift conditions and the transonic flight regime. Flying qualities at high lift conditions are enhanced by the wing leading edge extension, variable camber using leading and trailing edge flaps, and canted twin vertical tails. A high level of propulsion system performance, stability and reliability is achieved by locating the engine air inlets beneath the wing, diversion of fuselage boundary layer air upstream of the intake through wing root slots, and fixed geometry inlets. The YF-17 is equipped with two General Electric YJ101-GE-100 afterburning turbojet engines. The aircraft will possess a thrust-to-weight ratio substantially greater than one when configured for air-to-air combat.<sup>7/</sup>*

Test Planning. As stated earlier, the lightweight fighter program was originally seen as an investigation of new technology, and the 1972 test program concept as written by Aeronautical Systems Division and Flight Test Center people reflected a view oriented solely toward aerodynamics.<sup>8/</sup> However, because of the ever-present possibility that one of the prototypes could be selected for further development, the planners later designed the two actual test programs to be approximately parallel and serve as the basis for a matched competition. This reorientation also resulted in a look at some systems.<sup>9/</sup>

7. Plan, "USAF/Northrop YF-17 Flight Test Program Plan"; 15 Jan 74.
8. Draft, "Test Program Concept, Prototype Lightweight Fighter"; 19 Jan 72 (located in files of AFFTC/CA).
9. Interview with Mr. Fred N. Stoliker, AFFTC/CA; 1 Nov 74.

Both programs were to last 12 months and involve about 300 hours of flight test.<sup>10/</sup> The test force was to be fully integrated, made up of people from the Flight Test Center, contractors, Tactical Air Command, and to a lesser extent Logistics Command; and for each of the two programs there was to be a single, integrated test plan which would fulfill the requirements of each party without duplicating any testing.<sup>11/</sup> Each of the three principal parties was to fly the aircraft about one-third of the time. The contractors were allowed to set the pace for their own programs and schedule their flights accordingly.

The programs were expected to accomplish in one year, with the exception of stores separation, what normally took about three years for prototypes that had been selected for production. Col. William T. Thurman, the deputy for prototyping at Aeronautical Systems Division, said before testing started, "We don't intend to write the flight operations or mission manuals for the airplane, but we will know enough at the end of the test program to determine whether the airplane can handle the air-superiority mission."<sup>12/</sup> The test force would not, in other words, try to get all the specific data points of a conventional test program. Rather, exploration of the basic flight envelope would be emphasized, along with the aircraft's maneuverability and handling characteristics as a weapons platform.

10. Plan, "LWF Prototype Program USAF/General Dynamics YF-16 Flight Test Program Plan"; 12 Oct 73: Plan, "USAF/Northrop YF-17 Flight Test Program Plan"; 15 Jan 74.
11. Letter, AFFTC/DOA to 6510 ABGp/OI; Subj: U.S. Air Force History; 25 Nov 74.
12. Quoted in Aviation Week, 7 Jan 74; page 43.

The test plans established priorities:

- o Priority 1--evaluating performance and subsystem in the perspective of the aircraft's potential air-to-air combat effectiveness
- o Priority 2--evaluating performance which would contribute to combat mission profiles but for which reasonable estimates already existed
- o Priority 3--testing which would contribute valuable information but which was not required to achieve the goals of the program.<sup>13/</sup>

Specific objectives were given in the plan as follows:

- a. *Verify the operational flight envelope and demonstrate aircraft systems functional suitability.*
- b. *Conduct a limited handling qualities evaluation.*
- c. *Conduct a limited performance evaluation.*
- d. *Conduct gun-firing and missile firing to evaluate safe missile separation, engine operation, and airframe/flight control system response.*
- e. *Conduct a limited airframe and systems evaluation.*
- f. *Conduct a limited evaluation of operational characteristics during various phases of the projected aircraft mission.*
- g. *Determine the merits of incorporated technology features.*
- h. *Identify key features and procedures which would require follow-on engineering development to improve performance, reliability and maintainability if the prototype is to be used as a basis for a production aircraft.<sup>14/</sup>*

The first flights in each program, in other words, would be concerned with flight worthiness and the functioning of the basic systems. On subsequent early flights, a preliminary evaluation of the aircraft's performance, handling qualities, and overall systems would be emphasized.

- 13. Plan, "LWF Prototype Program USAF/General Dynamics YF-16 Flight Test Program Plan"; 12 Oct 73.
- 14. Plan, "LWF Prototype Program USAF/General Dynamics YF-16 Flight Test Program Plan"; 12 Oct 73; Plan, "USAF/Northrop YF-17 Flight Test Program Plan"; 15 Jan 74.

Specifically, the plan said:

*The primary flight test activity following functional checkout of the airplane and systems will be a rapid and safe verification of the predicted flight envelope with respect to speed, altitude, load factor, angle of attack, etc. The envelope verification will be established through a series of build up tests leading to demonstration points that will satisfactorily clear the envelope for subsequent evaluation testing. Initial efforts will concentrate on clearing the area of prime interest, i.e., the "combat arena", with the remainder of the envelope cleared to design limits later in the program.*

*Flight test efforts will be concentrated next on quantitative aerodynamic evaluation testing and evaluation of aircraft systems performance. This will include determination of maximum usable energy-maneuverability, handling qualities, aerodynamic characteristics, tracking performance, and measurement of basic aircraft performance.<sup>15/</sup>*

The operational capacities of the two aircraft would be evaluated early on, too. This evaluation was to include air-to-air offensive and defensive maneuvering, gun and missile firing, target tracking, and "an assessment of operational characteristics and capabilities for each element of a typical operational mission."<sup>16/</sup>

YF-16 Testing. The first General Dynamics prototype flew early in February, the second in May, and by the end of the fiscal year they already had a number of accomplishments behind them:

- o The two prototypes had made 102 flights totalling 105.2 hours of flying time: the first, 78 flights and 82.8 hours; the second, 24 flights and 22.4 hours.

- o Of those flights, General Dynamics pilots made 49, Flight Test Center pilots 30, and TAC pilots 23.<sup>17/</sup>

15. Ibid.

16. Plan, "LWF Prototype Program USAF/General Dynamics YF-16 Flight Test Program Plan"; 12 Oct 73.

17. Historical report, Jan-Jun 74; AFFTC/DOVF.

- o Number 1 prototype had flown a total of 3 hours and 51 minutes at supersonic speeds (as of 16 June); number 2, 31 minutes (as of 16 June).
- o Number 1 had averaged 3.5 flights a week.
- o Number 2 attained an 8.9 g loading (corrected data);<sup>18/</sup> structural build-up points were completed. (The YF-16 prototypes were built 25% over strength, which made it possible to push the aircraft to 100% load maneuvers early in the flight test program.)
- o All basic aircraft and systems check-out flights were completed.
- o The air-data system calibration was complete.
- o Three aerial refueling missions had been flown with satisfactory fuel transfer in the clean configuration.
- o Flutter tests were complete with the AIM-9E missiles on and off.
- o Flutter tests were complete with 370-gallon external tanks.<sup>19/</sup>
- o Mach 1.9 was exceeded.
- o Angle of attack of 28 degrees had been demonstrated.<sup>20/</sup>
- o Longest flight: 2 hours, 20 minutes, including 3 minutes of supersonic flight.
- o Landing at the most aft center of gravity was accomplished.
- o Operation in flight with the most negative static margin and full external tanks was demonstrated.

18. YF-16 Flight Test Summary; General Dynamics; 16 June 74.

19. Historical report, Jan-Jun 74; AFFTC/DOVF.

20. Booklet, "F-16 Air Combat Fighter"; General Dynamics; mid-1974.

- o Two spooldown airstarts were made after intentional shutdown of the engine.
- o Four successful gun-firing flights were made (no engine interference, cockpit smoke, yawing motion, or high noise levels in the cockpit).
- o Two successful AIM-9E missile launches were made.
- o Maximum-power takeoffs with afterburner were executed.
- o Takeoffs with the prototypes at maximum gross weight were made at military (MIL) power setting.<sup>21/</sup>
- o Six pilots (2 contractor and 4 Air Force) were checked out in the aircraft in 28 flights, adapting quickly and usually going supersonic on the third flight.
- o Pilots consistently pulled 7 g's and more without blackouts.<sup>22/</sup>

One element of the YF-16 design that had not yet been tested by the end of the fiscal year was the performance of the fly-by-wire flight-control system in the presence of major electrical disturbances such as those found in thunderstorms. Some minor electromagnetic interference was encountered during early flight tests between electrically powered components and elements of the flight control system, but this was easily corrected.

It was another problem, however, that gave the most trouble. In late February, test flights on the No. 1 prototype were cancelled three days in a row because of engine fuel-control anomalies.<sup>23/</sup> Then on 25 March when TAC test pilot Capt. R. D. Stickell was making his first flight in

21. Historical report, Jan-Jun 74; AFFTC/DOVF.

22. YF-16 Flight Test Summary; General Dynamics; 16 Jun 74.

23. Weekly activity report; DOE; 4 May 74.

the YF-16 and cycling the landing gear at 15,000 feet, the engine went to idle thrust.<sup>24/</sup> It was the aircraft's 28th flight. He was able to return to Edwards and land safely, but YF-16 flight testing was suspended for three weeks while the engine's Bendix fuel-control unit was examined and modified.

The malfunction had apparently been caused by high fuel temperatures and contamination, which Bendix Corporation then sought to eliminate by increasing the unit's tolerance to higher temperatures and by adding eight self-flushing screens to trap the dirt.

On 16 May, Lt. Col. James G. Rider, the lightweight fighter test director, was pulling up from a practice approach and retarding the throttle when the rpm's again rolled back to idle. The engine would not respond at all to the throttle after that, and Lieutenant Colonel Rider had to make an emergency landing on the dry lakebed.<sup>25/</sup>

After an 11-day suspension of flights, interim steps were taken to permit continued testing until a permanent fix could be found: aircraft were restricted to a geographical and altitude envelope near the Edwards dry lakes, and a rheostat was temporarily installed to enable the pilot to dial in a thrust setting of up to 5000 lb., which would get him back to Edwards. Metal contamination was eventually found in the fuel-control unit, lodged in the power-lever-angle piston servo area, and another modification was required.<sup>25A/</sup>

24. Msg., ASD/YPF to Hq. USAF/RDQL; Subj: YF-16 Weekly Flight Test Report (24-30 Mar 74); 2 Apr 74.

25. Msg., ASD/YPF to Hq. USAF/RDQL; Subj: YF-16 Weekly Flight Test Report (12-18 May 74); 24 May 74.

25A Msg., ASD/YPF to Hq. USAF/RDQL; Subj: YF-16 Weekly Flight Test Report (19-25 May 74); 29 May 74.

On the first flight of the No. 2 prototype, 9 May, the nose wheel failed to lock down during the initial gear cycles at 10,000 feet.<sup>26/</sup> But when the flap switch was activated, it caused enough of a hydraulic surge in the system to lock the nose gear into position--and the airplane went on to land uneventfully.<sup>27/</sup> The same thing occurred again, however, on 13 May. The General Dynamics maintenance people at this time ran a complete check on it, finally finding that the problem was caused by the actuator rod being out of adjustment.<sup>28/</sup>

Highlights. Some of the important dates in the YF-16 program were these:

- o 12 October 1973: Flight test plan published.
- o 13 December: Roll-out of the YF-16 at the General Dynamics plant in Fort Worth, Texas, with Dr. John L. McLucas, Secretary of the Air Force, as the featured speaker.
- o 8 January 1974: Arrival of the No. 1 prototype at Edwards AFB aboard a C-5, with the prototype's wings and horizontal tail removed.
- o 20 January: Unplanned, unofficial first flight. The contractor test pilot was making a high-speed taxi test when he encountered a roll control problem. The high sensitivity in the roll channel of the fly-by-wire control system was producing roll oscillations, and the right horizontal stabilizer dragged on the runway. The pilot, Philip F. Oestricher, elected to take off to prevent further damage rather than

26. Weekly activity report; DOE; 16 May 74.

27. Msg., ASD/YPF to Hq. USAF/RDQL; Subj: YF-16 Weekly Flight Test Report (5-11 May 74); 15 May 74.

28. YF-16 Flight Test Summary; General Dynamics; 23 May 74.

try to stop the plane on the runway. The aircraft flew for six minutes without further incident, and a normal landing was made. Following that incident, a rheostat was added to the roll control loop, enabling the pilots to evaluate several gain settings for takeoff and landing. Once it was determined that a 50% setting was the best for these two modes, an automatic gain switch was connected to the landing gear, leaving the roll channel otherwise as it was for normal flying.

- o 2 February: Official first flight, lasting 90 minutes.
- o 5 February: First flight by a USAF test pilot, Lt. Col. James G. Rider, the Flight Test Center's test director for the lightweight fighter program.
- o 27 February: First flight by a TAC pilot, Maj. Maurice Johnson.
- o 27 February: No. 2 prototype arrives at Edwards.
- o 11 March: YF-16 attains Mach 2.
- o 25 March: Engine hangs up at idle during Capt. R. D. Stickell's first flight because of fuel-control problem.
- o 9 May: First flight of No. 2 prototype.
- o 10 May: First aerial refueling.
- o 16 May: Lt. Col. J. G. Rider makes emergency landing on lakebed because of another engine hang-up at idle.
- o 10 June: First in-flight gun firing.
- o 18 June: First maximum-performance takeoff.
- o 27-28 June: Representatives from four NATO countries--Norway, Denmark, Belgium, and The Netherlands--visit the lightweight fighter

test force. These countries were seeking an aircraft replacement for their F-104s.<sup>29/</sup>

YF-17 Program. This airplane flew for the first time on 9 June 1974. By the end of the fiscal year, 30 June, it had made 17 flights totalling 17 1/2 hours. The problem facing the test force--after it was decided to turn the advanced prototype program into a comparative evaluation of the YF-16 and YF-17--was the problem of completing the YF-17 tests some seven months earlier than planned. This was done successfully, and the story will be told in next year's history. What happened during FY-74 was the following.

The first YF-17 was finished and rolled out of Northrop's factory at Hawthorne, California, on 4 April 1974. From then until its delivery to Edwards by truck over 135 miles of streets and highways during the night of 22-23 April, it underwent fuel-flow tests, proof-loads testing of the horizontal tails and spindles, and the other standard final checks and tests.<sup>30/</sup>

After further inspections at Edwards, including ground-resonance and taxi tests, prototype No. 1 made its first flight on 9 June piloted by Northrop's chief test pilot Henry E. Chouteau. That flight lasted one hour and two minutes, during which the aircraft attained a speed of Mach 0.85 and an altitude of 18,000 feet.<sup>31/</sup> On a second flight the

29. Historical report, Jan-Jun 74, AFFTC/DOVF; YF-16 Flight Test Summary, General Dynamics, 16 Jun 74; weekly activity reports, AFFTC/DOE, FY-74; and materials available in AFFTC historical archives, AFFTC/HO.

30. Historical report, Jan-Jun 74; AFFTC/DOVF.

31. Ibid.

next day, Mr. Chouteau reached Mach 1.1--without the use of afterburner, the first time a U. S. plane had ever done that in level flight, according to Northrop.<sup>32/</sup> The first Air Force flight took place on 18 June with Lt. Col. James G. Rider as pilot. It was the YF-17's fourth flight and lasted 1.2 hours.

By the end of June, the test program's accomplishments were these:

- o The aircraft had attained Mach 1.6, at 46,000 feet.
- o Airstarts had been made on both engines.
- o Load factors of 6g's and 1.2 negative g's had been reached, clearing the aircraft for normal symmetrical pitch maneuvers.
- o Airspeed calibration had been made over the full Mach range.
- o Takeoffs using thrust ranging from below intermediate to maximum power had been made.
- o Seventeen flights totalling 17 1/2 hours had been made.
- o Four pilots, one contractor and three Air Force, had flown the aircraft.
- o Airworthiness tests were 47% complete; as was 33% of the testing of the air data systems.<sup>33/</sup>

Some of the development problems encountered were these:

- o On the first flight, segments of the leading-edge flap seals were lost.
- o The left-hand generator failed three different times because of being starved of cooling oil at low g conditions.

32. Air Force magazine; Aug 74.

33. Historical report, Jan-Jun 74; AFFTC/DOVF.

- o When the landing gear retracted, it caused longitudinal trim changes.
- o The brake pedal was found to be placed at an uncomfortable angle.
- o There was one case of foreign-object damage.
- o Some intermittent fuel venting was discovered.

Except for the fuel venting, solutions to all these problems had been found by the end of this fiscal year.<sup>34/</sup>

The second prototype was scheduled to fly in late August.\* The test force planned to use it for stall and post-stall, flight loads, and operational tests. Prototype No. 1 would continue to be used for airworthiness, flight-control development, propulsion, performance, stability and control, armament, avionics, and operational tests.<sup>35/</sup>

Summary. The key people at the Lightweight Fighter Joint Test Force were as follows:

Director	Lt. Col.	James G. Rider
Deputy Director of YF-16 Operations	Maj.	Robert C. Ettinger
Deputy Director of YF-17 Operations	Maj.	Michael J. Clarke
TAC Deputy Director of Operational Support	Maj.	Maurice B. Johnston
TAC Deputy Director of Operational Support, YF-16	Capt.	Rutherford D. Stickell
TAC Deputy Director of Operational Support, YF-17	Capt.	Joseph W. Dryden Jr.

34. Ibid.

35. American Institute of Aeronautics and Astronautics paper No. 74-941, "Development and Flight-Test Progress of the YF-17"; prepared and read by Mr. Joseph B. Jordan, engineering test pilot, YF-17 flight test program, Northrop Corporation, Aircraft Division; at the AIAA 6th Aircraft Design, Flight Test and Operations Meeting, Los Angeles, Calif.; 12-14 Aug 74.

\* First flight took place on 21 Aug 74.

Systems Engineering Project Engineer	Mr.	Frank N. Lucero
YF-16 Systems Engineer	Mr.	John M. Day
YF-17 Systems Engineer	Capt.	James H. Doolittle
YF-16/YF-17 Airframe Engineer	1st Lt.	Stephan D. Peterson
YF-16 Propulsion Engineer	2nd Lt.	Lane B. Watkins
YF-17 Propulsion Engineer	Mr.	Alan T. Webb
YF-16 Avionics Engineer	Mr.	James E. Radar
YF-16/YF-17 Fire Control Engineer	Mr.	James Underwood Jr.
YF-17 Avionics Engineer	Capt.	Madison J. Parker
YF-16/YF-17 Armament Engineer	Mr.	Lyle Jones
YF-16/YF-17 Reliability & Maintainability Engineers	Capt. Capt. Sgt.	Rodney E. Stubbs James L. Dukas John Schaper
YF-16/YF-17 Human Factors Engineer	Capt. 2nd Lt.	Larry W. Shadow Talbot N. Vivian
YF-16 Performance & Flying Qualities Project Engineer	Mr. Mr.	James Papa Charles Van Norman
YF-16 Performance Engineers	Mr. Sgt. Mr. AIC	John W. Hicks (Lead) Gary L. Snitily Robert C. Breise Cora Yaeger
YF-16 Flying Qualities Engineers	Capt. Capt.	James A. Eggers (Lead) William F. Bryant Jr.
YF-17 Performance & Flying Qualities Engineer	Mr.	Stephen B. Smith
YF-17 Performance Engineer	Mr. Mr.	Billy R. Boxwell Wayne Olson
YF-17 Flying Qualities Engineers	Mr. Capt.	Richard A. Wood Paul J. Mathieu

Aircraft Maintenance Specialist (TAC)	MSgt.	Jerry D. Wilson
Avionics System Technician (TAC)	MSgt.	Edward D. Gaddis
Jet Engine Technician (TAC)	MSgt.	John W. C. Martin <sup>36/</sup>

The total costs (reimbursable) of the lightweight fighter program during the 1974 fiscal year were \$165,000.<sup>37/</sup>

Total flights of the YF-16 by 30 June 1974 numbered 102; of the YF-17, seventeen. Total flight test hours were, for the FY-16, 105.2; for the YF-17, seventeen and one-half.<sup>38/</sup>

The program element code, or Department of Defense identifier, for the lightweight fighter prototype program was 63235F; the statement of capability number, F720304R02; and the Flight Test Center's project directive number, 74-42. It carried a priority of 1.<sup>39/</sup>

#### The A-10 Attack Aircraft

Summary. Following last fiscal year's A-X competition which chose the A-10, the test force's activities this year were aimed principally at (1) further developing the airplane and (2) providing the Defense Systems Acquisition Review Council with data that would enable this body to decide whether to put the A-10 into production. In early 1974, however, these programs were held up by a second competition, this time a fly-off between the A-7 and the A-10 that resulted from pressure on the Department of Defense from Congress. Finally, about the same time, the aircraft's enormous 30mm. gun was installed. Since the A-X from its inception had

36. Historical report, Jul-Dec 73; AFFTC/DOVF.

37. Ltr., 6510 ABGp/ACB to HO; Subj: FY-74 Reimbursable Costs; 18 Dec 74.

38. Historical report, Jan-Jun 74; AFFTC/DOVF.

39. AFFTC Job Order Register; 17 Jul 74.