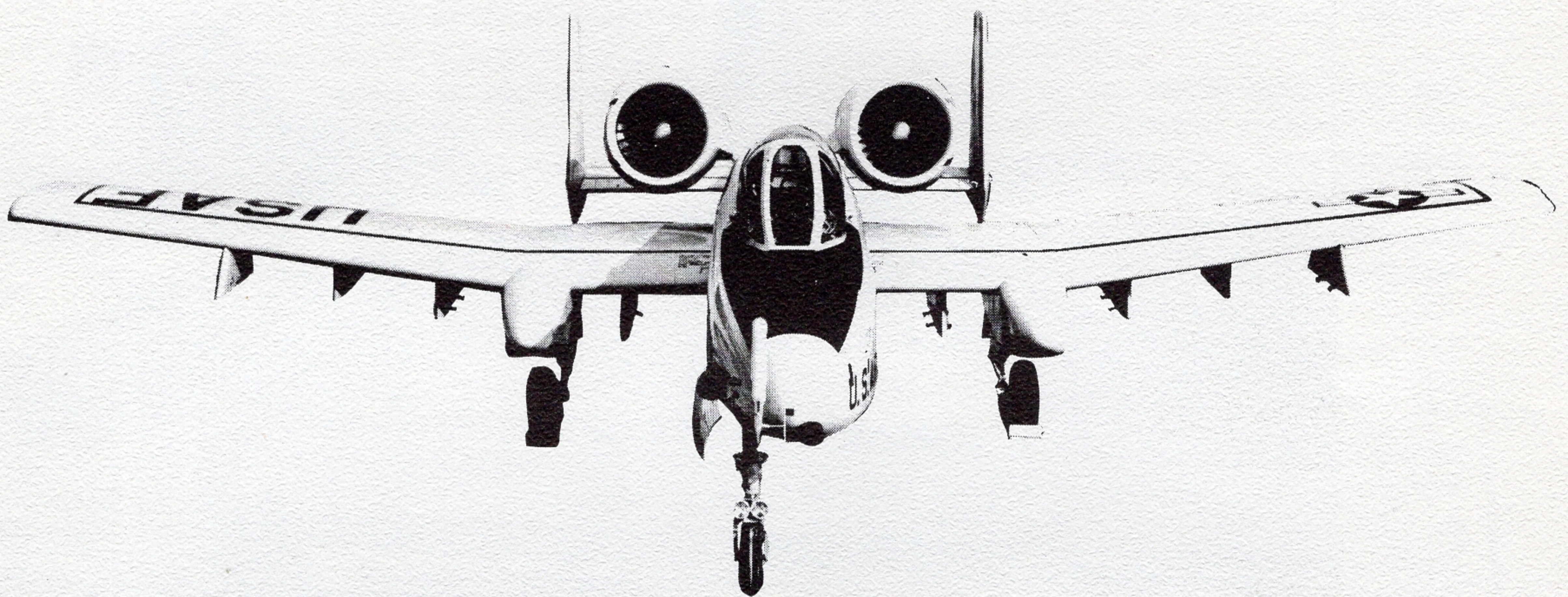


AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

THE A-10 APPROACH TO CLOSE AIR SUPPORT



By Edgar Ulsamer

SENIOR EDITOR, AIR FORCE MAGAZINE

EARLY in March, the Air Force moved its A-10 (formerly A-X) close-air-support aircraft program into preproduction and full engineering development, a broad and portentous action. In addition to signaling the successful conclusion of a key phase of the A-X development, this milestone also indicates, in the view of senior Department of Defense and Air Force officials, that the twin dangers of cost overruns and unforeseen technological difficulties can be minimized through innovative, disciplined management procedures.

The A-10 program is the first weapon development to be governed by the "design-to-cost" principles formulated by Dr. John S. Foster, Jr., Director of Defense Research and Engineering, and other ranking Pentagon officials. It also is the first military airplane program in more than fifteen years to undergo full-scale prototype development and competitive flyoff, the F-105 and F-107 competition having been the most recent.

Designing to cost and prototyping are the twin pillars of the Pentagon's new management

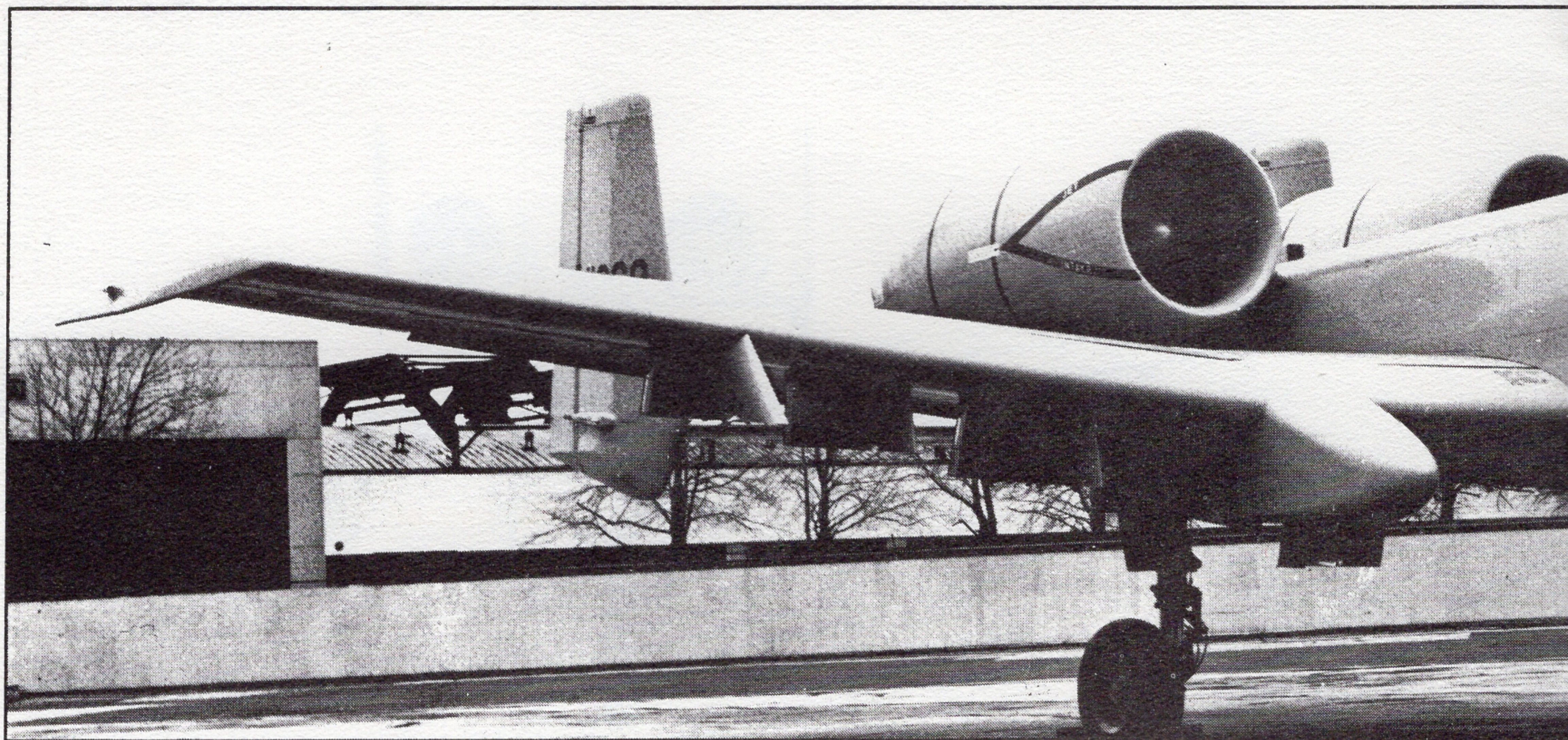
philosophy. The A-10 program, in the view of responsible defense officials, provides tangible evidence that "we can indeed produce a weapon system at a constant-dollar price and with performance as advertised. On both counts, the A-10 program is on a track that was plotted years ago."

Dr. Foster told AIR FORCE Magazine that "to date, the A-10 program has served as an excellent vehicle to implement the design-to-cost concept. From the outset of the program's validation phase, the production unit flyaway cost of the aircraft was the driving consideration for the contractors. The Air Force gave the contractors wide latitude in utilizing performance/cost trade-offs to meet design-to-cost and minimum performance goals. The trade-off process eliminated all but the essential features of the aircraft. As a result, for one of the few

craft and to proceed with full-scale development of the A-10 at a cost of about \$187 million affirms the Air Force's conviction that the new aircraft will provide improved close air support at the lowest possible cost and risk.

Birth of the A-10

The idea of an aircraft designed exclusively for close air support was first suggested in 1966 by Gen. John P. McConnell, then Chief of Staff of the Air Force. After an inspection of Southeast Asian air war operations, he initiated plans to design and develop a weapon system "on the order of but better than the A-1 and cheaper than the A-7D," which at that time was still under development. Translated into specifics by the Air Staff, the modern close-air-support mission was deemed to require a



times in years, we have reversed the increasing cost trend. The A-10 will cost less than other available aircraft for the close-air-support mission, and, because it is designed specifically to do only close air support, it will be much more effective in this role as well."

The A-10, built by Fairchild Industries and winner of a stringent evaluation and flyoff against a competing prototype, Northrop's A-9, holds another distinction: It is this country's first aircraft designed exclusively for close air support. Almost from its inception, however, the program has been caught in a crossfire of congressional questions about its characteristics and need. The decision by Air Force Secretary Robert C. Seamans, Jr., on March 2, 1973, to award contracts to Fairchild Industries and the General Electric Co. (maker of the A-10's TF34 engines) to build ten preproduction air-

rugged, economical, easy-to-maintain combat aircraft that is sufficiently accurate, maneuverable, and lethal to engage and destroy enemy ground forces—especially armor—without endangering friendly ground forces. (See January '70 issue, p. 33, "A-X: Lethal, Accurate, Agile, and Cheap.")

In addition, Air Force planners concluded that a close-air-support aircraft must be able to operate from short, rough airstrips if it is to serve as an optimally responsive element of the ground battle. It must be able to loiter for long periods and be agile enough to make frequent, rapid passes at its targets with minimum exposure to hostile ground fire. Above all, it must be more survivable in heavy ground fire than the present generation of combat aircraft and helicopters assigned to aerial fire-support roles.

After several years of intensive study by the Air Force and industry, which included a change from turboprop to turbofan designs, the Air Force awarded prototype development contracts to Fairchild Industries and Northrop in December 1970. Two years later, the Air Force completed flight evaluation of the two aircraft, including maintainability assessments. Involving comprehensive tests of weapons delivery capabilities and survivability, the evaluation culminated in the selection for preproduction of the A-10, which, once the test cycle is completed, presumably will be entered into full production.

The A-10 has a range of 250 nautical miles with a 9,500-pound external ordnance payload and two hours of loiter time in the target area. It can take off (with reduced payload) using a 1,200-foot ground roll. Where 4,000-foot run-

source selection, based on general capabilities common to both the A-9 and A-10. Comparisons with other aircraft were confined to close-air-support missions.

These computerized war games were predicated on classified order-of-battle information and included such scenarios as a friendly force in Western Europe resisting an attack from the east. Scenario variables ranged from no close support to massive use of the various aircraft types under study. The computer games also analyzed the performance of each aircraft in such specific areas as destroying tanks.

By examining many variables, the study produced a number of gradations within each of several findings. Among its broadly valid conclusions is one that Lt. Gen. Otto J. Glasser, USAF Deputy Chief of Staff for Research and Development, terms paramount: "The A-10



USAF's A-10 close-support aircraft, now in preproduction, is a single-seat, twin-engine design optimized for survivability, weapons delivery, and long loiter time.

ways are available, the A-10 can carry a maximum ordnance payload of 16,000 pounds. The aircraft cruises at 300 knots at sea level, and its maximum speed is about 400 knots. Two fuselage-mounted GE TF34 engines, each with 9,000 pounds of thrust, power the A-10.

The A-10 is designed to carry guided and unguided bombs, rockets, flares, and the electro-optically guided Maverick missile. The production model will be equipped with an internally mounted 30-mm Gatling gun, currently under competitive prototype development.

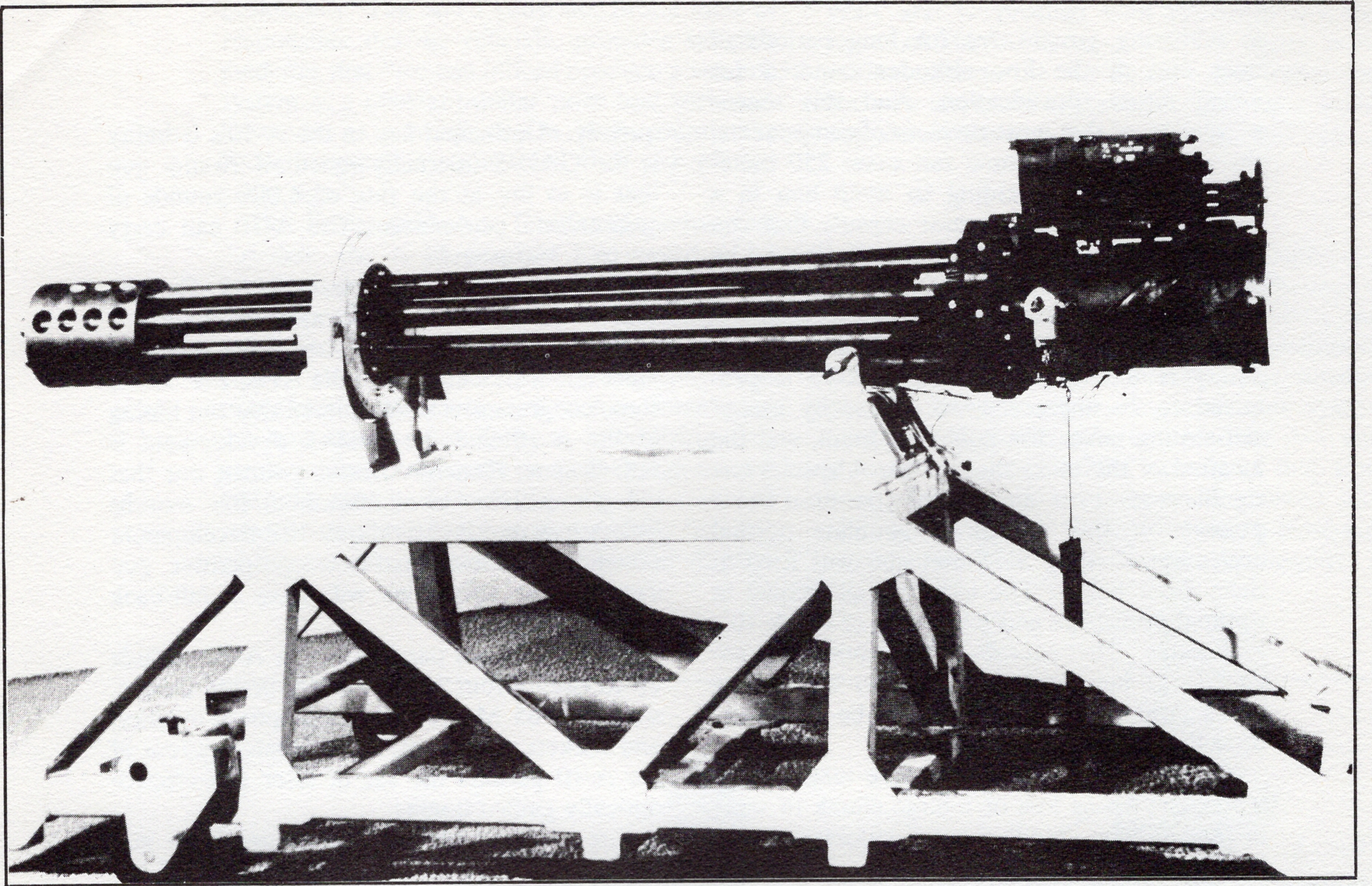
Combat Cost-Effectiveness

Recent Air Staff studies indicate how the A-10 would fare under a range of conventional war scenarios, compared to aircraft now in the inventory. The studies were completed before

can deliver the same kind of force effectiveness in terms of close air support as the next best competitor for about forty percent of the latter's total cost." The term "total cost" encompasses all ownership costs over the full life cycle of the weapon system.

Other conclusions were that, under those war conditions the US is likely to face, and within the parameters laid down by USAF for the study, the A-10 came out as best tank killer by a factor of 1.9. Put another way, under severe combat conditions, it could kill almost twice as many tanks as its top competitor. When equal numbers of the candidate aircraft were compared on a force-effectiveness basis, the A-10 proved to be 1.7 times more effective in containing a tank breakthrough than its nearest competitor.

Other findings indicated that it will cost



An internally mounted, rapid-fire, 30-mm gun that can fire at the rate of 4,000 rounds per minute and which is currently undergoing test and evaluation is the key element to the A-10's lethality.

about twenty-five percent less to operate the A-10 than the next cheapest-to-operate aircraft. When allowance was made for both acquisition and operation of a like number of aircraft, without regard to force effectiveness, the A-10's costs were twenty-five percent less than any other aircraft under study. Other points examined involved the constant number of aircraft types needed to produce a given level of force effectiveness, as well as the constant amount of funds invested in such forces. All findings, General Glasser told AIR FORCE Magazine, demonstrated that "the A-10 is the way to go for the close-air-support mission."

These findings "are, of course, not surprising," according to General Glasser. "It is obvious that an aircraft designed for a single purpose should perform that task more cost-effectively than an aircraft that provides us with a range of capabilities."

A-10: Designed to Cost

The Air Force and its contractors have adhered with "religious fervor" to the ironclad rule laid down by the Defense Department that the A-10 must be designed to a flyaway cost of no more than \$1.5 million expressed in 1970 dollars and premised on a "buy" of

600 aircraft, deliverable at a rate of twenty aircraft per month. Gen. William W. Momyer, Commander of the Tactical Air Command, told AIR FORCE Magazine that at a \$1.5 million price tag, the A-10 "promises to be the most cost-effective and best weapon for close air support, not only for ourselves but for our allies."

There were many pressures from many quarters to add capabilities and components for the sake of versatility, but ascetic adherence to the single-purpose principle held down the aircraft's price. "I think we have delivered very credible proof that the 'design-to-cost' concept is sound and that it will work. And this extends from acquiring the aircraft to the cost of owning and operating it," according to General Glasser. (The price of the A-10 is sometimes given at about \$1.4 million per unit. This figure is not based on flyaway cost but rather on unit recurring costs and does not include certain nonrecurring expenditures such as tooling.)

Survivability Paramount

Survivability is the paramount design criterion of the A-10. The close-air-support mission stands or falls with the ability to operate

in withering ground fire for long periods of time and at the low altitudes required for visual target identification. And this means protection of that most precious of components, the pilot. The Air Force ran some 250 materials tests before deciding to wrap him in a 1,700-pound titanium armor capsule that can defeat the 23-mm armor-piercing shells used by Soviet anti-aircraft weapons. Special bullet-resisting glass is used in the A-10's windscreen.

Second only to the pilot in terms of vulnerability is the fuel system. The A-10 is protected to an unprecedented degree by use of self-sealing tanks, fire-inhibiting foam, and the location of the tanks themselves. A special test rig blew air over the critical structural components of the aircraft to simulate normal cruise speed while a 23-mm gun was fired at them from below. The test findings helped in optimal protection and placement of the A-10's fuel tanks. The aircraft is equipped with so-called "go-home" fuel, carried in self-sealing tanks inside the fuselage, and to be used only after the wing tanks are empty.

The A-10 is designed to absorb major battle damage, such as loss of a large chunk of wing or of ailerons, rudder, or elevators, without catastrophic consequence, because its structure is not only rugged but aerodynamically very stable. The hydraulic system is backed up by a mechanical cable system, so arranged that a high-explosive shell will not sever both control cables. The placement and design of the engines also enhance survivability.

The A-10 is, of course, not meant to engage in air combat or to outrun fighter aircraft. However, when matched against F-4 fighters one-on-one during recent flight evaluations at Edwards AFB, Calif., the A-10's high maneuverability enabled its pilot to keep outside of the attacking F-4's gun and missile envelope and came very close to "luring the F-4s into the ground." The A-10's high maneuverability more than makes up for its lower speed, according to the Air Force's flight-test evaluation. Overall, the A-10 is "almost an order of magnitude more survivable than any other aircraft in the Air Force inventory today," according to the evaluation report.

The A-10's Lethality

There have been exceptions, but the most effective close air support, especially against moving targets, must come through visual contact. The A-10 is designed to operate on a visual basis under extremely marginal weather conditions, down to 1,000-foot ceilings and one-mile visibility. Because of its short turn radius—about 1,000 feet—it remains close to its target and can attack it rapidly and fre-

quently. A principal key to the A-10's lethality is the GAU-8 internally mounted 30-mm gun that is to fire at the rate of 4,000 rounds of ammunition per minute. The A-10 can carry up to 1,350 rounds.

Two competing gun designs, by General Electric and Philco-Ford, are undergoing a shoot-off evaluation at the Armament Development and Test Center at Eglin AFB, Fla. While some congressmen have claimed that the timing of the A-10 and the GAU-8 development is out of sync, General Glasser pointed out that the gun will be "available about five months before it is required by the A-10's development schedule. Because this is a competitive gun development effort, we will have a fall-back position."

Other weapons carried by the A-10 include up to twenty-four Mark 82 500-pound bombs, six AGM-65 Maverick electro-optical missiles, and rockets and flares. The avionics system of the A-10 permits the use of laser and electro-optically guided bombs.

Fire support of air rescue operations and helicopter escort are integral elements of the close-air-support mission. They were provided largely by A-1 Sandy aircraft in Southeast Asia. The A-10, according to General Glasser, "will be excellent—without peer—in such operations."

No Reason for Further Flyoffs

Some members of Congress have suggested that the Air Force arrange a flyoff among the A-10, the A-4, and the A-7. According to General Glasser, the idea behind such a "flyoff" seems to be misunderstood. The Air Force is definitely not out to frustrate such a test but we simply don't know how to formulate such a flyoff," General Glasser told AIR FORCE Magazine. If the flyoff is based on the Air Force's criteria for close air support involving such key factors as time on station, lethality, payload, survivability, and maneuverability, "there simply is no contest."

If the contest is premised on such performance qualities as head-up display and bombing systems, "then we measure something other than close-air-support capabilities," he said.

For the time being, the Air Force believes there is no reason to hold another flyoff, but very good reason to state, in the words of General Glasser, that "the A-10 represents a breakthrough in the cost-effectiveness of close air support." As forecast three years ago, it is "lethal, accurate, agile, and cheap," to a degree not found in any other close-support aircraft. ■

Reprinted by courtesy of AIR FORCE MAGAZINE