OCTOBER 1975 / $1

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

FIRST FLIGHT OF YC-15 IN USAF's AMST COMPETITION

It took a lot of technology to change a name like United Aircraft.

Because we're now a multi-market company, our old one-market name no longer fits.

The name our company has borne since 1934 is hardly descriptive of the activities in which we are now engaged.

While our traditional aircraft and aerospace businesses continue to grow, we've tapped the vast technology bank that's evolved from these operations to enlarge the company's business base in industrial and commercial fields.

Through the selective exercise of our abilities and skills over a wide spectrum of high technologies, we're now a multi-market corporation. But one with the same solid, dependable virtues. A corporation with 1974 sales in excess of $3.3 billion, substantial financial strengths, a 39-year record of consecutive dividend payments, a truly international business with representation in some 120 countries of the world.

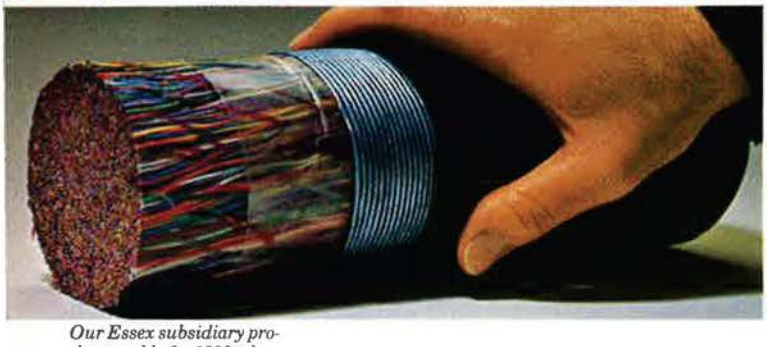
We're also a corporation with a promising future. Because when all those technologies are United, there's no limit to our powers of invention. United Technologies Corporation, Hartford, Conn. 06101.

	1974	1964
Total Sales	$3,321,106,000	$1,235,918,000
Net Income	104,705,000	29,084,000
Business Backlog	3,577,000,000	1,200,000,000

UNITED TECHNOLOGIES™

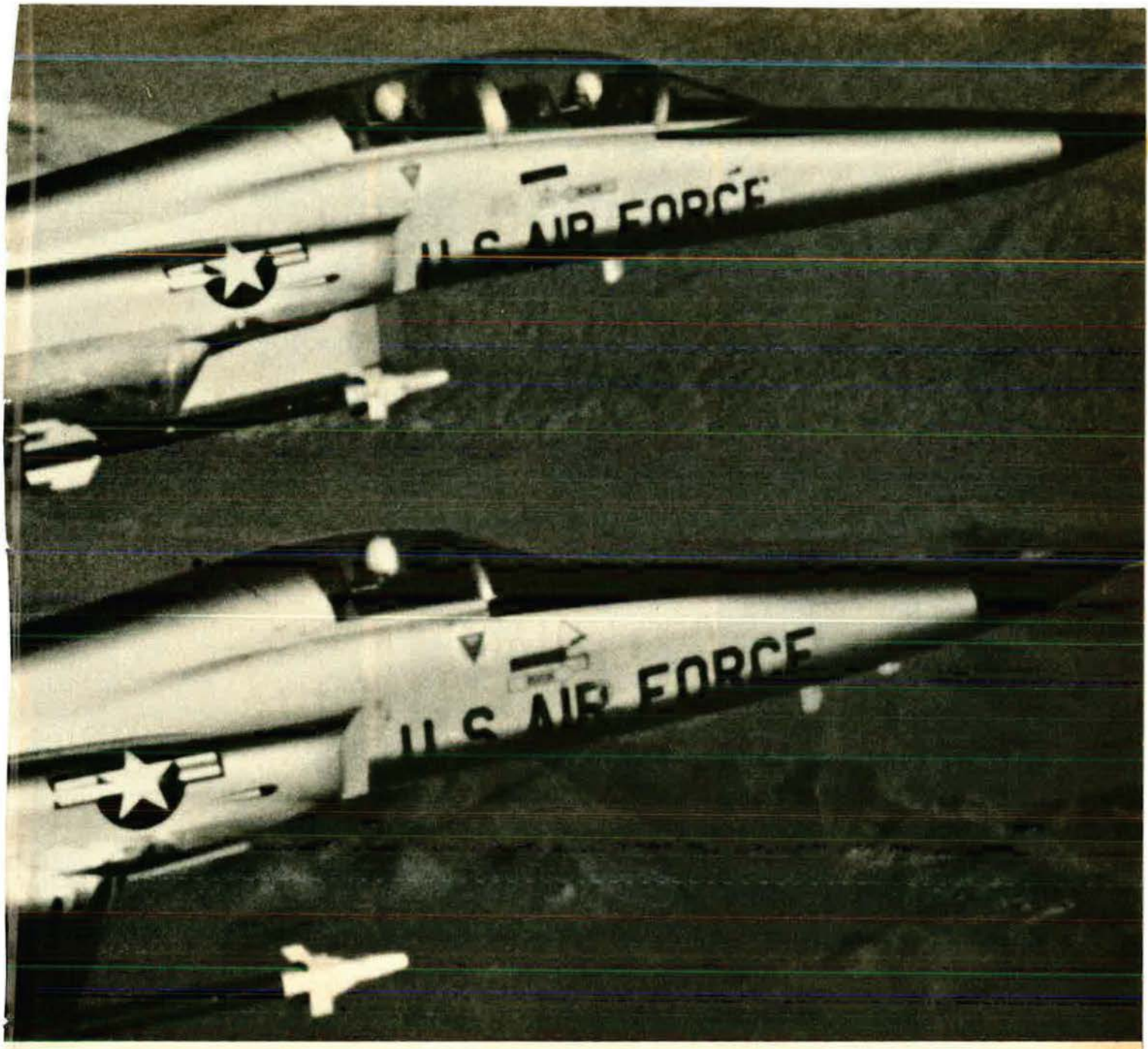
Hamilton Test Systems' Autosense® is the world's most sophisticated computerized diagnostic unit for automotive engine analysis.

Electric utilities use our gas turbines in single- and multi-engine plants for peak demand. These units come in modular packages for fast on-site installation.



Our Essex subsidiary produces cable for 1600 telephone companies, and has pioneered in moisture-proof cable for underground installation.

We'll always be a major force in flight—both military and commercial. Our Pratt & Whitney Aircraft engines power aircraft for 188 airlines around the world.



Companion Ship.

The Northrop F-5E Tiger II is in good company when its companion is the two-place F-5F.

Both are high-performance fighters with excellent combat agility and weapons delivery accuracy, air-to-air and air-to-ground.

But the versatile F-5F, with its second cockpit and dual controls, can be used for advanced pilot training, as well as combat crew training, while retaining full combat capability.

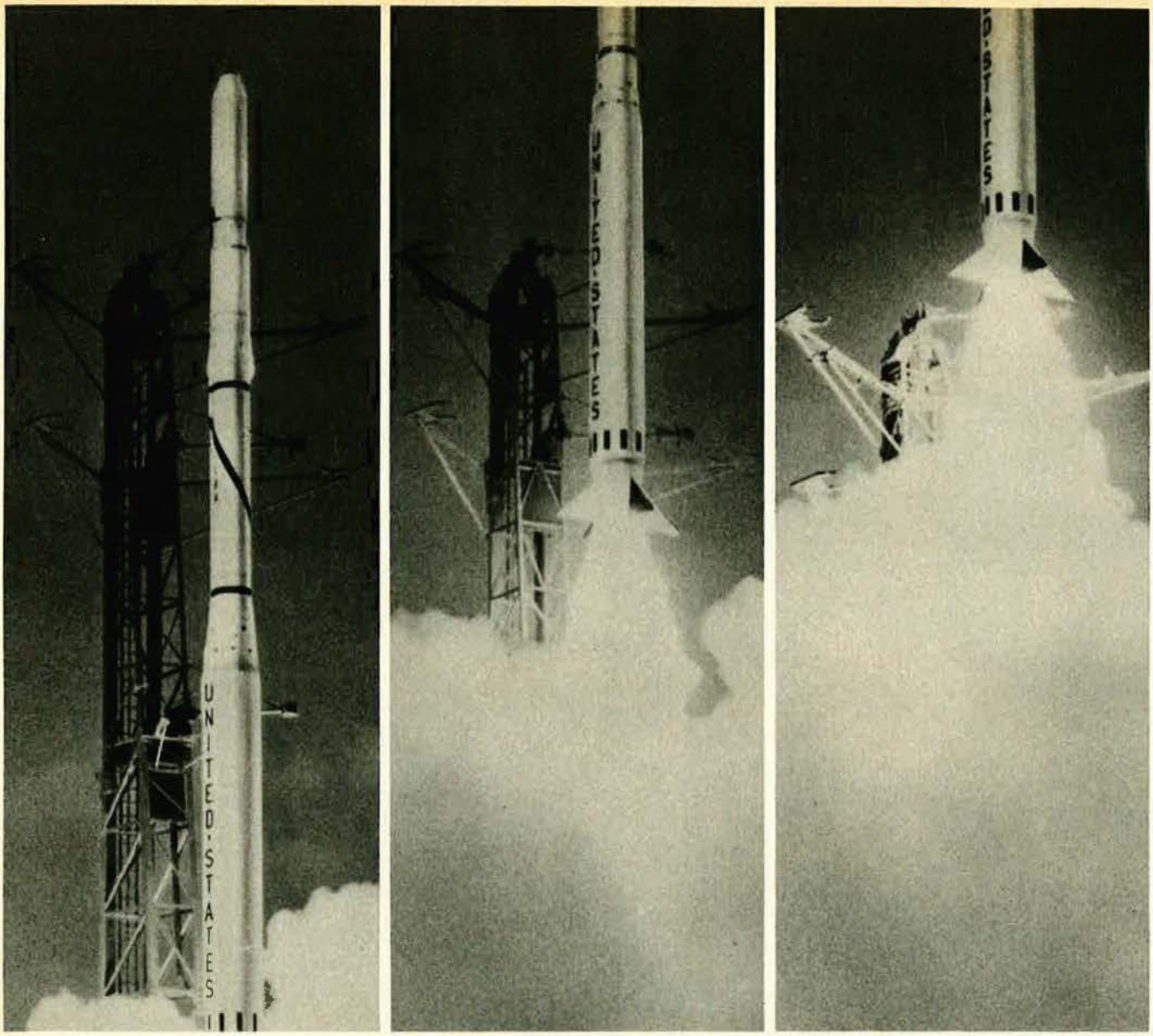
The easy maintenance, rapid turnaround, and extended endurance of the F-5E and F-5F, coupled with their proven performance and training capability, have made this pair of Tigers ideal for countries requiring flexible defense systems at affordable costs.

The F-5E and the F-5F join the F-5 on duty, or on order, with the air forces of 22 nations. We have delivered more than 2,600 aircraft in the F-5/T-38 series so far. On time. On cost. With the promised performance, or better.

These planes, together with the new McDonnell Douglas/Northrop F-18 for the U.S. Navy, make up the Northrop family of fighters—high performers at affordable costs.

Northrop Corporation, 1800 Century Park East, Los Angeles, California 90067, U.S.A.

NORTHROP



The trustworthy Scout. Another successful launch would hardly be a long shot.

The Scout launch vehicle holds the NASA record for dependability.

It's certainly no surprise when another Scout is launched successfully.

Because since 1963, the four-stage, solid-propellant Scout has achieved an operational success rate of over 95 percent.

That's one reason the Scout is NASA's lowest-cost orbital launch vehicle, with payload capabilities that have tripled since its inception with NASA and the Department of Defense. And it also has performed probe and re-entry missions.

These missions have supplied scientists with a potpourri of valuable information: From testing radioisotope thermoelectric generators to measuring ion densities to pinpointing the sources of X-rays and ultra-violet radiation in the atmosphere, the Scout continues to help get the job done.

This kind of proven dependability is why the Scout also serves France, Germany, Great Britain, Italy, the Netherlands and the 10-nation European Space Research Organization.

The stakes are too high to risk using anything else.

LTV AEROSPACE CORPORATION
A SUBSIDIARY OF THE LTV CORPORATION

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

OCTOBER 1975
VOLUME 58, NUMBER 10

This Month

ABOUT THE COVER

The YC-15—the McDonnell Douglas entry in the AMST competition—has made its first flight, and all went very smoothly. For details and more pictures, see pp. 16 and 19. AMST stands for Advanced Medium Short Takeoff and Landing Transport.

Departments

AIR FORCE Magazine (including SPACE DIGEST) is published monthly by the Air Force Association, Suite 400, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. **Phone:** (202) 452-7300. Second-class postage paid at Washington, D.C. **Membership rate:** $10 per year (includes $9 for one-year subscription); $24 for three-year membership (includes $21 for subscription). **Subscription rate:** $10 per year; $2 additional for foreign postage. Single copy $1. Special issues (Spring and Fall Almanac issues and "Military Balance" issue) $2 each. **Change of address** requires four weeks' notice. Please include mailing label. Publisher assumes no responsibility for unsolicited material.

BPA **Circulation audited by Business Publication Audit**

The world has waited 43 years for this

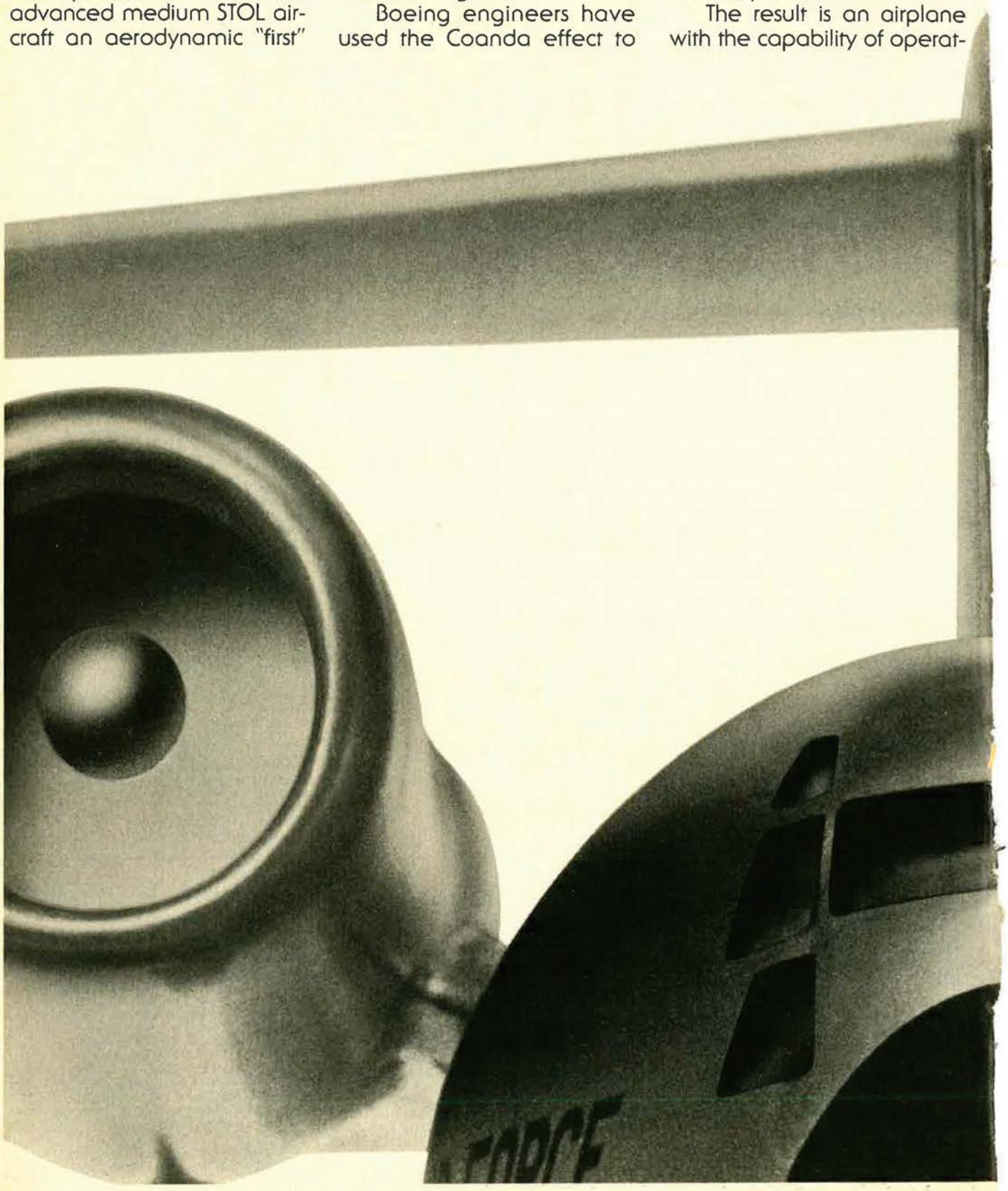
The Boeing YC-14 two-engine jet transport will fly in 1976.

The revolutionary, new concept that will make this advanced medium STOL aircraft an aerodynamic "first" was patented by Henri Coanda in 1932.

The Boeing adaptation of this idea is called upper surface blowing.

Boeing engineers have used the Coanda effect to create powered lift. Thrust from the aircraft's two engines is blown over the wing flaps and is directed downward for added, powered lift.

The result is an airplane with the capability of operat-



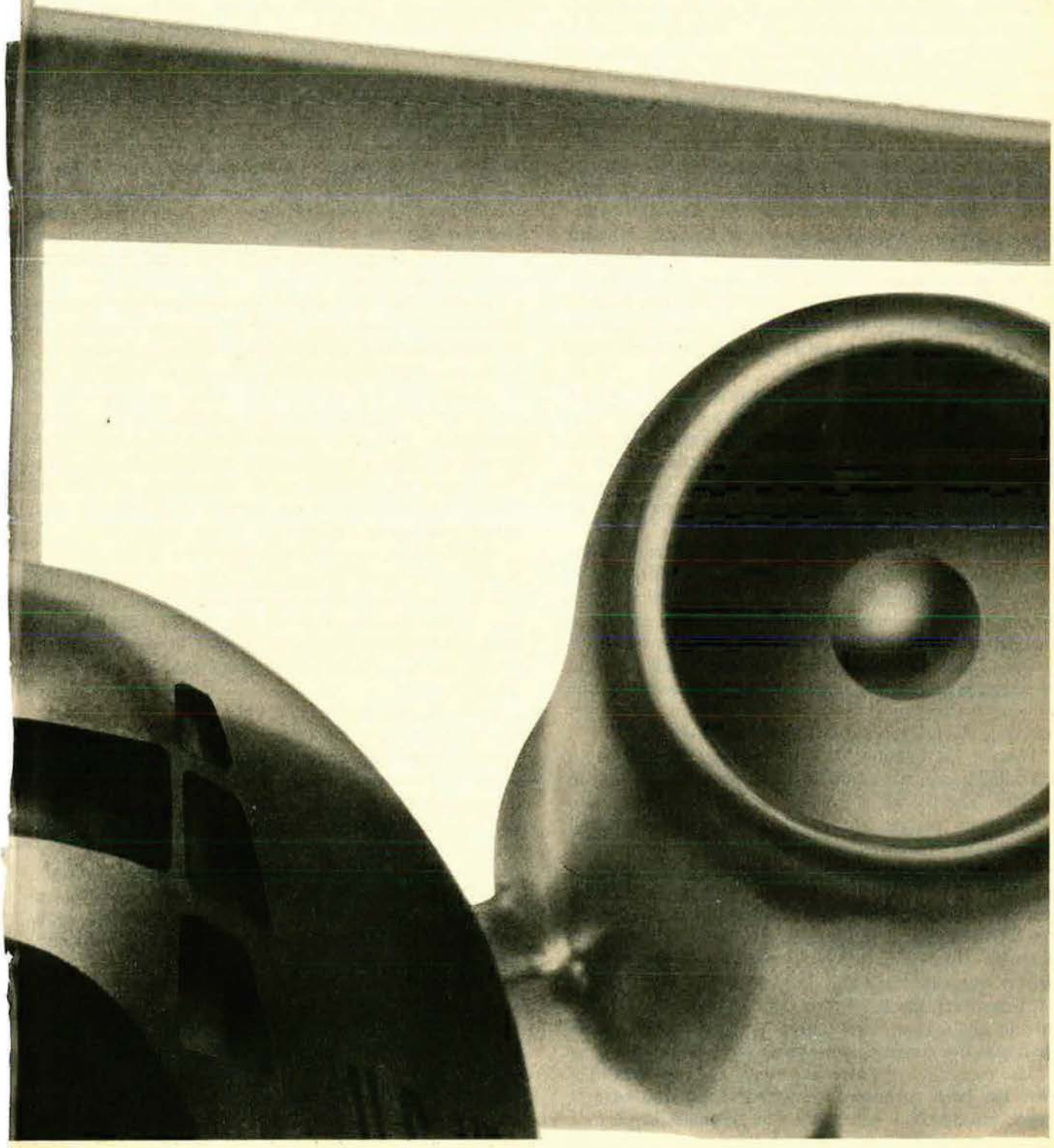
idea. It's worth waiting one more.

ing from an unimproved field less than half the length of those required by standard aircraft of comparable size.

The YC-14 can take off and land on a 2,000-foot field with a 27,000-pound payload. Carry 69,000 pounds to and from a 4,100-foot field. Cruise at 450 miles per hour and land at a lazy 100 miles per hour.

There's no other plane like it. And after 43 years, it's worth waiting one more.

BOEING YC-14



The CIA Hearings

By John L. Frisbee, EXECUTIVE EDITOR, AIR FORCE MAGAZINE

WASHINGTON, D. C., SEPTEMBER 10

CONGRESSIONAL hearings on the operations of the Central Intelligence Agency, in progress for several weeks before Congress adjourned in August, are scheduled to resume this month. Although far from completed, the hearings already have damaged the ability of our intelligence community to collect information on which defense planning must be based. Disclosure of classified and sensitive information by a few committee members and staffers has created a reluctance on the part of friendly foreign governments, civilian scientists, foreign policy experts, and others to cooperate with US intelligence agencies. Deputy Secretary of Defense William Clements comments on the seriousness of that situation in the article beginning on p. 24.

Ironically, up to this point the hearings have focused almost exclusively on the CIA's covert operations, which are only peripherally related to gathering and analyzing national security intelligence.

The blow the hearings have dealt to US intelligence capability could hardly have come at a worse time. We are confronted on the one hand by the burgeoning military might of the USSR which, during the course of SALT negotiations, has moved the Soviet Union from a position of strategic parity to at least the threshold of superiority.

On the other hand, serious social and economic problems at home are drastically limiting our ability—or at least public willingness—to invest in national defense. In practical terms, we cannot afford to spend any more on defense than is absolutely essential, nor can we afford to spend less. The line between too much and too little is exceedingly narrow. Defining it requires very fine judgments that can be made only on the basis of expertly and objectively analyzed intelligence information.

Despite the damage that the hearings have done to US intelligence, we admit to some ambivalence on the subject. The record of the US intelligence community is far from perfect. Responsible, discreetly conducted examination of that record is overdue.

A few examples: Testimony presented to the Congress by a succession of Defense Secretaries between the early 1960s and the early '70s, presumably based on the CIA's National Intelligence Estimates (NIEs), consistently underestimated Soviet ability and intention to deploy long-range missiles. Parenthetically, during most of these years, the Air Force's projection of the USSR's missile deployments was closer to actual deployments than was the consensus on which NIEs were based.

The capability of Soviet scientists and engineers likewise has been consistently misread. To take a case in point, the SALT I agreement was defended in part on the estimate that the USSR would not be able to deploy MIRV warheads before 1977. Today, the Soviets have MIRVs in the field on at least two and probably three types of ICBM. Further, there is growing evidence that estimates of Soviet military manpower and defense budgets have been decidedly on the low side for years. And these are the kinds of intelligence on which US defense planning is based.

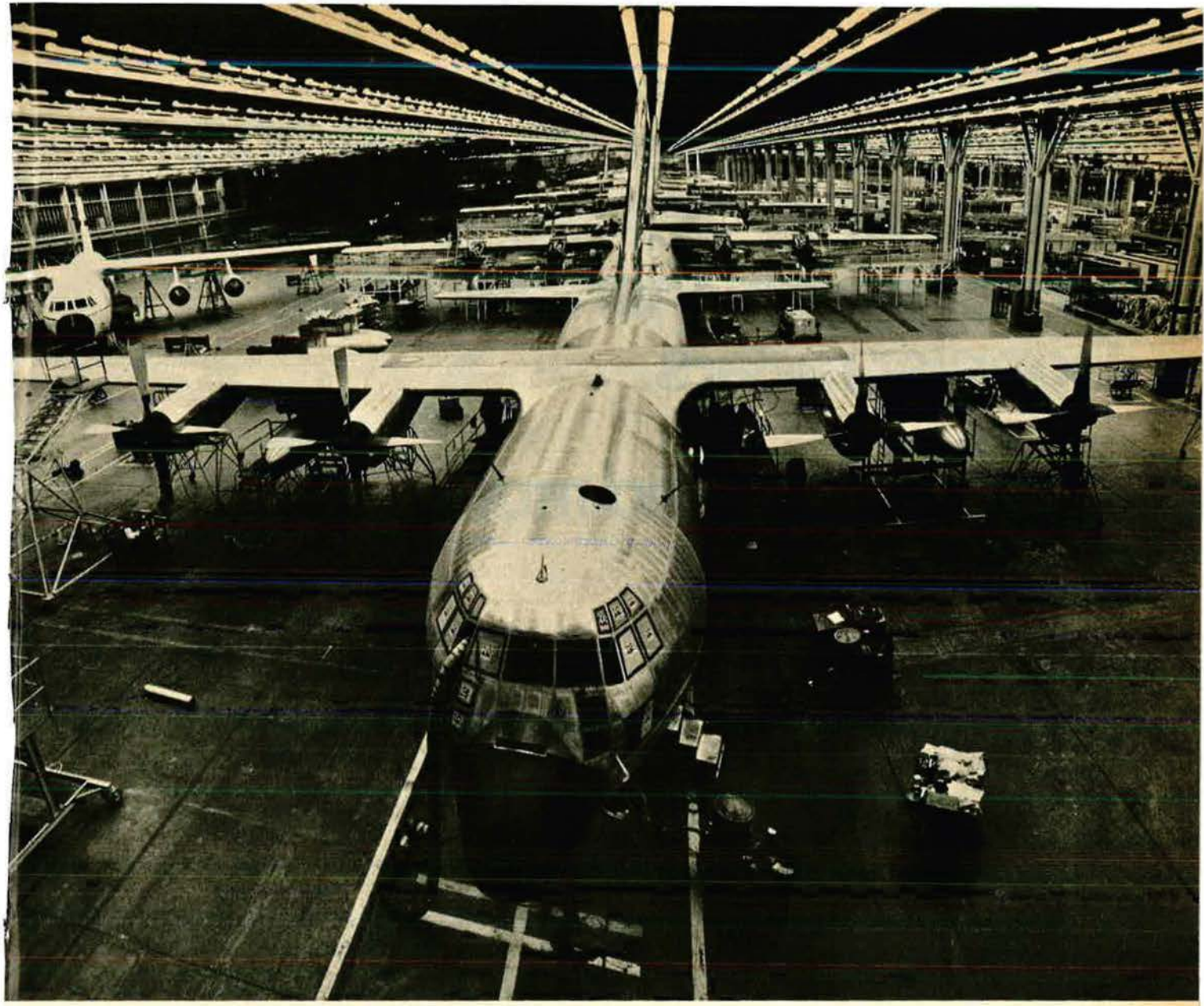
It is difficult to avoid the conclusion that threat estimates have become more a rationalization for the No. 1 US foreign policy goal—détente—than they are an objective basis for defense planning. Or, equally dangerous, that they may be a reflection of tenaciously held biases on the part of those responsible for threat assessments and force projections.

In either case, we believe the apparent gap between estimates and reality is a result of the overcentralization of intelligence analysis and threat estimates in the CIA, a process that began during the early years of the Kennedy Administration. That move was partially a reaction to the military services' practice of using threat intelligence for self-serving purposes. As centralization increased, highly classified threat intelligence has become so closely held that there are, in effect, only very limited checks and balances in the process of arriving at National Intelligence Estimates.

How best to restore a closer balance is not an easy matter in an open society, but it is one to which the congressional committees should address themselves. If war is too important to be left to the generals, the basis on which national defense must be planned is too important to be left to the judgments of any single organization.

Establishing a balance that will assure objective assessments is not a job for a part-time oversight committee, either on the Hill or elsewhere. It calls for the best efforts of full-time intelligence professionals. We believe it essential that the military services, in conjunction with the Defense Intelligence Agency, be given a larger voice in developing National Intelligence Estimates. It goes without saying that the services would have to refrain scrupulously from the past practice of using intelligence information, which often they now are denied, as a weapon in interservice battles for a share of the defense budget.

If the congressional hearings, on both sides of the Hill, are conducted responsibly and constructively, and if they are brought to focus on the prime function of US intelligence rather than the headline-grabbing aberrations associated with the CIA's covert operations, they can be of immense importance, offsetting the early damage that has been done. ■



Hercules.
The airlifter whose time keeps coming.

Years ago the world needed an airlifter able to carry cargo such as fully assembled trucks and bulldozers. An airlifter strong enough to land and take off from short dirt, gravel, sand or snowy runways. An airlifter built for quick loading and unloading without ground-handling equipment. An airlifter able to haul 45,000 pound payloads for 2,800 statute miles.

Today the world needs that airlifter more than ever. Which is why ten nations ordered the Lockheed Hercules last year.

Why do countries keep selecting Hercules? Because Lockheed has 20 years experience working with countries that need great airlift, and it keeps making Hercules better and better. To begin with, the Hercules' airframe is classic in its functional simplicity. High wings let the fuselage almost hug the ground for fast loading. A huge rear cargo opening enables tractors to drive on and off. Sturdy landing gear handles the jolts of remote fields.

Inside, Hercules is almost new with avionics systems updated from nose to tail. All basic operating systems have been improved. The 1975 Hercs, for example, will have new radar, air conditioning and auxiliary power systems.

Hercules. The timeless airlifter, chosen by 37 nations.

Lockheed Hercules

By any measurement, Teledyne Ryan's AN/APN-200 & AN/APN-213 are 10 times more reliable than any other Doppler radars.

S3A Viking ASW

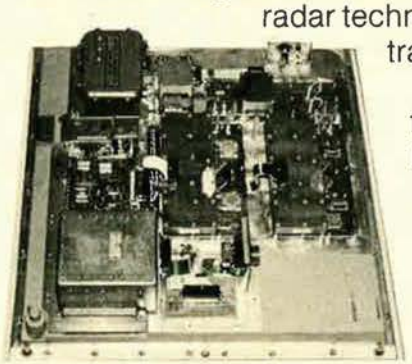
And more.

USAF E-3A AWACS

C-141 Ciris

NOAA WP3D
"Project Storm Fury"

Teledyne Ryan's newest Doppler radar velocity sensor has stood the test of time: More than 45,000 operating hours—with an MTBF of 2400 hours in Lockheed's S-3A Reliability Assurance Measurement (RAM) program. Over 1400 hours under the MIL-STD-781 reliability test program—the toughest test in the book—produced documented proof that Ryan's AN/APN-200 & AN/APN-213 are at least 10 times more reliable than any other fixed-wing Dopplers. With test-proven aircraft velocity accuracy of 0.1%. Better reliability means better operational cost effectiveness. So this Doppler's life-cycle cost, or total cost projection, is a fraction of anything else like it in the air. How did Teledyne Ryan bring it off? Starting with unique single-unit antenna construction, the AN/APN-200 & AN/APN-213 feature an IMPATT diode transmitter, stripline microwave receivers and integral BITE. The hybrid packaged integrated circuitry is a refinement of our aerospace—and outer space—proven radar technology. Then, we piggybacked the Doppler's signal trackers and power supply on the top side of the four-fixed-beam planar array antenna. Result: The finest fixed-wing Doppler radars in the free world. Teledyne Ryan's AN/APN-200 & AN/APN-213 . . .far and away the reliability and accuracy leaders.



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Airmail

Rated Supplement Tours

Gentlemen: I feel a need to register my protest against the latest AFMPC policy of assigning rated supplement tours to Air Training Command Instructor Pilots. The latest selection rate in our command is approximately ninety percent, with no end in sight for over a year from now. As a "plowback" IP, I have become extremely concerned about the implications of the rated supplement program on my career progression.

I believe it is axiomatic that a rated officer must establish early in his career: (1) a MAJCOM identity, such as TAC, MAC, or SAC, and (2) a weapons system, *i.e.,* F-4, C-141, or B-52. When a plowback IP finishes his tour in ATC, he has neither of these qualifications. Now force him to take a rated supplement, and you end up with a rated officer of seven to eight years' service with no operational MAJCOM experience. What command, aside from SAC, will be willing to take on such an officer and train him for their aircraft? And without that all-important experience, how well could that officer possibly do in competition for OERs and promotions compared to, say, another officer with seven or eight years' experience in that command and with that weapons system?

Nothing gripes me more than to know that a command like TAC doesn't care to bring me aboard from an ATC assignment, and yet they are willing to train a brand-new UPT grad after I've taught him how to fly. Certainly it would be cheaper and easier for TAC to train an experienced instructor pilot than the green pilot. Since ATC commanders are always praising the worth of their IPs, I think it is high time that they stop trying to kid us and give us our just rewards. The rated supplement may be a necessary AFMPC assignment tool, but the choosing and the timing are all wrong.

1st Lt. Ellis W. Sharadin, USAF
T-37 Instructor Pilot
Columbus AFB, Miss.

NATO–Warsaw Pact Balance

Gentlemen: I could not help but compare Mr. Frisbee's editorial "The New Soviet Threat to NATO" with the relatively unconcerned attitude of General Brown regarding the NATO situation as expressed in the article, "General Brown looks at US Defense Needs" (*August '75 issue, pp. 6 and 33*). General Brown is quoted as saying, "The Soviet bloc leads in manpower strength, tanks, artillery, and air defense. They are ahead in the number of tactical aircraft, but I doubt that either their people or their equipment can match ours. They have had no combat experience since World War II, while our people are truly battle tested."

With all due respect to the Chairman of the Joint Chiefs, it would be interesting to check the actual percentage of NATO troops that are, in fact, battle tested. I would be amazed if the number exceeded ten percent. As for the superiority of equipment and people, recent experience in the Mideast wars, and past experience with the countries involved, justifies some skepticism of that assumption.

The fact of the matter is, as Mr. Frisbee suggests, that NATO military strength, compared to the Eastern European Bloc, is impressively underwhelming. Further, General Brown makes no mention of the obvious uncertainty of Greek or Turkish participation or of Russia's growing ability to seriously interfere with the flow of oil to Europe.

The problem, of course, is the obvious effect this sort of bland assurance has on members of Congress. Their inability to see a need for a base at Diego Garcia, to protect the flow of oil, is a case in point.

In summary, until our senior military officers begin "viewing with alarm" the fact that Russia, while talking détente, is apparently preparing for war, I doubt if editorials, even one as excellent as Mr. Frisbee's, will get our national head out of the sand.

Maj. Gen. George V. Williams,
USAF (Ret.)
Hilton Head Island, S. C.

Nino Baldachi Again

Gentlemen: I am writing regarding the letter from 1st Lt. Nino Baldachi that appeared on page 11 of the July '75 issue of your prestigious magazine. I am very sorry to inform you that you have just been the object of a superb joke. As any USAF Academy graduate can tell you, "Nino Baldachi" is a figment of USAF Academy cadets' imagination. He is a fictitious character who has been "a fictitious member" of each Academy's class since 1959. I am sure that the 57th Fighter Interceptor Squadron is a real unit; unfortunately Nino Baldachi is not. I am sure all the graduates of the USAF Academy are now having a hearty laugh!

1st Lt. Joe Dab Babaluchi, USAF
Pope AFB, N. C.

• *We've long felt that the magazine is short on humorous material, so we welcome it when we get it, even unwittingly. Now that Nino Baldachi's cover is blown, we may as well tell you that we've had a number of letters from his classmates, about evenly divided between concern that he hasn't yet made captain and that he might make captain. Yes, the 57th FIS is for real. We're not so sure about Joe Dab.*—THE EDITORS

WW II Airmen in Australia

Gentlemen: I am currently collecting information concerning personnel of the Fifth AAF, World War II, with particular interest in those squadrons that operated from the Charters Towers field in North Queensland, Australia.

As an eleven- and twelve-year-old boy, I had contact with some of those airmen and their aircraft. Part of a book I am now writing will have a few chapters recording the history of this time and place from the eyes of a boy.

So that this record will be more complete and accurate, and, hopefully, one day useful, I would like to contact some of those men. I have set down a list of officers, with some sketchy details, and would appreciate any leads readers may give me:

Lt. R. G. Oestriecher, P-40 pilot, 33d Pursuit Squadron; Capt. "Chug" Chuduga, A-24 pilot, 27th Bombardment Group (Light), and later the 8th Squadron of the 3d BG (L); Lt. "Tommy" Thomson, cocrew [copilot?] with Captain Chuduga; Captain Angel, B-25 pilot of aircraft "Baby Blitz," 3d BG (L); Col. John

Airmail

H. Davies, 27th and 3d BGs (L); Capt. George E. Kiser, Somerset, Ky.; Lt. Donald M. Morse, Augusta, Me.; Lt. Chris Herron, Pittsburgh, Pa.; Lt. Dennis Seffron, Manawa, Wis.; and Lts. James Macafee; Clapp; and Pierre Powel [Powell?].

Lieutenant Oestriecher was not stationed in Charters Towers but he holds a unique distinction in that he shot down the first two aircraft over Australia. Unfortunately, he was shot down the next day. His aircraft ended up in Charters Towers, having been trucked to Mount Isa and railed to Charters Towers, where I was able to inspect it.

Noel Tunny
Roscommon House
Glen Road, Toowong
Queensland, Australia

Attention Flying Tigers

Gentlemen: I would greatly appreciate it if you could provide me with some information regarding a war souvenir that I have held for over thirty years. It is a silk handkerchief printed with an American flag and statements in French, Japanese, Chinese, Korean, Thai, Lao, and Annamese.

The French statement translates as follows:

"I am an American aviator. My plane is destroyed. I am not able to speak your language. I am an enemy of the Japanese. Have the goodness to protect me, to care for me and to conduct me to the allied military bureau as soon as possible. My government will repay you."

This handkerchief was apparently carried by the Flying Tigers and the US Air Force in China in the early 1940s. Each such handkerchief is identified with a serial number, and the one I own is serial number 69575.

I would greatly appreciate it if you could insert a personal notice regarding this handkerchief in case that former members of the Flying Tigers may be able to assist me in locating its original owner.

Charles Burton, M.D.
Director, Sister Kenny Institute
2545 Chicago Ave.
Minneapolis, Minn. 55404

Flight Training Manuals

Gentlemen: I am writing a book on the history of flight training and require some help.

I would like to locate original text books used in flight training during the period 1941 to 1948.

I have tried other sources but so far to no avail. Any help your readers can give me will be greatly appreciated.

Alfred F. Tenuta, Jr.
700 West Rand Road C-308
Arlington Heights, Ill. 60004

UNIT REUNIONS

7th Fighter Command/Wing

Thirtieth Anniversary reunion dinners for members of the 7th Fighter Command, 7th Fighter Wing, and WARDS will be held in San Francisco on October 10 at Admiral Nimitz Club, Treasure Island, and on October 11 at Presidio Officers' Club. Contact

William J. Boga
12000 Broadway Terrace
Oakland, Calif. 94611
or
Col. Sam Smith (Ret.)
261 Meadow Rock Way
Folsum, Calif. 95630

94th Bomb Group (H)

Former members of the 94th Bomb Group (H) will hold their first reunion October 17–19, 1975, at the Las Vegas (Nev.) Jockey Club. For registration forms and details contact

John Woolnough
Reunion Services
P. O. Box 1304
Hallendale, Fla. 33009
Phone: (305) 921-2161

96th Bomb Group

Lt. Col. John Woolnough, USAF (Ret.), editor of *8th Air Force News,* and Maj. Leo Freedman, USAF (Ret.), director of Gulf Coast Area Combat Pilots Association of USA, have asked me to act as contact member to try and reactivate the 96th Bomb Group Association. Would appreciate hearing from 96ers.

Robert W. Owens
900 S. Western Ave.
Suite 2-R
Chicago, Ill. 60612

392d Bomb Group

A roster of members of the 392d Bomb Group and attached units, based at Wendling, England, during WW II, is being compiled for reunion purposes. Contact

Col. Bob Vickers (Ret.)
4209 San Pedro, NE
Apt. 316
Albuquerque, N. M. 87109

457th Bomb Group (Fireballers)

A reunion is planned for July 3, 1976, at Bentonville, Ark., for all who served at Glatton, England, with the Group Hq., 748th, 749th, 750th, 751st Squadrons, the Sub Depot Unit, Medical Detachment, and the 1790th Ordnance. Contact

Homer L. Briggs
811 N. W. "B" St.
Bentonville, Ark. 72712

Class 61-Delta

The fifteenth anniversary reunion of Air Force Pilot Training Class 61-Delta will be held in San Antonio, Tex., November 6–8. For further information contact

David L. Roberts
4540 Kellogg Circle
Dunwoody, Ga. 30338
Phone (404) 458-4792

Schweinfurt Vets

Veterans of the second Air Battle of Schweinfurt, October 14, 1943, please send your address to

Phillip Taylor
3158 Fiji Lane
Alameda, Calif. 94501

USAFA Military History Symposium

The USAF Academy will hold its Seventh Military History Symposium on September 29 and October 1, 1976. Subject will be "The American Military on the Frontier." Further details on the theme, program, and participants will be published in the near future. For information, write

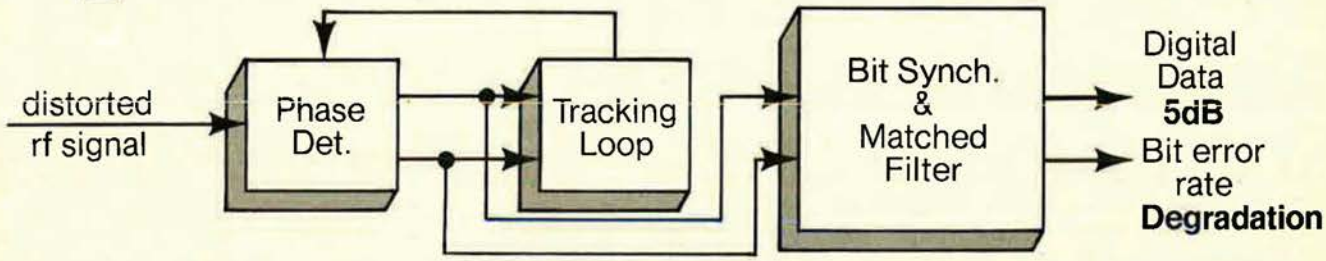
Capt. David Miles
Department of History
USAF Academy, Colo. 80840

Department of Amplification

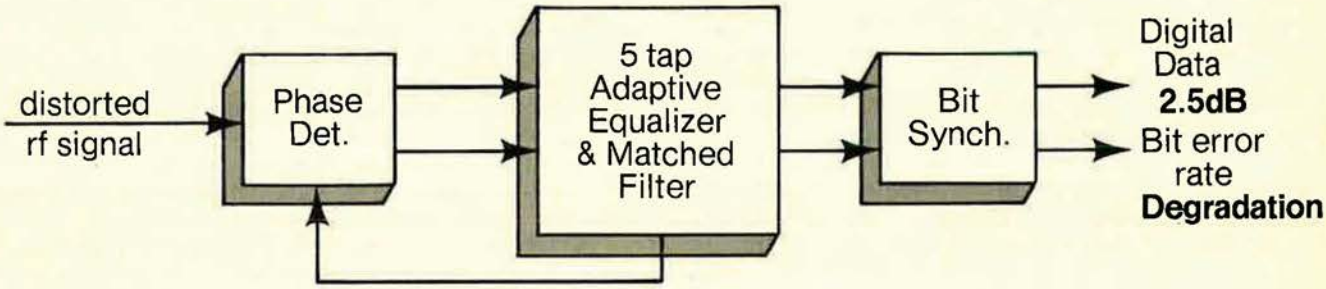
It is six months since April, but in the belief that it is never too late to correct a mistake or right a wrong, we must call attention to an error of omission in our issue of that month. In it, James Abernethy was identified in a photo caption (p. 15) as a "USAF civilian personnel specialist." The photo showed Mr. Abernethy receiving his retirement certificate from then DCS/Personnel Lt. Gen. John Roberts. (Lest we get into more trouble, General Roberts is now Commander, Air Training Command.) What we *didn't* say about Mr. Abernethy was that, during his last three years of a total of thirty-three in the Federal Service, he was USAF Director of Civilian Personnel, was lauded for his efforts in bringing civilian personnel into the Total Force Management program, and that he received his second AF Exceptional Civilian Award from Secretary John L. McLucas. Additionally, he has long been a source of counsel and support for the Air Force Association.

—John F. Loosbrock, Editor

Space Data Distortion



One-Half Off.



***State-of-the-art**... a 5-tap adaptive equalizer has been demonstrated to recover over half the degradation caused by both rf multipath distortion and dominant sources of hardware distortion."*[1]

***Background.** Adaptive equalization techniques had solved major distortion problems in handling high-speed data over land lines. But no one made the principle work in a high-data rate microwave QPSK link. We did. Successfully.*

Here's what it can mean to you.

The reduction of both distortion and cost in a wide range of high speed data systems.

The creative application of adaptive equalization and our other high technologies to the solution of data system challenges.

And right now we can demonstrate results applicable to wideband data systems at rates up to 1 gigabit per second with significant designed-in savings.

(1) Stilwell, J. H. and Ryan, C. R., Performance of a High Data Rate Adaptive QPSK Modem Under Media Distortions, paper presented June 1975.

Our experience includes 7-bit resolution, 20 megasample per second low power A-D converters, gigabit/second multiplexers and digital processors, and transmitters and receivers.

Add to this: 1) years of experience in designing advanced circuits and building hardware to exacting DoD and NASA specifications; 2) careful integration of complex functions into complete data-to-readout systems; 3) a unique I/C capability, and you get a combination unmatched in industry. With this combination, on-schedule, on-budget delivery of the most advanced high data rate systems becomes a dependable reality.

For more data without distortion on a design-to-cost budget, call or write Floyd Danielson at 602-949-3305 at Motorola Government Electronics Division, 8201 E. McDowell Road, Scottsdale, AZ 85257.

MOTOROLA
The mind to imagine . . . the skill to do

Airpower in the News

By Claude Witze
SENIOR EDITOR, AIR FORCE MAGAZINE

Through a Closed Window

Washington, D. C., September 5

Congress is back in town from its summer recess, and the first forty-eight hours have been spent pointing to the trouble ahead. It is Henry Kissinger who is in the headlines more than the senators and representatives, as he just flew in from the Middle East with a document under his arm that Congress must examine and approve.

It is no secret that Dr. Kissinger's relations with the Senate and House are at low ebb. Some say they are poisonous. Perhaps perilous is a better word. The Secretary of State is a brilliant man, and he has handled trouble before. This is a good time to recall that back in January of 1973, with the war in Vietnam and Nixon in the White House, Dan Rather of CBS reported as fact that there was a rift between Dr. Kissinger and the President. Columnist Joseph Kraft wrote that Dr. Kissinger abhorred the policy he was executing and soon would leave. Tom Braden, another columnist, predicted "Kissinger will go." They were wrong.

It is not yet possible, at this writing, to explore the implications for the Defense Department that lie pregnant in the new Israeli-Egyptian-American pact aimed at a lasting peace in the Middle East. The proposal that American civilian technicians be stationed in the Sinai to operate a warning system stirred up dust as soon as it was announced just before Labor Day. Mike Mansfield, the Senate majority leader, is afraid it could be the first step to another Vietnam. Armed Services Chairman John C. Stennis says he is "queasy" on the subject. Democrat Carl Albert, the House Speaker, also has reservations. These men are leaders in Congress, but it is difficult not to suspect they are diverting attention, possibly on purpose, from the real rub. The rub is that Henry Kissinger's popularity in Congress has declined, and the fact that 1976 is a presidential election year does nothing to enhance it. It is open season on the White House.

Because it is premature to walk on these eggs in print, it might be useful at this point to examine another issue that lies just down the legislative highway. It appears that the Middle East agreement and the energy problem will get first priority as debate begins next week. Soon after that we must come to Turkey, the arms embargo against that NATO ally, and the potential loss of US listening posts in Turkey. This whole affair, it can be demonstrated, is a key item in the struggle between Congress and the executive branch over foreign policy. The strategic implications, both to NATO and the Middle East, are monumental.

It was last year, during action on foreign aid legislation, that Congress challenged President Ford and Secretary Kissinger over the Turkish issue. What Congress said, with amplification from a high-powered Greek-American lobby, was that military assistance to Turkey is barred because Turkey used US weaponry in its invasion of Cyprus. There was a long wrangle in October of 1974, in which the President used his veto freely but ended up with a compromise that effectively embargoed arms shipments to Turkey.

The whole issue came up again in July, just before the summer recess. This time there was an effort to turn the House around, and it failed. The opposition to arms sales is centered in the lower chamber, which turned its back on a proposal that would have permitted:

1. The delivery of $185 million in equipment paid for by the Turks before the embargo went into effect last February 5;
2. Commercial cash sales;
3. Government sales, guarantees, and credits for equipment the Turks need to fill their NATO responsibilities.

The first time around, the idea was rejected by the House, 206 to 223. A last-ditch attempt to have the plan reconsidered was blocked by a simple procedure. Chairman Ray J. Madden (D-Ind.) of the House Rules Committee opposed the bill. He refused to convene the committee and permit the bill to come up for a vote.

In between these two efforts, the Ankara government assumed control of twenty-six US bases in Turkey. Included are at least four intelligence-gathering facilities considered essential for information on Soviet military activities.

Almost at once, there was an argument, carried on during and after the House debate, about how essential the bases really are.

Defense Secretary James R. Schlesinger warned early of a substantial loss in our intelligence-gathering capability. "A major portion of our coverage has, of

—*Wide World Photos*

CIA Director William E. Colby, shown here as a witness on Capitol Hill, has testified that the loss of listening posts in Turkey will deprive the US of information not obtainable from any other source.

The late Trevor Gardner was the man who first used information from Turkish radar stations. That was twenty years ago, when he was concerned about the race with Russia in developing ballistic missiles.

course, been out of Turkey," he said, stressing what this loss will do to weaken NATO defenses.

William E. Colby, Director of Central Intelligence, declared the base closings will bring deficiencies that cannot be "made up by any means of relocation."

Mr. Colby was supported by Fred C. Iklé, Director of the Arms Control and Disarmament Agency, who said the Turkish bases will be of increasing importance in monitoring future SALT agreements. He said they already have helped monitor the ABM treaty and will play a crucial role when we want to know what the Russians are doing with cruise missiles.

These statements brought a reply from Dr. Herbert Scoville, Jr., former deputy director of CIA, who said the bases are useful but "to say they are essential for verifying past or future SALT agreements would appear to be such an exaggeration as to raise questions as to the sincerity of those making the statements."

Dr. Scoville is associated with retired Rear Adm. Gene R. LaRocque at the Fund for Peace office, called the Center for Defense Information. He also has been active with the Members of Congress for Peace Through Law and contributes to their studies aimed at a cutback in national defense.

A few days after Dr. Scoville's statement, intelligence sources disclosed that the month of July was one of the busiest in the history of the Russian missile and space effort. Twenty-two missiles and nine satellites were fired or orbited. Much of this data was collected at a US radar post at Diyarbakir, in Turkey, one of those that became inoperative on July 26. What the Russians fired in August presumably is not known, except for what can be reported from sources outside Turkey.

With all of the current flap in Washington about our intelligence capabilities, and charges of their misuse, the best-informed officials are guarded in what they will say about anything, and that includes the Turkish affair. We have benefited for years from the accidents of geography that make observation posts in that country the most profitable in the world.

We have known this for twenty years. The first US radar monitoring post was operational in 1955. It was designed and maintained by General Electric, but was the brainchild of the late Trevor Gardner, who at that time was in charge of USAF research and development. At home, he was immersed in the ballistic missile program. From Turkey, he was able to obtain the first active confirmation of Russian activity in ICBM development. One of the news sensations of the day, and one that rocked even the White House, was the disclosure that the base was operating. The story first appeared in *Aviation Week*, whose editors reasoned that the Kremlin knew about the US radar and that there was no reason Americans should not know, particularly in view of the controversy over the essentiality of our own missile effort.

"Turkey is the optimum place," one expert told AIR FORCE Magazine. "It is the *only* place to watch and listen to what we call the VIPs—the Very Important Places." There are some of these VIPs that cannot be monitored without Turkish observation posts.

Missile launchings and the orbiting of satellites are not the only target. It is possible, from bases in Turkey, to keep a steady eye on the state of readiness of the Russian war machine and know its alert status at all times. This is because a substantial part of Russia's forces—twenty-six to twenty-eight divisions—is in that southern part of the country. There, the Soviet divisions are facing a NATO frontier, and NATO must, at all times, be able to assess the readiness of the Soviet forces.

This was demonstrated in October of 1973. There was an outbreak of fighting in which Israel was menaced. In the midst of it, President Nixon called a military alert for US forces. The reason was that through the Turkish window we saw a Russian mobilization of troop transports. One plausible explanation would be that Russian soldiers were preparing to invade the Middle East, where the Israeli army had the Egyptian army in a perilous situation. Whatever the Soviet military leaders had in mind, it was dropped at once. Intelligence experts are explicit about the value of watching these Russian forces on a day-to-day basis.

"If Russia moves into the Middle East," one of them says, "the forces that move will be the ones we see from Turkey, not the Russian forces in Mongolia."

Melvin R. Laird, the former Secretary of Defense and adviser to President Ford, has spoken out to deny that the Turkish bases are essential to monitor Soviet compliance with the SALT agreements. While acknowledging they produce valuable information, Mr. Laird insists the bases do not contribute to verification of the existing agreement or agreements reached in the future. The reference here is to the numbers of ICBMs on station, and Mr. Laird is right in that respect. But, experts point out, the Russians also are prohibited from deploying an antiballistic missile (ABM) system, and the Turkish bases are valuable in this respect.

"We need a feel for what they are doing; we must watch their R&D effort at all times," one scientist said, "and if they move in the direction of deployment of ABM systems, we would know it first from Turkey. Like General Custer, we cannot assume that the Indians over the hill are friendly."

There is an assumption by some supporters of the arms embargo, expressed on the floor of the House, that American technology can bridge the information gap with ease. The argument is that we can do without the Turkish bases. Their mission can be carried out from space or even with greatly improved surface devices, on the land and on the sea.

It is true, according to expert sources, that some things can be handled by "retasking." But there re-

mains a substantial loss. It is one that can be overcome only after years of effort, and the cost would run into the hundreds of millions of dollars.

"We can run a highly productive ground station for $20 million or $30 million a year," according to one specialist, "and it would cost ten times that just to go through the R&D required to take a new approach and get a costly new system into operation."

The intelligence specialists look upon Congress, and its imposition of the arms embargo against Turkey, with something approaching incredulity.

"Somehow," one of them said, "we have not been able to convey to Congress the true impact of what it has done to our, and NATO's, strategic capability. The situation now, as Congress reconvenes, results from our failure to explain the strategic situation on Capitol Hill. Congress never has had an understanding of the plain, hard facts on the Cyprus situation, to start with. This has snowballed into an even more critical situation in regard to the slamming of the window in late July."

He added that another important factor is what, in polite language, is "ethnic representation." That is a reference to the Greek lobby, which has been working hard. When Congressman Madden conducted a Rules Committee session on the subject, the Rev. Evagoras Constantinides, a Greek orthodox priest, was present, front and center. The priest is from Merrillville, Ind. Mr. Madden is his congressman, and Mr. Madden has admitted he was persuaded to take the pro-Greek stand by such lobbyists as Father Constantinides.

One of the few printed comments on the true extent of the pro-Greek persuasion appeared in the *Wall Street Journal.* The newspaper pointed out that the House, single-handed, may have altered the balance of power in the Middle East and damaged Israel's chances for survival. Many of the same liberals who give Israel strong support voted for the Turkish embargo, which closed the radar bases and left Israel with substantial new risks.

"But while the shrewd efforts of the Greek lobby are fathomable," the *Journal* observed, "it defies explanation why the contingent of liberal Democrats, who in their campaigns and earlier votes had strongly supported Israel, would now join in an effort that jeopardizes the Middle East security arrangements vital to the survival of Israel.

"Certainly they must realize that giving the Soviet Union unmonitored passage for arms shipments would at the very least heighten the dangers of a surprise attack on Israel. They must also be aware that weakening US defenses in the Eastern Mediterranean, now heavily dependent on Turkish air and naval bases, would reduce our ability to guarantee Israel's or even Greece's security."

The Ford Administration plans a new effort to have Congress lift the ban on arms exports to Turkey. It probably will not come until action is taken on the new Middle East agreement, which rates a higher priority.

The two issues have a couple of things in common. One is that their resolution will depend, to some degree, on the ability of Dr. Kissinger to prevail. The interim peace document involves more than the proposal that a couple of hundred Americans will be put on duty in a hazardous area. The agreement is going to be costly in dollars, possibly as much as nine billion in the next three years, which has led a few wits to call it the best agreement that money can buy.

The other thing they have in common is that they share a sharp interest from the Kremlin. It has been a Soviet aim for decades to smash NATO, and Russia has an essential interest in the Middle East. Destruction of the new agreement now also is a Russian objective. If Congress does not reverse itself on the arms embargo, the cheers from Moscow will drown out the mistaken delight, if any, in Athens. ■

The Wayward Press

According to the newspapers, which frequently print stories that never make the television screen, more than half a dozen advertisers pulled their commercials the other night from a CBS documentary about hunting. The show was called "The Guns of Autumn," and the papers say it contained graphic scenes of the killing of animals.

It appears that the National Rifle Association may have had something to do with this bringing of pressure on the network, which properly exercised its constitutional rights and went ahead with the broadcast, sans ads. It is estimated the canceled commercials represented more than $100,000 in lost revenue to CBS. The advertisers, it seems, had received calls from gun and hunting groups in Atlanta, Denver, Cincinnati, and other cities. Apparently they were intimidated, or at least CBS thinks they were.

And now, side by side with this twisting of corporate arms, we have the case of one Robert Metz, who has written a book and now suspects he is being boycotted by the major TV networks, who won't let him on the screen to plug his product. The book, in case you haven't guessed, is titled *CBS: Reflections in a Bloodshot Eye* (Playboy Press, $13.50).

Mr. Metz is quoted in a Washington newspaper to the general effect that if CBS does not like what you write about CBS, you will not be asked to discuss your book on CBS—or NBC, or ABC, either. In other words, the TV networks look upon a study of the bloodshot eye almost exactly in the same way the National Rifle Association looks upon a documentary about hunting.

In his promotional effort, reports author Metz, he has been turned down by NBC's *"Today"* and *"Tomorrow"* shows; ABC's *"AM America,"* and the syndicated Mike Douglas and Merv Griffin programs, both of which are seen on a lot of CBS affiliates.

Just to keep you from wasting $13.50, this department can vouch for *Reflections in a Bloodshot Eye* as a book about CBS that leaves us still in need of a book about CBS. It is gossipy, sometimes inaccurate, highly unbalanced. As a book, it displays an order of talent about equal to that of Sally Quinn working for CBS on a morning news show.

Conversation Pieces

Probing the High Energy Universe

Since radio astronomy began, only a few decades ago, some brand new words have been added to the dictionary. Pulsar, quasar, black hole . . . these are only the most talked about objects and there are more questions about them than answers. How do these largely invisible but annihilatingly powerful generators of electromagnetic energy fit into man's basic theories of physics? Or do they fit? Are we on the verge of fundamental changes in scientific thought?

To find preliminary answers, instrumented balloons and rockets were sent above most of the Earth's atmosphere, starting soon after World War II. Then, small satellite observatories made better measurements. But the need for more prolonged observations and bigger instruments, with wider apertures, was obvious.

Now, NASA has given TRW the task of building a series of High Energy Astronomy Observatories and integrating their complex and massive experiments. HEAO-A will systematically map all significant high-energy sources over the entire celestial sphere. HEAO-B will point its wide-aperture X-ray telescope at objects of particular interest and measure their emissions with about 10,000 times the sensitivity of any previous instrument. HEAO-C will scan for cosmic and gamma-ray sources. The results may give us new insights into the physical processes which produce such interesting objects as pulsars, quasars, black holes, and other exotic astronomical phenomena.

The HEAO program is only the latest in nearly two decades of TRW projects designed to help NASA explore the solar system and the universe beyond. Back in 1958 our Pioneer 1 was the first spacecraft ever built by a private firm and the first of a whole series of low-cost, and highly reliable, interplanetary spacecraft. During the 1960s, TRW built the Orbiting Geophysical Observatories for NASA, to map the Earth's magnetosphere and provide data on phenomena that affect long-distance communications, In 1970-71, we built Pioneer 10, which made the first transit of the asteroid belt, the first close-ups of Jupiter, and, in 1987, will become the first man-made object to leave the solar system. Pioneer 11 has now swung round Jupiter and is heading for Saturn.

Space instrumentation is another long suit at TRW. Our Viking Lander Biology Instrument, a masterpiece of miniaturization and automation, is scheduled to reach Mars on July 4th, 1976, and start analyzing soil samples for signs of life. Another TRW instrument on Viking will make meteorological measurements.

If you'd like to know more about TRW in general and our HEAO work in particular, write:

TRW®
SYSTEMS GROUP

Attention: Marketing Communications, E2/9043
One Space Park Redondo Beach, California 90278

Aerospace World

News, Views & Comments

By William P. Schlitz
ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

Washington, D. C., Sept. 11

The Air Force's new prototype YC-15 STOL cargo jet transport made its maiden flight on August 26—only three weeks after rollout (*see photo on front cover*).

The flight from the assembly plant at Long Beach to Edwards AFB, Calif., took two hours and twenty-six minutes, including an initial series of flight tests en route.

McDonnell Douglas Corp.'s Douglas Aircraft Co. Div. is building a second YC-15 in the Air Force Systems Command competition. Contending with McDonnell Douglas for USAF's Advanced Medium Short Takeoff and Landing Transport, or AMST, is Boeing Co., whose first YC-14 is currently abuilding in Seattle, Wash.

The YC-15 "is the first jet transport to use the externally blown flap technique for powered lift to shorten takeoff and landing distances," McDonnell Douglas said. On its first flight it used only fourteen degrees of a maximum twenty-four-degree flap setting, but the wide-bodied transport was airborne about 3,000 feet down the runway. Takeoff weight was 168,000 pounds (76,205 kg).

Another vaunted design characteristic of the YC-15 is its supercritical wing, which is looked to for improved flight performance and reduced fuel consumption. The plane is powered by four Pratt & Whitney JT8D-17 engines, each developing 16,000 pounds of thrust.

With a fuselage eighteen feet in diameter, the YC-15 has a cargo compartment with sixty-seven percent more space than USAF's largest tactical transport currently operational—the C-130.

Crew for the first flight: Douglas test pilot Kenneth K. Lewis; YC-15 Deputy Test Director USAF Maj. John A. Harris; and Douglas flight test engineer Leslie L. Spengler.

☆

A single manager—the Air Force Office of Scientific Research—has been designated to oversee all USAF basic research. As such, AFOSR will assume a major responsibility for "overall planning, management, implementation, and control of a unified Air Force basic research program," as well as interrelating research with other DoD and government agencies, officials said.

Located in the Washington, D. C., area, and headed by Dr. William L. Lehmann, AFOSR will continue to report to the Director of Science and Technology, Hq. AFSC, Andrews AFB, Md.

"This change of organization command lines places research into a separate and distinct category from development. It will not compete with development for its funds," said Gen. Samuel C. Phillips, AFSC Commander prior to his retirement on September 1. "Tight coordination of research planning will be of mutual benefit to all agencies concerned and will assure that unwarranted duplication of effort does not exist," he added.

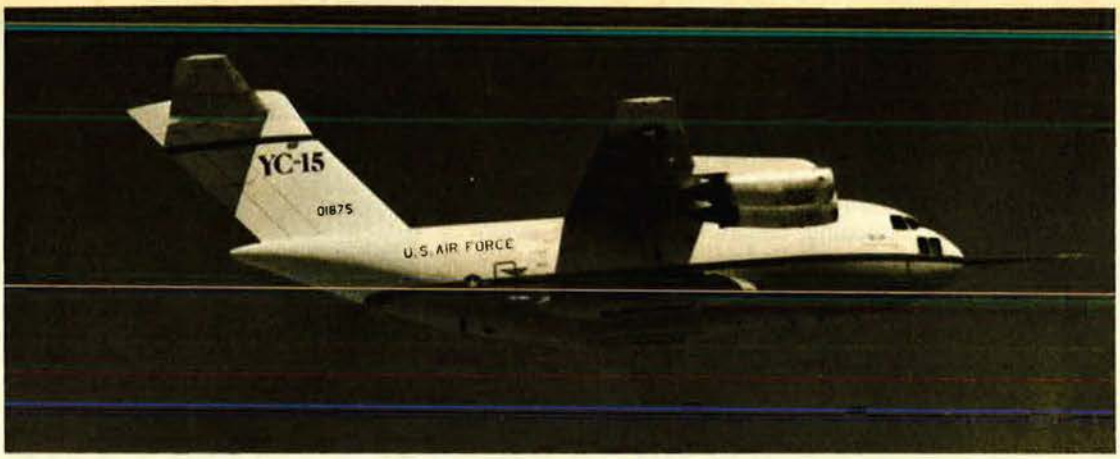
☆

The major objectives of the B-1 development program are either on or ahead of schedule, the plane's manufacturers report.

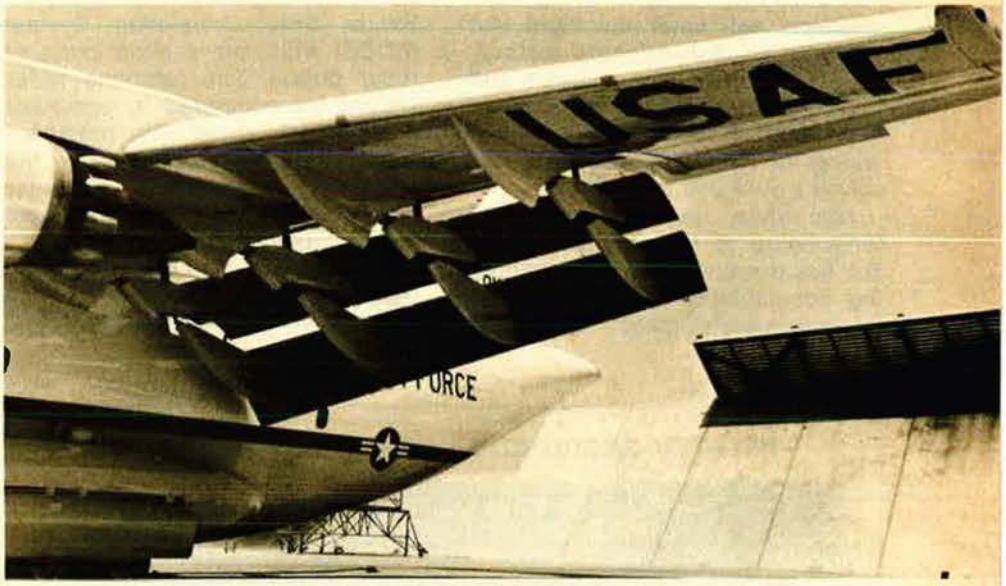
During some five months of testing, B-1 number two was the object of static load tests over an extensive range of simulated flight and ground conditions that represented the maximum airframe loads the plane will experience during its operational life.

This series of tests to demonstrate the B-1's structural integrity took place on a 383-ton test rig at Palmdale, Calif. Palmdale is the final assembly site for the B-1, and the tests were conducted by Lockheed

Off on a successful maiden flight is the first entry in USAF's competition to produce an Advanced Medium Short Takeoff and Landing Transport, or AMST (see above). The wide-bodied YC-15, built by Douglas Aircraft Co., is unique for its use of an externally blown flap system and critical-wing design.



Shown here (also, see cover) is the YC-15 on its first flight, during which initial tests were undertaken (photo above). Right is a near view of the aircraft's extraordinary flap system for short takeoffs and landings. And, below, the YC-15 taxies in after landing at Edwards AFB, Calif. Designed primarily as a tactical military jet transport to be operated from short and unimproved strips, the YC-15 or derivatives of it may have a place in the commercial or civil markets in a wide range of missions currently under study by McDonnell Douglas. In the AMST flyoff, McDonnell Douglas and Boeing Co. each will supply two prototypes for USAF evaluation.



California under the supervision of Rockwell International's B-1 Division.

The new bomber is the first large swingwing aircraft to undergo such a highly complex test program prior to flight, and this clears the way for the aircraft to enter the flight test program at Edwards AFB, Calif., where the first B-1 is currently being put through its paces.

A third B-1, currently under construction, will enter the flight test program as the avionics testbed. Its defensive avionics software and hardware are awaiting installation; first flight is scheduled for next spring (a fourth B-1 recently received a go-ahead to be built).

Meanwhile, during more than forty hours of flight time, the first B-1 has demonstrated its air refueling compatibility with the KC-135, its heavyweight takeoff capability, and its ability for sustained supersonic flight.

Up in Alaska, the B-1 navigation system aboard a C-141 has passed the high-latitude part of its test program, with flight durations up to ten hours. These flights conclude the navigation test series, conducted by Boeing, responsible also for avionics integration.

☆

With the letting of a nearly $2 million contract, USAF has given the nod to a demonstration of how a ballistic missile's reentry vehicle (RV) can be guided by radar through reentry to a predetermined target.

Under development by Goodyear Aerospace since the mid-1960s, the Range Only Correlation System (ROCS) transmits a short burst of radar pulses. The returning radar signals are compared by computer at very high speed with prestored signals, thereby determining the missile's position. The computer then corrects the RV's flight path through its system of controls.

According to Goodyear, the ROCS concept has already been successfully demonstrated in ground tests in Arizona and Tennessee. Its feasibility will now be further tested "through analysis and computer simulation of the system hardware," with radar data being obtained from helicopter flights.

If ROCS lives up to expectations, an expanded program of tests will follow, Goodyear said.

Goodyear has developed a number of guidance systems. Radag, another radar guidance system that is said to be extremely accurate, is in advanced development for the Army's European-based Pershing II missile. Still another system, Aimpoint, has as its core an optical correlation guidance system and has recently completed a test program under Air Force direction at White Sands Missile Range, N. M.

☆

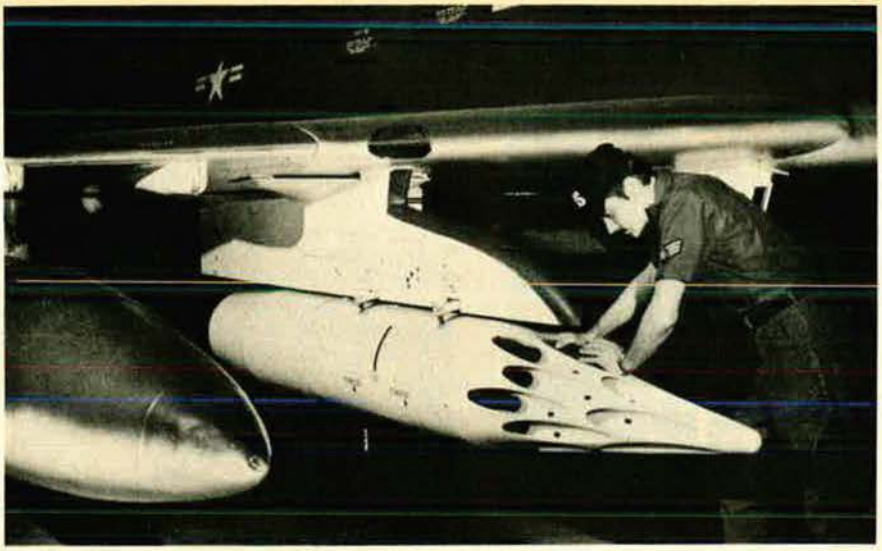
Deliveries are under way of the first production Pave Spike pod-mounted, electro-optical, target acquisition, tracking, and designating systems for F-4D/E Phantom aircraft.

Pave Spike is to be integrated with the F-4 weapon-release system to permit the delivery of laser-guided bombs or act as a laser target designator. (A number of preproduction versions saw more than 6,000 hours of operation in Southeast Asia before US participation in the war ended. This operational experience has led to improvements in the current production models, USAF said.)

Lt. Gen. Clarence S. "Bill" Irvine, USAF (Ret.), former Deputy Chief of Staff, Materiel, industry executive, and pioneer pilot, died in Los Angeles on September 7. He was seventy-six. A participant in the Billy Mitchell bombing show against warships, in 1946 he piloted the B-29 Pacusan Dreamboat *nonstop from Honolulu to Cairo in thirty-nine hours. As a USAF executive, Bill Irvine established a reputation as an expert in aircraft production, and a tough administrator with a low tolerance for contractor failings. He retired in 1959 and had since served the aerospace industry in executive positions.*

BELATED RECOGNITION FOR BORA KACAREVIC

At recent ceremonies conducted by AFA's Greater Los Angeles Airpower Chapter, the Air Force acknowledged the US's long-standing debt to Bora Kacarevic by awarding him a scroll of appreciation. Mr. Kacarevic, a British-trained commando guerrilla who parachuted into Yugoslavia during World War II, is credited with saving more than 300 Allied airmen. From left, Lt. Merrill Walker of the Los Angeles Police Department, copilot of a B-24 crew Mr. Kacarevic helped save from the Nazis; USAF Maj. Gen. Richard Henry, Vice Commander of SAMSO, who made the presentation; Mr. Kacarevic; Lt. Col. David Osborne, USAF (Ret.), the B-24 pilot; and AFAer Mack Harbin, responsible for Mr. Kacarevic's belated recognition. The citation, signed by Secretary McLucas and Chief of Staff General Jones, read, in part: "Mr. Kacarevic was given the mission to disrupt enemy communications, destroy installations and train Chetniks for sabotage. His group built a secret airstrip and was responsible for the care, feeding, protection, and eventual evacuation of over 300 Allied airmen who crash-landed or parachuted behind enemy lines."



Sgt. Gary Carter inspects an experimental supersonic-qualified rocket-launcher pod built by Hughes Aircraft Co. for the Air Force Armament Development and Test Center. The pod, here mounted on an F-4 Phantom, underwent a series of ground test firings this past summer.

The Pave Spike system, being produced at a Westinghouse Baltimore, Md., plant, is housed in a pod twelve feet long and ten inches in diameter, weighing in at 420 pounds. The system includes a TV sensor to acquire targets and a laser system to deliver coherent laser radiation to a target; the reflected beam provides accurate target range as well as laser signals that weapons can guide on.

The Pave Spike system has undergone vigorous reliability tests, USAF said. A total of 156 have been ordered.

☆

With past and potential shortages—and mushrooming costs—of aviation fuel has come the accelerated use of simulators in flight training (*see p. 65*).

NASA reports a Vertical Motion Simulator (VMS) that will reproduce the maneuvers of aircraft during takeoff and landing is currently being built at its Ames Research Center, Mountain View, Calif.

The VMS should play an important role in the economical training of pilots in flying the new STOL aircraft as well as the VTOL aircraft of the future. Also, the space agency said, "Operation of the facility by research pilots will help engineers arrive at workable designs before expensive and sometimes dangerous flight tests are needed."

Utilizing an existing simulator cab and computer system, VMS will be able to move vertically up to sixty feet and sideways forty feet, "to accurately simulate flare and touchdown of aircraft."

VMS will be operational by late 1976.

☆

The Air Force is well along in its efforts to prove the feasibility of applying computer technology in operating jet engines.

Closer control of jet engines should result in benefits ranging from operating economies to improved flight safety and upgraded performances, aerospace engineers agree.

The new technique—dubbed Integrated Propulsion Control System (IPCS)—is being developed and evaluated under a three-year program sponsored by USAF's Aero Propulsion Lab, Wright-Patterson AFB, Ohio. Boeing Aerospace Co. is prime contractor, with Pratt & Whitney and Honeywell also involved. NASA is contributing technical support.

Objective of the IPCS project is to substitute digital electronics for the increasingly complex and costly hydromechanical systems that now control jet-engine operation. "Digital computers have been improving rapidly in both cost and reliability. Computer electronics also can be integrated into an airplane's controls more easily than a hydromechanical system," a project official said.

Test engines under computer control have already been put through hundreds of hours of testing in both sea-level test-stand and altitude-cell operation. Flight-testing aboard a modified F-111E supersonic aircraft at NASA's Flight Research Center, Edwards AFB, Calif., has begun.

☆

A digital computer is also the heart of STOLAND, a new automatic landing system for STOL aircraft, that has met with initial success during test flights at NASA's Ames

Giant B-52s being worked on at the Air Force Logistics Command's huge maintenance hangar at the San Antonio Air Logistics Center. AFLC, which provides worldwide logistics support for USAF, for the Air Guard and Reserve, and for the other services and federal agencies, marked its fifty-fourth anniversary in July. AFLC employs more than 100,000 people.

Aerospace World

Research Center, Mountain View, Calif.

NASA has high hopes for the system: "This concept permits aircraft to take off and land from short runways, make steeper climbouts and approaches, and maneuver in less airspace than conventional aircraft, offering potential relief from air traffic congestion. Automatic controls will allow pilots to perform steeper noise-reducing landings safely under all weather conditions."

Installed on the Augmentor Wing Jet STOL Research Aircraft, a modified C-8A Buffalo, are the digital computer and advanced electronic displays that provide pilots with navigation, guidance, and control data. The aircraft is otherwise unique in that more than half its lift is derived by engine thrust, allowing flight at much lower speed than conventional aircraft.

Another feature of the STOLAND system is its ability to control the craft's lift with automatic flaps and augmentor nozzles, NASA reports.

A wide range of experiments is planned for the Augmentor Wing aircraft as well as a DHC-6 Twin Otter, currently the subject of a second STOLAND modification.

Sperry Flight Systems, Phoenix, Ariz., designed and built the STOLAND gear for the joint DOT/NASA STOL/Augmentor Wing programs.

☆

Even traveling at 25,000 mph, it will take the two Viking spacecraft ten months to reach Mars, a journey of 460,000,000 miles.

The last flight at the Air Force Academy for the T-33 Shooting Star. Cadets will now receive their motivational flights in the T-37 trainer at nearby Peterson Field.

Everything seems to be running smoothly since the crafts' respective launches on August 20 and September 9. But the successful launch and subsequent trip to Mars are only the first steps in this research mission—the most ambitious study of a distant planet ever attempted (and, with a price tag of $1 billion, the most costly).

The first Viking lander is scheduled to separate from its orbiter sometime next July and set down at a site known as Chryse, with the second to put down at Cydonia in September. With no men aboard, computers will handle the landings.

The landers are fantastic, highly miniaturized pieces of equipment, designed and built over a seven-year span (at one point 12,000 people were at work on them). Instrumentation aboard the landers will be able to detect life, regardless of how primitive, and even recognize fossilized forms.

The landers' power source is a nuclear battery that generates a mere seventy watts. Through an ingenious system that shuts off instrumentation not in use, it will run the on-board computer and everything else.

There is much speculation about

Capt. Robert G. H. Carroll, III, formerly an information staff officer with the Secretary of the Air Force Office of Information, Public Information Division, is presently serving with AIR FORCE Magazine under USAF's Education With Industry program. Captain Carroll holds a BA from the University of Maryland and a Master's in Public Relations from American University. He entered the Air Force via ROTC in 1965 and has held a number of posts in the information field, including that of managing editor of the *USAF Tactical Air Warfare Center Quarterly Report*, an internal Air Force publication dealing with tactical research and development.

Index to Advertisers

Fully qualified EC-121 crew members are, from left, TSgt. Doreen Burgess, A1C Carla Singer, and A1C Deven Sauvigné. They are with the 79th Airborne Electronic Control and Surveillance Squadron, an Air Force Reserve unit based at Homestead AFB, Fla. The three are the first female operational aircrew members in USAF.

what concrete benefits might be derived from this very expensive, unmanned journey to a neighboring planet. Well, at least one Viking-designed system is already in use at a Boston hospital. Called a gas chromatograph mass spectrometer, it can, within seconds, identify toxic substances in blood samples.

☆

In this age of satellites and other highly sophisticated surveillance systems, the Air Force is harking back to a device first tested in combat during the US Civil War.

Project "Seek Skyhook," a unique system based on an aerostat (balloon) to suspend a radar at height, is currently under development. The aim is to improve NORAD's low-altitude surveillance of the Florida straits.

ADCOM's 671st Radar Squadron and the Range Measurements Lab of the Air Force Eastern Test Range, Patrick AFB, Fla., are currently conducting experiments of Seek Skyhook equipment at Cudjoe Key, near Key West, Fla.

If and when the system becomes operational, plans call for three 200,000-cubic-foot capacity aerostats, two launch sites at Cudjoe Key, and ground-support equipment. Two of the aerostats will rotate in the surveillance mission and the third will act as emergency backup.

The balloons, designed to withstand ninety-knot winds, will be tethered at about 12,000 feet altitude in a zone off-limits to other aircraft.

☆

USAF has successfully test-flown a turbofan jet engine having third-stage fan blades built entirely from composite materials.

The blades, carried aboard an F-111D at the Air Force Flight Test Center, Edwards AFB, Calif., mark the first military operational evaluation of a rotating structural engine component made of such materials, Air Force Systems Command said.

Validation of the blades, which are forty percent lighter than conventional fan blades made of titanium, is considered a milestone in the program to demonstrate the suitability of such materials for future propulsion systems.

Maximum use of composites may provide as much as a fifteen to twenty percent saving in the weight of jet engines, resulting in increased aircraft payload or extended range. Other benefits are likely, including reduced operational and maintenance costs.

☆

NEWS NOTES—CMSgt. Elmer W. Wienecke has replaced retired **CMSgt. John R. "Sam" Bass** as Air Force Academy **Senior Enlisted Adviser.**

Walter E. Fellers, chief designer for Northrop Corp.'s Aircraft Div., was presented the American Institute of Aeronautics and Astronautics' **1975 Aircraft Design Award** for his outstanding achievement over the past thirty years in the design and development of fighter aircraft. . . ."

Lt. Gen. Ernest C. Hardin, Jr., USAF (Ret.), has been named **Director** of the Energy Research and Development Administration's newly formed **Office of Internal Review**—an audit and inspection unit. General Hardin's last active USAF post was as Deputy CINC, US Readiness Command. In another ERDA move, USAF **Lt. Gen. Edmund O'Connor** has been named **Deputy Assistant Administrator for Nuclear Energy.** He previously served as Vice Commander, AFLC.

November 1, 1975, is the deadline for entries in the National Space Club's **Goddard Historical Essay Contest.** Write c/o NSC, 1629 K St., N. W., Washington, D. C. 20006.

Following September's two-week tour of the Soviet Union, the **Apollo/Soyuz crews** will begin a similar tour of the US beginning October 13.

Ninety-six **NATO-committed USAF F-4s** in September–October participated in thirty-day deployments to Germany during **Crested Cap 75.** TAC's 49th TFW, Holloman AFB, N. M., flew the mission.

AIR FORCE Magazine and its Editor, **John F. Loosbrock,** were recently awarded **Freedoms Foundation** (Valley Forge, Pa.) **certificates of appreciation** for "outstanding achievement in bringing about a better understanding of the American way of life."

USAF **Col. Eldon W. Downs,** *Air University Review* Editor for more than a decade, is now Director, Civilian Institutions Directorate, AF Institute of Technology, Wright-Patterson AFB, Ohio. He is succeeded by former AU IG **Col. Glenn E. Wasson.**

Barksdale AFB, La., has won the Secretary of Defense **Natural Resources Conservation Award** for 1974, for which all the services compete.

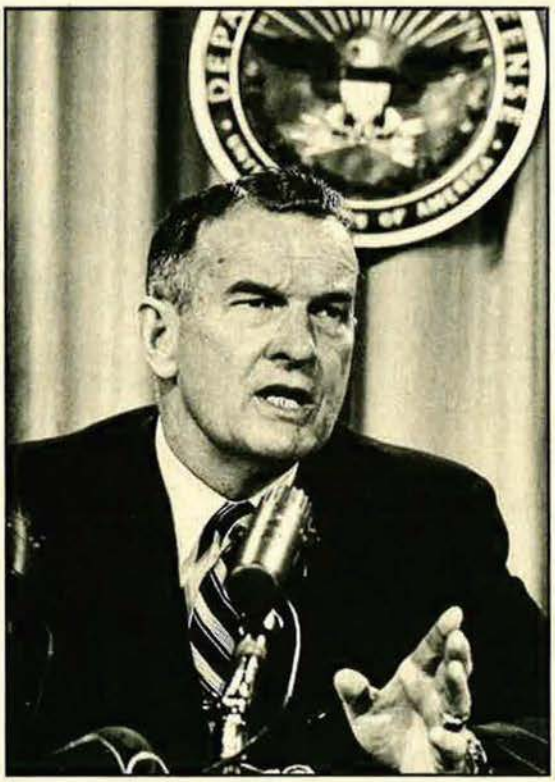
The Air Force's new **F-16 fighter** completed its **500th flight** in mid-August. ■

Col. Bernie Bass, Air Force Museum Director, accepts the last operational C-47 in USAF's inventory from Brig. Gen. William J. Holton, Commander of the 834th Tactical Composite Wing, Hurlburt Field, Fla.

The government leader in charge of the hardware side of national defense, though concerned about recent congressional actions and the effects of public discussion of CIA activities, predicts that the US can maintain a qualitative lead over the USSR if our R&D continues to be funded at present levels. In this exclusive interview, Deputy Secretary of Defense William P. Clements also discusses . . .

THE KEY STRATEGIC REC

BY EDGAR ULSAMER
SENIOR EDITOR, AIR FORCE MAGAZINE



Deputy Defense Secretary William P. Clements advocates a go-slow policy on the MX program.

CONGRESS' Joint Committee on Atomic Energy contends that "the specter of a Soviet first-strike capability with a reserve [re]-strike capability may soon be at hand." In its recently issued annual report, the committee, headed by Sen. John O. Pastore (D-R. I.) and Rep. Melvin Price (D-Ill.), warned that continuation of the present massive R&D effort by the Soviets will gain them qualitative superiority, in addition to "existing quantitative and throw-weight superiority" and thus will "raise serious questions about the present strategic balance."

The defense leader principally concerned with the hardware side of the US strategic deterrent agrees that "all the statistical information available to us indicates that the Soviet effort in the strategic arena—especially in the development of strategic systems—exceeds our own." But Deputy Defense Secretary William P. Clements, Jr., told AIR FORCE Magazine that the extent of their lead is not precisely known to US analysts: "Because of the lack of information coming out of the Soviet Union, our assessments are not nearly as definitive as we would like them to be. I am inclined to call our assessments 'guess-estimates,' which don't warrant high confidence, especially so far as some of the numbers go. At the same time, I am willing to agree that however the Soviet R&D effort in the strategic arena is measured against our own, and expressed in current dollars, the Soviets lead by a significant margin."

In Secretary Clements' view, there are countervailing factors: "It is equally clear that there is a qualitative technology gap that is in our favor. I am confident that given the present level of expenditures in the strategic R&D area, we will not lose this qualitative lead. Possibly the gap will narrow somewhat between now and the year 2000, but we can maintain a lead of some kind if we continue to invest in our strategic capabilities at the present level in constant dollars. But if the Congress cuts our expenditures, we could well become vulnerable and be overtaken—in a technical sense—by the Soviets."

Secretary Clements views the recent decision by the Senate not to adopt the Conference Committee Report on the Defense Authorization Bill as a most ominous congressional problem: "This turn of events is very disturbing. Are we going to have to depend on another committee [other than Armed Services] for overview rights regarding our authorizations? If so, things could get very difficult for the entire executive branch, from the White House to OMB and DoD, to say nothing about the Senate and the House.

JIREMENT: FLEXIBILITY

What committee, if any, will have basic responsibility? I can well see why some people in the Senate are having second thoughts about the whole matter."

Arms Control Impact Statements

Secretary Clements is chary also of another congressional proposal that could have serious effect on proposed military R&D by requiring that virtually all research projects be subject to arms-control impact statements by the Arms Control and Disarmament Agency (ACDA), certifying that no deleterious effects on arms control negotiations or proposals are likely to result from their implementation. All DoD R&D projects that can be envisioned to have a total life-cycle cost of $250 million or more—if fully developed and deployed—would be affected and, in effect, subject to a veto by ACDA.

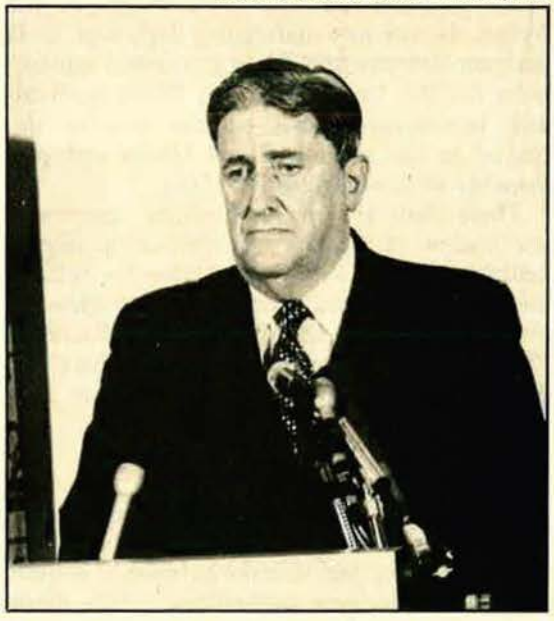
Secretary Clements expressed the hope that "the Congress will not give final approval to the measure. It passed the House and Senate Foreign Relations Committees, but I believe that a close look at the bill will convince the Senate that the bill would just be a brake, or veto, on necessary weapons projects and yet would not further the arms-control objectives we share with the Congress. We do consider arms control very carefully under existing laws and directives. If Congress feels it needs more information on a particular system, there are many ways to provide that. Better communications with the Congress are a definite plus if we can make more members of Congress understand what we are trying to achieve and what our programs and the reasons behind them are."

New Soviet ICBM Systems

The framework for a future SALT II accord, loosely agreed to at last year's Vladivostok meeting between President Ford and Soviet Party Chief Brezhnev, is vitally dependent on a verifiable limit of MIRVed strategic systems. The Defense Department recently announced that three new Soviet ICBMs—the SS-18, SS-19, and SS-17—are now operational. Some fifty of the six-MIRV SS-19s and ten of the four-MIRV SS-17s are now thought to be in commission. In addition, the largest Soviet ICBM, the advanced version of the SS-18 that has been observed with "at least seven MIRVs," is approaching operational status. About ten SS-18s are regarded as operational, but, in all likelihood, are the unMIRVed version.

The United States is continuing to "pursue the question of the intelligence capabilities that can, with high confidence, verify any distinction between the two variants of the SS-18," according to DoD. (The Deputy Director of the Central Intelligence Agency, Lt. Gen. Vernon A. Walters, recently responded to a question by this reporter about alleged Soviet attempts to pre-

—Photo by Ankers Capitol Photographers



Lt. Gen. Vernon A. Walters, CIA Deputy Director, disclosed that the Soviets mask their ICBM tests.

vent the US from obtaining telemetry data on MIRVed ICBM test flights, saying that "traditionally" the USSR seeks to mask its weapon tests. He added, however, that he wouldn't want to say how successful the Soviets are in those endeavors.)

Secretary Clements is cautiously sanguine about the US ability to differentiate between MIRVed and unMIRVed systems: "We must relate this issue to what the agreement might say about how the two sides are supposed to count MIRVed and unMIRVed systems. Verification must not be treated in a vacuum but in consonance with the provisions of the eventual accord. In that sense, I believe that the national means for verification will turn out to be adequate and the margin of error small."

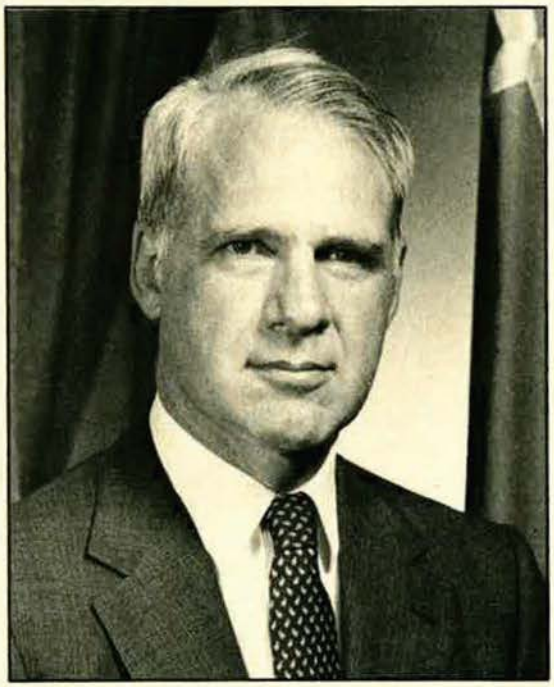
(ACDA Director Fred C. Iklé, in recent congressional testimony, characterized verification as "a stubborn problem" that places "increasing burdens of scope and complexity on our intelligence organizations." He complained that public disclosure of US monitoring methods furnishes "a potential violator with a road map for deception or countermeasure, thus making the verification methods in some cases ineffective.")

The verification problem, in Secretary Clements' view, would become "much more difficult" if the Soviets deployed a mobile ICBM. (A recent Defense Department announcement reconfirmed Soviet "experimentation" with the solid-fuel SSX-16 in a mobile mode, but reported no evidence of operational deployment of that weapon either in fixed silos or as a ground-mobile system. DoD did disclose that a derivative of the SSX-16, the 2,000-mile-range SSX-20, which borrows the two lower stages of the former, is currently undergoing flight test. DoD analysts view the SSX-20 as a potential replacement for the "soft" SS-4s and SS-5s, medium- and intermediate-range ballistic missiles deployed in the western Soviet Union and presumably targeted against NATO.)

There may also be ambiguities concerning verification of MARV (maneuvering reentry vehicle) tests, be they meant either for ballistic missiles of increased accuracy or as means for evading defensive systems. To date, Secretary Clements said, "I believe we have no hard evidence" that the Soviets have conducted such tests.

The Key Requirement: Flexibility

The buildup of Soviet strategic forces, Defense Secretary James R. Schlesinger believes, is motivated by the Kremlin's desire to acquire "major counterforce capabilities." This desire finds concrete expression in "higher beta [ballistic coefficient, leading to greater reentry speed and steeper reentry angles, thereby reducing the dispersion error and the effects of wind and weather] RVs, [in the fact] that they are in the process of obtaining reasonable accuracy . . . and [in] the acquisition of greater throw weight." Soviet progress in this regard, Dr. Schlesinger recently disclosed, "is slightly better . . . than might have been anticipated."



Defense Secretary Schlesinger reported Soviet ICBM accuracy is improving faster than expected.

None of these actions, he said, means "that the Soviets have violated the Interim Agreement" of SALT I even though there are ambiguities that "are under study and I hope in the process of resolution." In this gray area, Secretary Schlesinger said, are new large, hard Soviet silos, claimed to be command posts: "I think that we will have clear indications whether or not those silos are employed for command control purposes. I think that is a kind of ambiguity that results from the language of the original agreement, which, of course, cannot be altogether precise."

Stating that there is a prohibition against building new silos to house ICBMs, Dr. Schlesinger conceded that "whether one would regard a silo-like configuration . . . intended for command control to fall under that ban, of course, is something that one has retrospective judgments on." He acknowledged that it has not been possible to achieve mutual restraint concerning the development of major counterforce capabilities and promised that "we will not allow our position in this area to become secondary."

Secretary Clements, who sees his job as making sure "that we obtain maximum security at minimum cost to the taxpayer," feels strongly that fundamentally the US response to proliferating Soviet strategic capabilities must aim at "maximum flexibility. If there is one thing I feel very strongly about, it is the need to keep an open mind about what strategic systems we need and how we formulate our R&D effort. This flexibility should extend to the basic aspect of our deterrent—the Triad. It would be unwise to set the need for all three branches—the ICBMs, SLBMs, and bombers—in concrete and to vow, for instance, that we will need strategic bombers, now and forever. It would also be imprudent and premature to freeze the MX [a potential follow-on to the Minuteman ICBM] at this time. There is more R&D that must be done before we can have a DSARC [Defense Systems Acquisition Review Council meeting that defines the weapon system]. We have not yet adequately explored all available options regarding the system as a whole, its basing mode, and the missile in particular."

Secretary Clements didn't "rule out the possibility of a prototype development of MX. But the relative merit of such an approach would depend on the specific technologies involved. If we are dealing with known technology that can be 'grown' to take the form appropriate for the new missile, or family of missiles, prototyping would not be economical. On the other hand, if we have to get into new fields of technology—such as we had to with new propellants a few years ago—we would have a different situation."

In counseling a go-slow approach on MX, Mr. Clements explained that "we are not now neglecting missile technology. We are working hard on two strategic efforts in the ICBM area: improved accuracy and improved yield. It took quite an effort to win congressional approval, but both programs are now moving forward. Both are very important and highly cost-effective. Using the existing cube space and basic form of the Minuteman system, we can achieve a marked gain in effectiveness to counter the Soviet throw-weight lead."

The Defense Department, he said, is under no illusions about Soviet advances in the field of ICBM accuracy and yield: "As we know only too well, the Soviets are improving their accuracy and, in time, may also work on improving their yield-to-weight ratio. They built those big missiles because of their technological limitations at the time."

National Defense Affected by CIA Probes

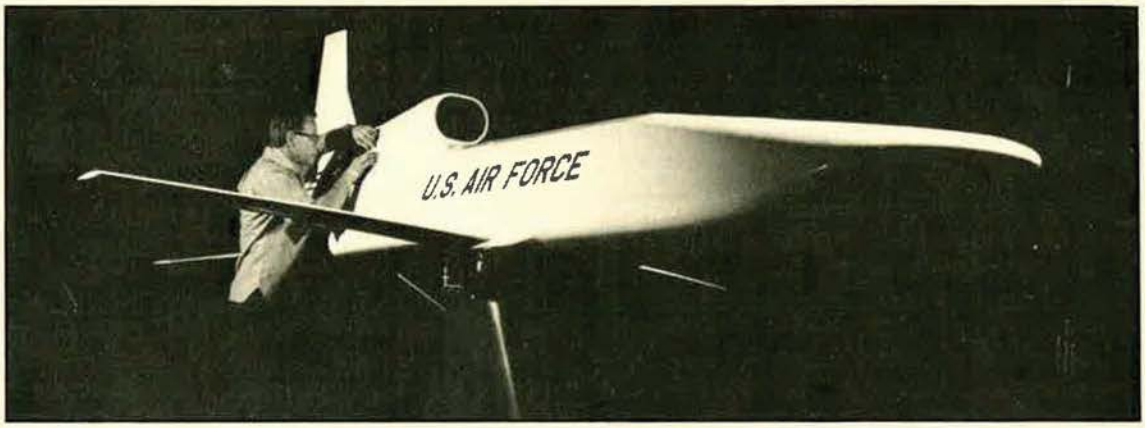
The current wave of public hearings involving US intelligence activities and many other detailed disclosures of specific operations and techniques have "many negative aspects so far as the national defense posture is concerned," in Secretary Clements' view. As the Pentagon's ranking overseer of national intelligence activities, Mr. Clements is concerned that "in going through these public bloodlettings, we let everybody else, especially the Russians, in on our secrets. In fact, we are being our own worst enemy. To say this in no way abrogates my firm belief in the Congress' responsibility to provide overview, control, and discipline with regard to all of our intelligence activities. That is not only good but essential.

"We should keep the appropriate congressional committee fully informed—in a really consultative sense—and have the Congress in accord with what we are trying to do and with our intelligence objectives. But the general distribution of this type of information is harmful; it is demoralizing internally to our own people and externally it helps our adversaries. Further, this unrestrained public disclosure of our intelligence activities is highly disturbing to our foreign friends and allies, who also are important sources of information for us. Traveling abroad on behalf of the Department, I uniformly find our friends simply can't understand why we are doing these things to ourselves."

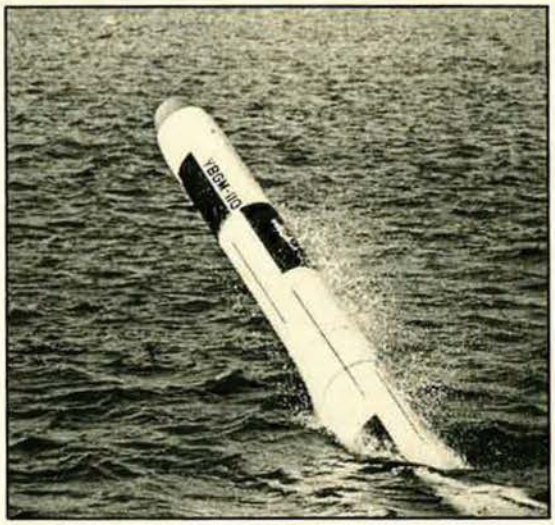
Needed: Strategic Cruise Missiles

Cruise missiles that can deliver nuclear warheads over distances in excess of 1,000 miles with high accuracy and survivability represent potentially the most cost-effective improvement of the US strategic posture, Secretary Clements told AIR FORCE Magazine. Admitting to "a certain amount of bias in favor of cruise missiles" because of his long-standing advocacy of these weapons, he underscored their "undeniable economic merits: We can deploy them in four ways and in concert with existing systems. Cruise missiles can be launched from surface ships, submarines, aircraft, or land. They add a new dimension to our existing weapons, be they B-52s or submarines. We know these missiles can give us extreme accuracy and good penetration capability. Because of these two qualities, we can use these weapons against a variety of targets with high operational flexibility."

Cruise missile prototypes, he said, will begin flight test before the end of this year to demonstrate that the various technologies that make these weapons possible can indeed be made to work harmoniously and reliably: "There is a widespread misconception that the cruise missile is a rehash of ideas that we had ten years ago. That is wrong; ten years ago we couldn't have made cruise missiles work, especially because of inadequate competence in guidance technol-



Cruise missiles add a new dimension to existing weapon systems because they can be launched by aircraft in the configuration shown above, by navy vessels (right), or from land.



ogy. But we can and should today. In that regard, we are at least ten years ahead of the Soviets."

Cost-Effective Management of Technology

DoD's development and acquisition of weapon systems is a $33-billion-a-year business and the favorite target of defense critics in and out of the Congress. There are, Mr. Clements points out with conviction, no pat solutions or panaceas for managing these massive and varied tasks: "There can't be full uniformity throughout our procurement system. The management systems used by the three services and the Defense Department are the products of a constantly evolving process that is being modified, added to, and curtailed as needs and conditions change. Improving that process is the full-time business of a large number of dedicated, competent people in DoD and the services. But these improvements must be handled in an evolutionary fashion rather than by radical, drastic changes that would disrupt all the procurement programs in progress."

While he eschews categoric uniformity in the management of technology, Secretary Clements insists on close adherence to broadly applicable management policies. These include prototyping and life-cycle costing (LCC).

Prototyping, Secretary Clements stresses, "is the most cost-effective means for advancing the state of the art, most of the time. But there are occasions when, because of special but perfectly legitimate reasons, prototyping will not be appropriate and, instead, we apply concurrency of some sort. Still, normally—if there is such a thing as normalcy in military R&D—we will use the prototype approach."

LCC is now a mandatory DoD management policy "for certain categories of systems, with no new ones to be introduced without meeting that standard," Secretary Clements explained. "LCC is no temporary buzzword but the essence of systems engineering. When we develop a new system, it is imperative that we think of how much it will cost us over its lifetime. We must establish as definitively as possible its reliability, maintainability, and all other aspects that make up its life-cycle costs.

"We are getting a new bomber, the B-1, and a new submarine system, Trident; essentially, these are thirty-year systems. Obviously, we have to establish as accurately as we can how much it will cost to operate, maintain, and repair them during the thirty years that they will be in the inventory."

Congress, Mr. Clements points out, "has been very receptive" to the concept of life-cycle costing. "DoD's job is to inform Congress why life-cycle costing, which goes beyond the current year funding, is crucial to the long-term economics of national defense. So far, we have a good reception and everybody understands that the issue is somewhat like buying a car; even though one may cost less to buy than another, if its upkeep is much higher, it isn't the better buy." ■

Soviet leaders regard civil defense as an important element of strategic planning. In stark contrast to our virtually nonexistent civil defense programs, Soviet preparations for protecting the population and economy involve every Soviet citizen and extend far beyond our concept of the term . . .

CIVIL DEFENSE IN THE USSR

BY HARRIET FAST SCOTT

GO IS NOT a Russian monopoly game. GTO is not a Soviet sports car. ZOMP is not a new cereal. GO stands for *Grazhdanskaya Oborona*—Civil Defense, in Russian. GTO is a military-sports complex, "Ready for Labor and Defense." ZOMP represents the initials of "Defense from Weapons of Mass Destruction." These letter combinations are quite familiar to Russians from seven to seventy, for they represent different aspects of civil defense. As Soviet citizens of all ages are told: "Civil defense is everybody's business!"

The Politburo takes civil defense seriously. Several dozen Soviet general officers who work full time at civil defense tasks have been identified. The Moscow Military School of Civil Defense is believed to be the first of its kind anywhere. It was started in 1967 with a three-year course to prepare officers for mechanized civil defense units.

General Colonel A. T. Altunin became the Chief of Civil Defense of the USSR and Deputy Minister of Defense in 1972, only a few months after the signing of SALT I. Official Soviet sources since then have listed Civil Defense Troops on a par with the other five Soviet services—Strategic Rocket Troops, Ground Troops, Troops of National Air Defense, Air Forces, and Navy.

In June and July 1975, 23,000,000 Soviet youth were in the countryside participating in massive military-sports games. The purpose of the games was "to improve the military-patriotic education, the physical and military training of youth." Survival training in simulated nuclear war conditions was a major part of these games.

But that is not all. For many years, instruction in the use of gas masks and individual medicine kits—which contain first-aid pills for use in the event of nuclear, bacteriological, or chemical attack—have been regular features in the millions of booklets published on civil defense. For example, a 1974 textbook, written for college and university students studying required civil defense courses, states:

> Radioprotective pills #1 are to be taken at the danger of radiation (6 tablets in the course of 30 to 40 minutes), and in the event of repeated radiation, another 6 tablets.

Contrasting Views on Civil Defense

In contrast to the Soviet effort, Washington seems to pay little attention these days to civil defense. There are those in the United States who feel that a civil defense program instituted by either side would be destabilizing. The Soviet response to this is unequivocal:

> Soviet civil defense does not incite, does not promote, and does not provide impetus to war. Its nature is decisively influenced by the peace-loving foreign policy of the socialist state. Therefore, there is no basis for the "forecasts" of Western experts that a strengthening of the Civil Defense of the USSR will lead to greater "inflexibility" of Soviet foreign policy and even to aggravation of international tension.

This statement is from a 1972 book written under the aegis of the Main Political Administration of the Soviet armed forces, the Party's voice in the Soviet military. And, moreover:

> Improving Soviet Civil Defense, raising its effectiveness, is just one more real barrier on the part of the imperialists' unleashing a new world war. Consequently, Civil Defense of the USSR intensifies the peaceful actions of our state and strengthens international security as a whole.

The Soviet Minister of Defense and Politburo Member, Marshal Andrey Grechko, in his 1975 book, *The Armed Forces of the Soviet State,* asserts that civil defense is now a matter of

The author, Harriet Fast Scott, a Washington-based consultant on Soviet military affairs, lived in the USSR for four years while her husband was US Air Attaché in Moscow, and has traveled widely in Russia since that time. She has written many articles and several books on Soviet affairs, the latest her translation and analysis of Marshal Sokolovskiy's Military Strategy, *3d Edition, published this year by Crane, Russak & Co. Recently, Mrs. Scott has been involved in a study of Soviet civil defense.*

strategic significance. In his view, "modern war demands the creation of a carefully thought-out system of measures to ensure stability of operation of the whole national economy and reliable protection of the country's population."

History of Soviet Civil Defense

Prior to 1961, civil defense was called MPVO, meaning "local air defense," and was under the control of the Ministry of Internal Affairs. In July 1961, it was reorganized on a national level to become Civil Defense of the USSR and placed under the Ministry of Defense. Its first Chief was Marshal Vasily Chuykov, Commander in Chief of the Ground Troops and Deputy Minister of Defense at that time.

This new status of Soviet civil defense was a result of the "revolution in military affairs," brought about by the introduction of nuclear weapons and ballistic missiles into the Soviet armed forces. A basic tenet of the new military doctrine, adopted in 1960, is that "the Armed Forces, the country, the whole Soviet people must be prepared for the eventuality of a nuclear rocket war." Civil defense was no longer a "local" affair; it became a matter of national importance.

The three groups of tasks given to Soviet civil defense are:

- **Protecting the population;**
- **Keeping the economy going in wartime;**
- **Post-atomic recovery and disaster relief.**

The scope of these tasks, particularly of the first, is considerably broader than the popular Western concept of civil defense, which tends to be limited to sheltering the population from fallout and caring for casualties. "Protecting the population" in the Soviet scheme of civil defense includes more than passive measures. It extends, through the programs described below, to mass training of civilians in the use of arms, to prepare them for active defense against attack.

Task 1:
PROTECTING THE POPULATION

Soviet officials point out that at Hiroshima losses would have been significantly reduced if there had been advance civil defense measures. For instance, when the bombers appeared, no warning signal was given. After the explosion, in addition to the victims of the bomb itself, there were thousands more victims of panic. And many died months later from radiation. Had they known how to protect themselves, according to General Altunin, tens of thousands would be alive today.

Civil defense got a boost from General Secretary Brezhnev, in 1966 at the 23d Party Congress, when he urged greater attention be given to the problem. About this time, there was a shift from primary reliance on shelters, to evacuation. The general plan was to disperse essential workers at distances of thirty-five to fifty miles from cities likely to be hit. The old, the young, and the sick would be evacuated to smaller towns.

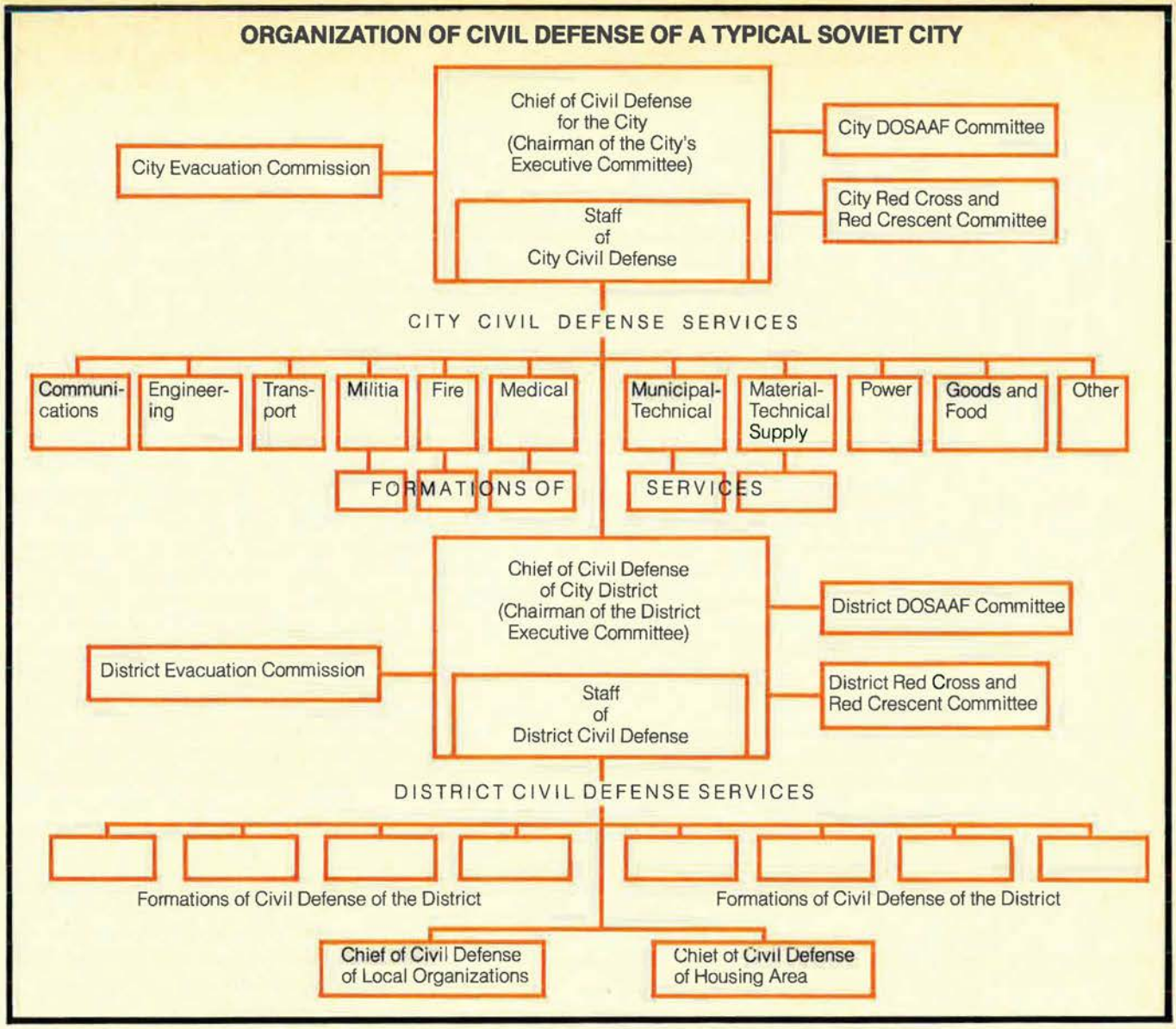
Evacuation depends on a number of complicated estimates: advanced warning, the size and significance of the city, the surrounding area, and transport means. Evacuation and/or dispersal will be done only by government order, when a threat of attack arises. Based on calculations of probable nuclear destruction, safe distance can be established and the people moved to secure villages, camps, and holiday rest areas before an attack takes place.

Preplanning by city evacuation commissions reduces to a minimum the time needed to evacuate an area. Each citizen, upon being warned by radio, TV, loudspeakers, etc., of the decision to evacuate, will gather his individual means of protection, food for two to three days, clothing, his vital documents, and his first-aid kit, if available, and proceed to his designated evacuation point. There, upon presentation of his evacuation certificate, he will be boarded on the designated evacuation means, train, bus, boat, and the like. In some cases, evacuees will proceed on foot to the designated area of evacuation.

If there is no warning time to prepare for evacuation, the population, on hearing the "Air Alert" signal, must proceed to the nearest shelter, either in housing areas or public buildings, subway stations, tunnels, or other protective structures. Those in rural areas threatened by radioactive fallout will be told the time it will hit their area, and will use that time to prepare livestock and protect food and water before taking shelter. If the attack is chemical, gas masks and protective clothing should be donned if one is not in a shelter, and he should proceed in the direction indicated by civil defense posts to safe areas where he can be decontaminated.

For residents in a number of the major Soviet cities—Moscow, Leningrad, Kiev, Tbilisi, Baku, Kharkov, and Tashkent—deep subways provide remarkable shelter systems against nuclear blasts. All of these subways have heavy blast doors throughout their length, so that sections can be closed off as required. It is estimated that the present ninety-mile Moscow Metro alone could accommodate 1,000,000 of the city's inhabitants. During the Battle of Moscow in 1941, the subways were even used to house the Soviet General Staff.

Soviet civil defense planners are urged to make shelters dual-purpose. In peacetime, they can be used as garages, storehouses, training facilities for lectures, and so on. Civil defense is also to provide gas masks and respirators, special clothing and boots. Food and water



supplies must be provided. It does no good to save the population from bombing only to have them die of starvation.

The other side of the coin is teaching the people what they must do. Psychological preparation of the people to believe measures can be taken that will save them is vital. Therefore, general compulsory courses in civil defense have long been in effect. In 1956, it was a twelve-hour program, which, in 1957, was increased to twenty-two hours and included defense against possible chemical and bacteriological attacks as well as against nuclear weapons. In the early 1960s, there was a nineteen-hour program, now increased to twenty hours.

Today, students in the second, fifth, and ninth grades, as well as students in institutions of higher learning, study a special program at their schools. All workers must take a twenty-hour civil defense course at work. Nonworking and retired persons must study independently and attend lectures.

This instruction is the primary responsibility of the staffs of Civil Defense, DOSAAF, and the "Znaniye" Society, with the cooperation of the Red Cross and Red Crescent.

The Role of Civil Defense Staffs

Each of the fifteen Soviet Republics has a general officer who is the Chief of the Civil Defense Staff for that republic. Each institute, factory, collective farm, school, or grouping must set up a civil defense unit to work closely with local authorities. The director of the facility becomes the Chief of Civil Defense for that facility. He has a staff to assist in the following tasks:

- Insuring compliance with teaching civil defense courses;
- Planning dispersal of workers and evacuation of their families;
- Construction of adequate shelters;
- Keeping his facility operating in wartime;
- Restoring operation after enemy attack by weapons of mass destruction.

The Chief of Staff for Civil Defense is as-

sisted by the Party organization, the Komsomol (the Young Communist League), trade union organization, and local city council agencies.

The Role of DOSAAF

DOSAAF—the Volunteer Society for Cooperation with the Army, Aviation, and Fleet—is a paramilitary organization dating back to the 1920s. It has about 10,000,000 active members ten years old and up. Forty million to 60,000,000 more use DOSAAF sports facilities. The head of DOSAAF is a Marshal of Aviation, and he is assisted by a large military staff. One of DOSAAF's major responsibilities is to support civil defense training.

DOSAAF works through a physical culture complex called GTO—"Ready for Labor and Defense." The latest program was introduced in 1972, differing from previous programs in that the beginning age for training of youth was reduced from fourteen to ten years. The individual proceeds through five steps, based on his age. Civil defense training is an integral part of each step. Great emphasis is placed on awarding gold and silver pins to those who complete the norms of each step. DOSAAF also organizes military sports competitions.

In the summer of 1967, in cooperation with schools, Komsomol organizations, and military commissariats, DOSAAF organized a military sports game, code-named "Zarnitsa" ("Summer Lightning") for millions of young teenagers all over the country. By 1975, 16,000,000 youths were participating in these games. So successful was "Zarnitsa" that in 1972 "Orlenok" ("Eaglet") games were launched for older teenagers. Seven million participated in 1975. A featured part of the games is the identification of contaminated areas, and determining how to go around or through them in accordance with radiation safety rules and civil defense measures. Winners of the competition are given awards at special ceremonies, with major press and TV coverage.

Role of the "Znaniye" ("Knowledge") Society

"Znaniye" with its 3,000,000 members, most of whom are scientists and teachers, conducts science-educational work with the population. It uses lectures as a medium, both live and by radio and TV. In 1973, for example, 21,000,000 popular science lectures were given to various live audiences and 300,000 on radio and TV. It also publishes magazines and books. Through its popular science lectures, "Znaniye" teaches, among other things, the importance of civil defense.

The "Znaniye" Society informs the Soviet population about radiation and other destructive factors of nuclear weapons, the dangers of poison gases and the new psycho-gases, and germ warfare. "Znaniye" lectures are a form of agitation and propaganda to arouse the citizenry to greater efforts in learning the basics of civil defense, in supporting the armed forces, and in fulfilling their work norms and other socialist obligations.

Coordination of Civil Defense Programs

An example of the coordination in civil defense matters between the "Znaniye" Society, DOSAAF, and the Komsomols is the program at Technical High School No. 5, located in the city of Kalinin, between Moscow and Leningrad. The military instructor, a lieutenant colonel who is an active-duty reserve officer, heads the DOSAAF organization at the school. After twenty-five years in military units, he was selected by the local military commissariat for the assignment. His two tasks are preinduction military training and civil defense instruction for the student body. The school's Party bureau, the Komsomol Committee, and the teaching staff provide assistance. He also receives help from district and city DOSAAF Committees, and maintains close ties with the local "Znaniye" Society. At this particular school the physics teacher has been made responsible for ensuring that the students pass DOSAAF's GTO norms. Another teacher, a Komsomol member selected by DOSAAF, organizes sports competitions and arranges expeditions to military monuments, battlefields, and museums.

The DOSAAF Committee sets up firing ranges and a military sports camp, and works out the annual plan of instruction. DOSAAF is supported primarily by lottery, tickets for which are sold by student and faculty DOSAAF members. The first concern of the school's DOSAAF Committee was setting up a well-outfitted room for primary military training.

A small civil defense classroom existed before primary military training was introduced, but it needed remodeling. This was done after the military room with its storage for firearms was completed. The civil defense classroom now *is* the air-raid shelter. It contains a large model of the city; a model of dispersal and evacuation plans, including those of the school; a model of the school's shelter; and a model of a nuclear explosion.

At the end of school, the students spend two weeks at a military-sports camp on a campsite of a local military unit. The local military commander details officers and sergeants, with the necessary supplies, for the camp. Campers are divided into platoons and drilled by the officers and sergeants. Work is intensified for passing the GTO norms.

The "final exam" at camp is a military-sports game, such as the nationwide "Orlenok" competition. This involves a hike with map and compass, rendering first aid, building a simple shelter, conducting decontamination and sanitary work. Later, weapon assemblage, grenade-throwing, and firing competitions are conducted.

Points are added up, local area winners are

announced, awards are given at a ceremony with much fanfare, and national winners are treated to a special trip to Moscow.

In summary, the task of protecting the population is accomplished by a combination of physical, military, and civil defense training and psychological indoctrination. The Soviet leaders use to the utmost Hitler's invasion of the USSR and the foreign intervention during the Civil War to keep alive a belief in the necessity of preparedness for war. There are monuments, museums, and reminders everywhere to instill in the younger generation the fear of being attacked and the need for them to do their patriotic duty.

Task 2:
KEEPING THE ECONOMY GOING IN WARTIME

Although Soviet military planners may hope for a quick victory in the event of a future war, they also fully recognize that the nation must be prepared to fight a protracted conflict. This means that factories and farms, as well as transportation, communications, and services, must continue to operate in wartime.

Soviet planners anticipate that entire cities will be completely destroyed in the event of a nuclear conflict. To ensure that vital segments of the economy continue to operate, a planned dispersal of industry has been in effect for years. One has only to recall that in the Soviet Union 10,000,000 people and 2,600 industrial plants were evacuated in toto from western regions to the Urals and Central Asia from July to November 1941. After the war, these plants remained where they were and duplicate new plants were built on the old sites. Civil defense needs lie at the base of the formation of many "new cities" now in eastern and northern parts of the Soviet Union. As Marshal Grechko explained in 1971:

> The movement of the productive forces to the east, bringing them closer to the sources of raw materials and fuel, and their scattered placement in the economic regions will significantly raise the defense capability of the Soviet motherland and make our industry less vulnerable in the event imperialism unleashes a nuclear missile war.

Obviously, an important factor in preparation of the economy for a possible war is the food reserve. A 1974 book, *The CPSU—The Organizer of the Defense of the Socialist Fatherland,* reminds us of this necessity, quoting these words of V. I. Lenin:

> The Red Army cannot be strong without great state reserves of wheat because without this, the army cannot be moved about freely, nor trained as it should be.

Recent grain purchases from the West are a telling reminder that reserves must be maintained at all costs.

Task 3:
POST-ATOMIC RECOVERY AND DISASTER RELIEF

This task calls for the Civil Defense Troops of the armed forces to cooperate with local firefighting and nonmilitary formations to conduct rescue work, both in wartime and during natural disasters. Such equipment as bulldozers and cranes must be available with skilled operators, trained to work in contaminated areas. There must also be personnel trained to check areas for radiation, put out signs, keep order, evacuate the survivors and those needing medical treatment, and decontaminate the area as soon as possible.

In the summer of 1972, dry weather brought on many forest fires, and peat bogs north of Moscow ignited spontaneously, putting the main railway line out of operation for several days. Troops of Civil Defense and nonmilitary formations were joined by units of the armed forces to fight these destructive fires, which were reported to be raging over thousands of acres.

Civil defense troops are responsible for restoring communications, railroads, and bridges, defuzing unexploded bombs, and perhaps even countering airborne attacks and enemy diversionary groups. Primary emphasis, however, is on putting essential plants back into operation as soon as possible.

* * *

It may be argued that where approximate parity in ICBMs exists between the United States and the Soviet Union, an all-out attack with the nuclear arsenals of the superpowers is unlikely. However, a number of strategists believe that small "surgical" attacks, paradoxically, have become a greater possibility.

The more impossible the unthinkable becomes, the more possible a limited nuclear attack, or the threat of one. And if such an exchange should take place, or be used as a threat, the country best prepared for postattack recovery clearly will have an advantage that may be decisive in negotiations. Therefore, the nation that has a viable civil defense program for general nuclear war obviously will be in a better position to withstand limited attacks than will a nation that has made no preparations.

The attention given to civil defense by the Soviet Union perhaps cannot be duplicated in a free society. This does not mean that the prudent planner should not attempt to do everything possible to prepare ahead of time for such a contingency. The Soviet leadership has physically and psychologically prepared its people for the possibility of nuclear war. Western leaders have not. ■

The first Chairman of the NATO Working Group on Mutual and Balanced Force Reductions (MBFR) comments on five years of fruitless discussions with the Soviets, and muses about some similarities in negotiating . . .

On Used Cars and MBFR

By Gen. T. R. Milton, USAF (Ret.)

Wallowing along in the wake of the Helsinki agreement—the Final Act of World War II—are the talks on mutual force reductions in Europe.

Once upon a time, this subject was called Mutual and Balanced Force Reductions. Because there was no way of knowing whether or not the Soviets would consent to any discussion of the matter, the work was begun in NATO in 1970 with one principal objective: the pacification of Senator Mansfield, who seemed determined to cut US forces in Europe, no matter what.

In one of my Lucky Pierre moments, I was made Chairman of the NATO Working Group on Mutual and Balanced Force Reductions, and not exactly by standing ovation, either. One nation objected, presumably on the grounds that I was military and thus not a fit person to chair a group made up, in large part, of civilian diplomats. Another was unhappy for other reasons. They apparently feared an American general meant a stacked deck. Nonetheless, the job was mine.

Some months, and thousands of words in English and French later, we had completed the assignment given us and submitted our report to the Defense Ministers of the Alliance. Our work was warmly praised by the British, and more or less denounced by the United States, as I sat glumly pondering the future. The only bright spot I could detect was the fact that we were through, and I could cease being Chairman of this undisciplined group of bilingual semanticists. However, the Secretary-General, a very wise old man named Manlio Brosio, after first musing on the innocence of military men in a political world, regretfully told me the work would go on. It would go on for years, he said, long after we had both left NATO. Even if nothing ever came of it, it would go on.

Well, it did. MBFR has been studied, and analyzed, for almost six years now in the NATO forum, and it is just where it has always been—nowhere. Nowhere, that is, as a mutual and balanced proposition.

The Soviets simply have too many advantages. In the first place, there is no reason to believe that they think the matter of force reductions in Europe a pressing one. They have, after all, no internal political pressures to reduce, and they have had occasion, in the past decade, to employ Soviet troops against their own allies to keep them in line. Far from showing any interest in reducing, they have, over the very same years that NATO has been earnestly studying force reductions, steadily increased and modernized their forces facing NATO's Central Region *(see also the editorial on p. 6 of the August '75 issue, "The New Soviet Threat to NATO").*

The original premise for the NATO study on MBFR was undiminished security. In its barest form, undiminished security would call for reductions that would leave the present balance, however tenuous, undisturbed. In other words, the Soviets would have to reduce disproportionately more than the US to keep the balance undisturbed. On the evidence thus far, there is little chance they will accept this sort of asymmetric reduction. In fact, our first early effort in the Working Group to construct a reduction model designed to give NATO undiminished security was ruled out by our own NATO politicians as too tough to be negotiable.

There are all kinds of considerations that must be taken into account as these MBFR talks resume. There is, first of all, the fact that one day, sooner or later, there must be some change in the status quo. In the absence of any new crisis, NATO, and its bulwark, the United States, will find it increasingly difficult to maintain the present force levels. There has already been considerable erosion in these forces in the form of reduced conscription periods, relaxed training standards, and general indifference to the need for military vigilance.

The Soviets, thus, are entering the best of all worlds. They see, in all probability, a chance to exploit this business of MBFR to their own advantage. Presumably they see in it a way of hastening the end of NATO and hence any semblance of Western European unity. If this is the case, the form the reductions take is relatively unimportant from their point of view since there is little chance of any sort of effective verification machinery coming out of these talks.

For our own reasons, perhaps the form these reductions take should be unimportant as well. There is, from our standpoint, no military advantage perceptible in any negotiable proposal. And there will be no reliable way to detect cheating on the agreement, or, at any rate, to detect it in time to do anything about it. It is clearly easier to move Soviet troops from the Western USSR to East Germany than it is to move US troops to West Germany from Kansas.

If, then, we must assume some force cuts in Europe are inevitable, whether for détente, or balance of payments, or congressional pressure, or whatever, then why not just agree on a figure with the Soviets and make the cuts? Get the best deal possible, just as you would with Mad Man Harry, the used-car dealer, but don't have too many expectations. Make the force reductions, but resist being too explicit as to their nature. Leave the force structure intact, if undermanned here and there.

The disarmament experts will have no use for this proposal. There is no possible way to verify this sort of reduction, and hence no place for the experts to perform. Short of achieving an honest bargain, one that would leave the two sides equal in strength—the so-called common ceiling proposal—it seems to me the simple approach would do the least damage to NATO's aging facade. ■

In this second of a series of articles on our sister services, the author describes the Marine Corps's unique organizational pattern, designed primarily but not exclusively for amphibious operations. Marine aviation is the fifth largest air force in the world, and the Corps is a "light" combat force only in its nonfighting logistic tail . . .

US MARINE CORPS—1975

BY COL. BROOKE NIHART, USMC (RET.)

THE Marine Corps is many things to many people. Some may still consider it, as a certain general put it some thirty years ago, "a small, fouled-up Army, talking Navy lingo." But then and now it *was* and *is* much more.

Marines are convinced that any thinking defense analyst's answer to the multiple choice question: "Is the Marine Corps (a) amphibious, (b) a combined arms team, (c) a national swing force, or (d) a synergism?" has got to be, "All of the above."

The Corps is *amphibious,* able quickly to load out on ships, live for a prolonged time at sea, land from ships, seize a beach and beachhead and an objective area against serious enemy opposition, defend it against counterattack—all of this to permit prosecution of a land campaign by larger forces or establishment of a naval and air base area.

Having landed, the Corps is able to accomplish this mission because it is a *combined arms team.* It combines, in a closely coordinated and commanded whole, a force of heavy infantry, tube artillery, armor—tanks,

Helicopters make up half of USMC's aviation. Left is the upgraded, seven-blade CH-53E heavy lifter.

self-propelled artillery, and armored personnel carriers in the form of amphibian tractors—and, above all, its own air arm.

And Marine aviation is not just helicopters to land and sustain the troops and not just close air support of the ground troops. It provides the five functions essential for the air support of an amphibious operation, or for that matter, any combat operation: (1) air superiority, (2) offensive air support, (3) assault support, (4) reconnaissance, and (5) air-space control through command control and communications.

While amphibious operations continue to be the Marine Corps's prime specialty, military planners now view the Corps as a swing force.

Each of the five functions is performed across the spectrum of operations—tactical or when in contact with the enemy, operational or the movement of aircraft and bases to where the tactical phase can begin, and logistic or the supply and maintenance to keep the aircraft flying night and day.

A new and growing notion sees the Corps as *a national swing force.* The National Security Act of 1947 gives the Marine Corps the mission of seizure and defense of advanced bases, as well as land operations incident to naval campaigns. This is a time-honored mission, validated by many landings, from the Bahamas in 1776 to Da Nang in 1965.

By the same 1947 Act, the Corps was assigned "such other duties as the President may direct." This also is a traditional mission that has sent Marines to the Battle of Princeton in 1777, to New Orleans in 1815, Bull Run in 1861, France in 1918, Korea in 1950, and kept them in Vietnam from 1965 to 1972.

This means the Marines have never been limited to one mission—amphibious operations—or reserved for that alone. They prefer their primary amphibious mission in which they alone are skilled. But they see themselves as a keenly honed fighting force, ready and eager to fight where needed.

Marine aviation is a swing force of its own—a swing force in the national tac-air picture by virtue of its combat capability and its basing flexibility. With fighters, attack, reconnaissance, and electronic countermeasures (ECM) aircraft, it has a great additive capability to theater air warfare, as demonstrated at Guadalcanal, the northern Solomons, Okinawa, Korea, and Vietnam.

But any aviation force that can base on aircraft carriers, amphibious shipping, mobile and hastily constructed airstrips, or conventional runways has an additional special value in support of national interests abroad.

When not participating in an amphibious operation, Marine aviation can reinforce the Air Force in a land theater or the Navy in a naval campaign, and can operate from conventional land or sea bases or from its own portable airfields.

Taken separately, the Marine Corps consists of three very good amphibious-specialized infantry divisions and fifty-six fixed-wing and rotary-wing aircraft squadrons. Combined into three Marine Amphibious Forces of a division and an aircraft wing each, the Corps becomes *a synergism* with the overall effect of the combined arms team being vastly greater than the mere sum of its parts.

Fleet Marine Force

To achieve this synergism, the Marines are uniquely organized into two Fleet Marine Forces—Atlantic and Pacific—headquartered at Norfolk, Va., and Hawaii respectively. The former, based in North Carolina, consists of the 2d Marine Division, 2d Marine Aircraft Wing, and Force Troops of heavy supporting artillery, armor, engineer, and service units. The Pacific FMF is based in Southern California (1st Division, 3d Wing) and the Western Pacific (3d Division, 1st Wing) and also includes Force Troops units.

Critics have referred to the Fleet Marine Forces in general and the Marine division in particular as

"light" combat units, in contrast to comparable Army units. This is a gross misconception. First, there are really no comparable Army units beyond the infantry battalion, and the Marine battalion is about twenty-five percent stronger.

The Marine division is structured to sustain combat for a short period during and after a landing. This calls for a powerful infantry force, a heavy complement of forward air controllers and naval gunfire spotters, shore party units for the logistic operation of the beach, amphibian tractors for landing and movement inland, and various specialized staff and technical groups. With them is the usual division allotment of armor, artillery, and combat engineers. This all adds up to a heavier division overall, one that is heavier particularly at the cutting edge.

Secondly, what the critics don't mention is the one factor that makes a Marine division really "heavy," a unique powerhouse among fighting organizations. That is the Marine air wing that is teamed with the Marine division into a Marine Amphibious Force.

The synergistic effect of powerful Marine ground units driving on the surface supported from the air by covering fighters, interdiction and close air support by attack aircraft, helicopter troop lift and supply, observation and FAC aircraft, photo and ECM aircraft, all based on offshore ships or quickly built expeditionary airfields, is truly vastly greater than the sum of separate ground and air components not integrated under one commander and one command and control system at the tactical level.

What the critics are saying, without spelling it out, or maybe even without understanding it, is that the Marine Corps is "light" in its non-fighting logistic tail. It was not designed to and cannot sustain prolonged ground combat at distances from its beachhead or port. To criticize it for this "lightness" is to lack understanding or merely to be wrong-headed.

In the objective area, the Corps's logistic tail is its supply and maintenance capability carried in the ships of the Navy's amphibious and service forces. When committed to "such other operations as the President may direct" in concert with the Army and at a distance from the beach, it receives additional heavy combat and service support from the Army.

Army support may include heavy engineers, motor transport, long-line communications, reinforcing heavy artillery fire, and even more armor. It would be uneconomical for the Marines to maintain these additional forces against the secondary contingency when the much larger Army will have them available for supporting either soldiers or Marines.

MARINE CORPS AVIATION AT A GLANCE

Nr. Sqdns.	Type of Sqdn.	Nr. Aircraft	Type Aircraft
12	Fighter-Attack	144	F-4B/J/N Phantom II
5	Attack	80	A-4E/F/M Skyhawk
3	V/STOL Attack	60	AV-8A Harrier
5	All-Weather Attack	60	A-6A/E Intruder
3	Reconnaissance	18	EA-6A ECM aircraft
			and
		21	RF-4B photo aircraft
3	Tanker	36	KC-130F Hercules
3	Observation	36	OV-10A Bronco
22	Helicopter (heavy, medium, light, and attack)	425	CH-53D, CH-46D/F, UH-1E/N, and AH-1G/J
56	**squadrons**	**880**	**active combat aircraft**

The Aircraft Wing

The Marine Corps cannot be discussed without developing the above rationale compounded of traditional Marine amphibious, combined arms, and combat air support philosophies and practices. But AIR FORCE Magazine readers are, no doubt, more interested in the aviation organization and the hardware that makes the Marine Corps different and the synergism work with such effectiveness.

Marine aviation consists of 880 active combat aircraft in fifty-six combat squadrons. Aircraft undergoing maintenance, in training squadrons, and in backup pools boost this figure to more than 1,000.

Of course, Marine aviation is an integral part of Naval aviation and a partner in the national airpower picture, but, should it be considered separately, it would rank as the fifth largest air force in the world, behind the US Air Force and the US Navy's air arm, and the Soviet and Chinese Air Forces, but ahead of Britain's RAF, the Egyptian and Indian Air Forces, and those of any of the individual NATO members.

The fifty-six combat squadrons *(see box)* are divided among the three aircraft wings. Each wing can operate 300 or more aircraft in an integrated combat effort teamed with a Marine division or it can task-organize mixed groups or squadrons to be integrated with regimental or battalion landing teams of combined arms from the division into Marine Amphibious Brigades or Units (MABs or MAUs).

In the former case, operating as an entire wing, the aircraft are organized into functional Marine Air Groups (MAGs) of the same or similar mission aircraft. A wing typically will include one fighter/attack group, two attack groups, two helicopter groups, one observation squadron, one photo/ECM squadron, one transport squadron, a headquarters and a service group, and an air control group. Each MAG includes a headquarters and maintenance squadron (H&MS) and a Marine Air Base Squadron (MABS).

The MABS is the key to Marine aviation's capability for quick basing ashore. The MABS operates a conventional airfield on an existing strip or sets up a SATS (short airfield for tactical support) ashore. Surface for the SATS or for a Harrier V/STOL strip is AM-2 aluminum matting. The 2,000-foot SATS includes a catapult powered by two J79 jet engines, aircraft carrier-type arresting gear, TAFDS (tactical airfield fuel dispensing system) rubber bag fuel farm and plumbing, a mirror land-

ing system, a portable control tower with land and launch communications and radar, and, of course, shelters for a variety of uses.

The MAG's H&MS provides maintenance vans for the multitude of work on engines, instruments, airframes, electronics, and armament needed to keep the squadrons flying. All the SATS components and vans can be either landed over the beach or lifted to the field site from amphibious shipping by helicopter. A 2,000-foot SATS can be installed in four to five days, a 600-foot strip for AV-8A Harriers in five hours, or a Harrier pad in five hours.

At the wing level, the service group (MWSG) provides motor transport and airfield engineer construction, maintenance, and utilities. The air control group is the nervous system of the wing and the communications data link with the supported division and to Navy and Air Force command and control systems. The Marine Corps has developed a quantity of unique gear to support its doctrine of air support command and control. In the air defense radar field, it has developed the portable but highly capable TPS-32 and TPS-59. For the radar control of all-weather, blind, close air support, the TPQ-10 was developed and used with great success in Vietnam. It will soon be followed by the more capable TPQ-27.

The air defense radar supplies information to the MTDS (Marine tactical data system). MTDS is a complex of computer, power supply, control console, communications, and radar huts, all helicopter liftable. It presents a real-time air defense, air support, and air traffic control picture. It is the equipment for the Tactical Air Operations Centers (TAOCs), and eventually for the wings' Tactical Air Control Centers (TACCs) and the Direct Air Support Centers (DASCs) with ground headquarters.

MTDS was used with great success in Vietnam in the TAOC, and the Marines are still the only service with equipment having this capability. MTDS was designed to be compatible and link with the Navy's NTDS (Naval tactical data system) on carriers and flagships. Using a Marine-developed buffer on Marble Mountain in South Vietnam, MTDS was able to talk with 7/13th Air Force control centers by converting the digital data to the Air Force's code. Thus, the only way the Air Force control centers in Vietnam could talk with Seventh Fleet carriers and the flagship on Yankee Station using real-time air control data was through the Marines' MTDS. This proved to be an extremely significant capability during critical phases of the Southeast Asia air war. No one else could provide this service.

Marine aviation philosophy can be summed up in two words, "user oriented." That is to say, everything done is keyed to the support of Marines on the ground, whether it be pre-D-day reconnaissance, insertion of troops by helicopter, fighter cover, or close air support. Command is integrated under a Marine aviator or ground officer (which is immaterial and varies from operation to operation) at the MAF, MAB, or MAU level.

Fixed-Wing Aircraft

There are about 34,500 Marines in aviation—5,000 of them pilots. This is about one-sixth of the Corps strength. Yet aviation absorbs about one-half of the budget dollars. This should not be surprising to AIR FORCE readers who understand that aircraft, related equipment, and aviation training are costly. But to those mentally geared to the cost of infantry weapons and training, the seeming disparity is sometimes hard to swallow.

Actually, the frugality for which the Corps is noted is applied to aviation as well. During the 1920s and 1930s, the Marines invariably flew second-line naval aircraft obsolescent for Navy carrier use. While this hasn't been the case since 1943, when Marines started getting the F4U-1 Corsair, they still don't procure every new aircraft developed, but pick and choose between a new type here or a modernization of an existing type there.

The Grumman F-14 Tomcat was to have entered Marine service at the end of this year, but, upon reassessment, it was dropped, considered too costly in maintenance personnel and initial and lifetime costs. Moreover, the F-14 doesn't fit the Marine philosophy of multiuse aircraft and forward expeditionary basing. It is pure fighter, not fighter/attack—it doesn't drop bombs, and if it did, it would still be too costly a delivery vehicle.

So Marine aviation will continue with its McDonnell Douglas F-4s, by extending their service life and upgrading their equipment, until it can get the F-18. The F-18 will cost half as much, at $8 or $9 million, as the F-14 and should be available to the Marines in 1982.

The workhorse of Marine attack aviation is the McDonnell Douglas A-4, still going strong more than twenty years after its prototype flew. The Corps is transitioning to the product-improved A-4M model with an additional twenty-four in the FY '75 budget at $60 million. The A-4M boasts an uprated engine with greater thrust, and can operate from a SATS using a catapult shot at full gross weight carrying 8,000 pounds of ordnance and fuel to a 450-mile radius. The really important feature of the M-model, however, is an electronics countermeasures pod mounted as a dorsal hump between the cockpit and tail. The ECM pod enables the Skyhawk to operate in a hostile missile environment and survive.

The great "gee whiz" of Marine aviation is the V/STOL Hawker-Siddeley AV-8A Harrier. The AV-8A is a transonic attack aircraft that can take off vertically by virtue of four movable tailpipes or thrusters taking gasses from the jet engine and pointing straight down. In its STOL short-takeoff mode, with the thrusters at a slight angle and using only 1,500 feet of SATS runway, it can carry 8,000 pounds of ordnance to a radius of 220 miles. Using thrusters straight down for vertical takeoff from a forward area fifty by fifty-foot pad, it can carry 3,000 pounds to a radius of fifty miles.

Fifty miles may not seem like much range for an attack aircraft, but when based close to the supported troops and supplied by helicopter, the range is ample to strike targets of immediate concern to the troops. Moreover, transit time from base to target is short and in validation exercises dropping live ordnance, as many as eight to ten sorties

Marine air has been carefully tailored to fit the Corps's missions—including the vital one of close ground support. Clockwise from top, the McDonnell Douglas A-4M; the Grumman A-6E Intruder; and the British-built AV-8A Harrier.

per aircraft per day were flown over a one-week period.

Another bonus payoff for the Harrier is its maneuverability. Thrusters are used (called thrust vector control, or TVC) to augment control surfaces in air combat maneuvering. Tests indicate that if the Harrier detects and survives the first attack by an enemy fighter, it can then outdogfight the enemy, using TVC, and get a kill with its 30-mm guns or Sidewinder missiles.

Navy R&D is pursuing several approaches toward a second-generation V/STOL fighter/attack aircraft—the XFV-12A with thrust-augmented wing, the lift-plus-lift/cruise engine, and an advanced Harrier AV-16 with an uprated Pegasus 15 engine. Meanwhile, it is hedging its bets in the event of cuts in development funds by looking at a less expensive developmental track. Termed the AV-8 Plus (*see pp. 49 and 57 of this issue for more on this aircraft*), this approach would feature aerodynamic improvements to the existing Harrier that would increase payload and range to full A-4 capability. Success in this attempt would make possible replacement of all A-4s with advanced Harriers, giving the Marines an all V/STOL light attack force.

Another aircraft unique to the Navy-Marine Corps inventory is the A-6 all-weather attack aircraft. This two-place Grumman Intruder can carry 14,000 pounds of ordnance twice as far as the A-4 can carry 4,000 pounds and deliver it on the money at night or through cloud cover. The A-6 has a radar for ground mapping and tracking point targets, a digital computer for navigation, and a separate radar for moving targets. By locking onto a transponder in the hands of front-line ground Marines, called the FAC beacon or radar beacon forward air controller (RABFAC), the A-6 can deliver all-weather close air support.

Two of the Corps's five all-weather attack squadrons are now equipped with the new A-6E. The objective is eventually to reequip the remaining three squadrons as well. The E model is distinguished by a fifty percent reduction in maintenance time and an additional delivery system called target recognition and acquisition multisensor (TRAM). TRAM employs electro-optical sensors such as infrared to detect and attack static or moving land and sea targets in the all-weather mode. Using TRAM, near first round hit probability with both guided and unguided bombs can be achieved against such moving targets as tanks.

One more unique Navy-Marine Corps aircraft is the EA-6A/B electronic reconnaissance and countermeasures version of the A-6. Its weight-carrying ability enables it to lift a large package of radar and electronic gear and a crew of four to a great range. This gives it a much greater capability than the smaller Wild Weasel packages carried on USAF F-105s and F-4Cs. It serves as early warning, radar detector, and tactical jammer with these features well validated in defense suppression missions over North Vietnam during the late war.

Helicopters and SAMs

Helicopters comprise roughly half of Marine aviation and are the key to the Corps's vertical envelopment ship-to-shore movement doctrine. This gives the landing force a two-pronged attack, with one part landing over the beach in amphibian

tractors while the remainder lands deep inland, flanking beach defenses and blocking enemy counterattacks.

An improvement program for the 5,500-pound lift CH-46D, to be designated CH-46E, is under way and will extend out to 1982. Engine power will be increased, to give increased range and lift. Improved controls and instruments will be fitted for greater safety and reliability, and new fatigue-resistant rotor blades will be installed.

Early models of the heavy CH-53 will be uprated, the A model with an improved lift equal to the D model, and the D model with improved reliability, maintainability, and performance. The first two test models of the new CH-53E heavy lifter have been delivered, and the program is going ahead. The E's three engines deliver a total of 11,570 shp, compared to the D's two engines and 7,560 shp. A seven-blade rotor will replace the six-blade rotor. The E is expected to lift close to 20,000 pounds, has external drop tanks and air-to-air refueling gear.

The Marines' light helicopter is the venerable Huey with the more powerful engined UH-1N replacing the UH-1E. The Corps has been charged with taking a very close look at the Army's UTTAS (utility tactical transport aircraft system) with a view toward eventual replacement of both the CH-46s and UH-1s.

Marine attack helicopters are the AH-1G and AH-1J Huey Cobras, and their principal mission is escorting the troop-carrying helicopters and suppressing antiaircraft fire on the approach and landing. For an added antitank capability TOW (Tube-launched, Optically controlled, Wire-guided) missiles will be backfitted.

In the fixed-wing transport area, the Marines are completing their buy of Lockheed KC-130R tankers used for air-to-air refuelers in long-range deployments, as well as to extend the range of fighter and attack aircraft on distant combat missions. The KC-130s also have the backup capability of intratheater medium STOL transports when the quick-disconnect tanks are removed. As tanker or transport, they can operate from the short SATS strips.

In the nontactical or administrative transport area, the Corps is replacing its fleet of aging piston C-118s and C-131s with McDonnell Douglas C-9 Skytrain II and Rockwell International CT-39 Sabreliner jets.

Marines at the double disembark from an amphibious vehicle specifically designed for their mission—the LVTP-7 Amtrack.

In addition to the F-4s for air defense of the MAF, the Marine Aircraft Wing has surface-to-air missiles (SAMs). The hand-held bazooka-type Redeye is actually part of the wing T/O. The Forward Area Air Defense battery (FAAD) of seventy-five two-man Redeye teams is organic to the wing's air control group. Redeye teams are assigned down to rifle companies, but for fire control continue to be closely linked with their parent organization, the air control group. Redeye will soon be replaced with Stinger, which has a head-on shot capability and is able to link with friendly aircraft IFF.

For longer-range SAM defense, the Marines have two battalions of Hawk missiles, one with each Fleet Marine Force. When these are deployed with a MAF, they come under operational control of the wing and are linked closely to the air control group in the same manner as the FAAD battery.

Opportunities, Not Problems

Part of the Marine Corps "can do, make do" philosophy is the perception of difficulties and changing situations as opportunities rather than as problems.

Like the other services, the Corps has come out of the Vietnam years of blood and trial, our third war in less than thirty years, only to be faced with new challenges. Transitioning from a force partially filled by the draft to an all-volunteer Corps is but one of the challenges. The Marine Corps alone of the services consciously made the decision to keep old standards of discipline, physical stress, and personal grooming.

This has resulted in an unauthorized absence rate higher than that of the other services. Many of these men might not have become problems in other services, but the Marines see no reason to let down their standards. It used to be that five percent of the Marines caused all the disciplinary problems; now it is more like ten percent. These figures are not acceptable, of course, so they are viewed as an opportunity to purge the Corps of the worst offenders by appropriate discharges.

More than 1,500 troublemakers were discharged shortly after the new policy was announced. On the positive side, renewed emphasis on leadership by senior NCOs and junior officers is being stressed. This action will be reinforced by recruiting higher-quality men, always a sought-after goal, now attainable because of higher service pay and distressed economic conditions in the civilian sector.

Through trial and error, the Marine Corps has concluded that while a high school diploma doesn't necessarily mean that the graduate has a sound educational grounding for acquiring hard service skills, it is a measure of a man's trainability, motivation, and determination to complete a task. These are highly desirable qualities for recruits in any military service. Accordingly, Marine recruiters are aiming for sixty-seven percent high school graduates in FY '76 and seventy-five percent the following year. This appears attainable with increased effort since a figure of fifty-nine percent was achieved in FY '75.

A further method of improving the quality of recruits is being con-

sidered: evaluating recruiters on the basis of the performance of those they recruit. Recruiters who bring in underachievers and troublemakers will lose their pro-pay or their recruiter jobs.

The recruiting service, in fact, is faced with a double challenge. Not only must it increase the percentage of high school graduates, but it fell 7,000 men short last year. The service is being reenergized with more and better trained recruiters. It is expected to meet its quota this year. However, the new Commandant, Gen. Louis H. Wilson, has gone on record that he is willing to accept a Corps of less than the 196,000 ceiling if they are quality Marines. Officers and NCOs, to a man, enthusiastically agree with this "shape up or ship out" policy.

Another changing situation that offers the Marine Corps new opportunities was brought into sharp focus during the Yom Kippur war. An enemy counterattack during a landing is one of the most dangerous threats to an amphibious operation. It has always received high-priority attention from Corps planners and, in view of the 1973 Mideast war experience, USMC's plans have been reassessed and recast.

The brief tank flurries launched by the Japanese against Marine beachheads in the Pacific during World War II were handled on the spot by Marine bazookas and antitank guns. Large German tank attacks against the Army's Sicily landings were handled similarly, with a big assist by naval gunfire from Navy cruisers. German armor movements behind the Normandy beachhead never materialized into an effective counterattack, as the Germans were pinned down and largely destroyed by Ninth Air Force's fighter-bombers. Marine doctrine has always prescribed a close coordination of these three methods, and this approach is now receiving renewed and expanded attention.

First deliveries of TOW have already begun and will continue throughout FY '76. The heavy antitank missile was successfully used from helicopters against the 1972 North Vietnamese tank offensive and by Israel in late stages of the 1973 war. One TOW company will be organic to each Marine tank battalion and can be task assigned where required. Dragon, a medium and man-portable weapon, will enter the system later this fiscal year and will be assigned to rifle companies.

Another tank is still considered by many to be the best antitank weapon, and in the Marines the 90-mm-gunned M48 will be replaced over the next few years by the M60 with 105-mm gun, laser rangefinder, and diesel engine.

Extremely responsive close air support from V/STOL Harriers based close behind ground units and from on-station heavier attack aircraft and TOW-firing attack helicopters should so chew up enemy tanks that they are manageable on the ground by Marine M60s, TOWs, and Dragons. The aircraft will use the latest detectors such as TRAM and the latest in guided ordnance.

Close coordination of diverse weapon systems as envisioned in Marine antitank and, indeed, all combined arms doctrine requires constant realistic exercising. The Marine training center at Twenty-nine Palms on California's high desert provides just the site for such training. Long used for artillery and tank training because of its clear firing areas, it will be used increasingly in exercises designed to weld the latest ground and air weapons and techniques into an even closer integrated air-ground team. Tank and aircraft units will be assigned there continuously for this purpose.

There are other Marine Corps concerns, of course, and they are all viewed as opportunities to improve combat power, responsiveness, readiness, and *esprit de corps.* For example, concern over the adequacy of amphibious shipping has resulted in the new series of large amphibious assault ships, the first of which will be commissioned in November as USS *Tarawa* (LHA-1). More assault lift than the five programmed LHAs is needed, but that concern is a future opportunity.

Concern over the reduced naval gunfire capability, so essential for beach assault, as six-inch and eight-inch gun cruisers are retired and missiles replace guns, has resulted in a new lightweight eight-inch gun that can be mounted in such small ships as destroyers. And so it goes, from concern to opportunity to improved capability.

Semper Fidelis, Semper Paratus

As in the past, the Marines "are with it" in implementing national defense policies. They are ready to supply the big amphibious landing with three air-ground MAFs, 75,000 Marines, and 1,000 aircraft, in line with their primary assigned mission. This big push can be backed up within thirty days with a fourth division-wing MAF from the Reserves, if needed.

In the important area of force interdependence, the Marines are a national "swing force" that can participate with the Army in large land campaigns, adding an integrated air-ground team punch. And Marine air is itself a national tac-air swing force able to operate off carriers or hasty strips in support of naval campaigns or with the Air Force to augment theater tactical airpower.

Finally, in less-than-war situations, Marine readiness in the form of MAUs consisting of Marine ground troops, helicopters, and V/STOL attack aircraft embarked on Navy ships and deployed forward in the Mediterranean and Western Pacific continue to be used in support of national interests. The evacuation of Cyprus, the Saigon and Phnom Penh evacuations, and the *Mayaguez* cutting-out operation validate the practice.

The Congress and Department of Defense analysts may ask searching questions, but they continue to get meaningful answers from the Marines—answers that add up to the likelihood of the Corps remaining on the scene for a while longer, as the nation's combined arms force in readiness. ■

The author, Col. Brooke Nihart, USMC (Ret.), is a 1940 graduate of Occidental College. After graduation, he was commissioned in the US Marine Corps and served for twenty-six years in a series of sea duty and infantry command and staff positions. Following his retirement in 1966, he worked for several research organizations and was a Senior Editor of Armed Forces Journal. *In 1973, he was recalled to active duty to serve as Deputy Director for Museums, Marine Corps History and Museums Division.*

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Proposals from five competing companies (General Dynamics, Northrop, Boeing, LTV Aerospace, and Lockheed) were submitted to the USAF on 18 February 1972 as candidates in the Lightweight Fighter (LWF) prototype programme.

On 14 April 1972, General Dynamics and Northrop were each awarded a contract to build two prototypes, the former pair being designated YF-16 and the latter pair YF-17. The prototypes were intended to determine the viability of a small, lightweight, low-cost air superiority fighter, and to aid evaluation of the operational potential of such an aircraft as well as establishing its operational role.

The two General Dynamics YF-16 prototypes, built under a contract worth more than $37.9 million, were for evaluation in a twelve-month, 300-hour flight programme directed by the USAF Aeronautical Systems Division's Prototype Programs Office at Wright-Patterson AFB, Ohio, under the overall control of Col Lyle W. Cameron, succeeded by Col William E. Thurman. Design priorities for this programme recognised cost as being of equal importance to schedule or performance. The USAF specified that the prototype aircraft must provide accurate information in respect of both cost to develop and cost to produce. Thus, each manufacturer had to consider how best to use advanced technology to provide very high performance within a price range considered acceptable to USAF planners. The concept chosen for the YF-16 blends advanced technology with a basically conservative configuration and a power plant offering high thrust/weight ratio.

The selection of a single-engined configuration meant that emphasis was placed on weight savings to meet the critical performance categories of high acceleration rates, high rate of climb, and exceptional manoeuvrability. This dictated limitation of aircraft size, and the use of advanced concepts to obtain optimum lift.

More than 1,200 hours of wind tunnel testing of over 50 configurations led to the

present design, with special emphasis on development of an optimum relationship between the wing leading-edges and the forebody strakes which provide vortex control. Similar in-depth study of potential requirements of a lightweight fighter resulted in the selection of manufacturing breaks, methods of attachment of external aerodynamic shapes and surfaces, structural provisions, and internal space, so that full advantage could be taken of any new features or concepts that might originate during progress of the prototype programmes. This ensured that changes could be made easily to a particular component, with minimum structural disruption to the rest of the airframe. The forward section of the engine air inlet, wings, tail surfaces, and forebody strakes are examples of readily removable structures. This modular approach provides great flexibility, and could make it possible to flight test on the F-16 components such as supercritical wings, advanced composite wings, growth versions of the F100 engine, advanced armament, a more advanced high-*g* cockpit, and a variable-geometry engine air intake.

In other respects the structure is conventional, keeping material costs to a minimum; it consists of approx 78.3% aluminium alloy (of which 80% are sheet metal parts), 3.7% steel, 4.2% advanced composite materials, 2.2% titanium, and 10.6% other materials, including about 1% reinforced plastics. Despite the large-scale use of conventional materials, there has been no degradation of structural strength, the F-16 airframe being designed for a manoeuvre capability of 7.33*g* with full internal fuel, full ammunition, and while carrying two AIM-9 missiles.

USAF, NASA, and company research all contributed to the technological advances built into the YF-16. They include vortex control, variable wing camber, a high-*g* cockpit, relaxed longitudinal static stability, fly-by-wire control system, a blended wing/body, and the use of advanced composites in the tail unit.

The first of the two YF-16 prototypes (72-01567) was rolled out at Fort Worth, Texas, on 13 December 1973, and was ferried in a USAF C-5 to Edwards AFB, California, on 8 January 1974. It made an unscheduled first flight on 20 January 1974, when test pilot Philip Oestricher elected to take off after the all-moving tailplane was damaged during high-speed taxi tests. The official first flight was made on 2 February 1974, and on 5 February a speed in excess of Mach 1 was recorded. A level speed of Mach 2 at 40,000 ft (12,200 m) was attained on 11 March 1974. The second YF-16 (72-01568) was ferried to Edwards AFB on 27 February 1974, where it flew for the first time on 9 May 1974.

During a ten-month flight evaluation programme, from February to November 1974, the YF-16s and YF-17s were flown against other current USAF aircraft. In the course of this evaluation, the YF-16 prototypes flew at speeds in excess of Mach 2 and to heights of more than 60,000 ft (18,300 m); executed manoeuvres of up to 9*g*; made subsonic and supersonic firings of seven AIM-9 Sidewinder air-to-air missiles; fired 12,948 rds of 20 mm ammunition; dropped 10 Mk 84 2,000 lb bombs; made endurance flights of up to 4 hr 30 min with in-flight refuelling, and up to 2 hr 55 min without refuelling; flew a total of 330 missions, amounting to 417 hr in the air, of which nearly 14 hr were at supersonic speeds; and met or exceeded all design objectives.

On 11 September 1974 the Department of Defense announced that the winning design, now known as the Air Combat Fighter (ACF), would be declared in January 1975; and on 13 January the Secretary of the USAF announced that the F-16 had been selected and authorised for full-scale engineering development. Contracts were awarded to General Dynamics ($417.9 million) and Pratt & Whitney ($55.5 million), for fifteen F-16 engineering development aircraft and their F100 engines. A contract change on 9 April 1975 reduced the pre-production buy to eight aircraft, comprising six single-seat F-16As and two two-seat F-16Bs, construction of which began in July 1975.

The first of these aircraft is scheduled to fly in the last quarter of 1976, and the last in 1978. They will be used to evaluate the potential of the F-16 under operational conditions, prior to full-scale production; the USAF has indicated its intention to procure initially at least 650 such aircraft.

It was announced on 27 May 1975 that Marconi-Elliott Avionic Systems had been contracted to supply the HUD (head-up display) system for the pre-production full-scale development version of the F-16. This follows reports of outstanding performance of the HUD weapon-aiming computer system during flight evaluation of the YF-16 prototypes.

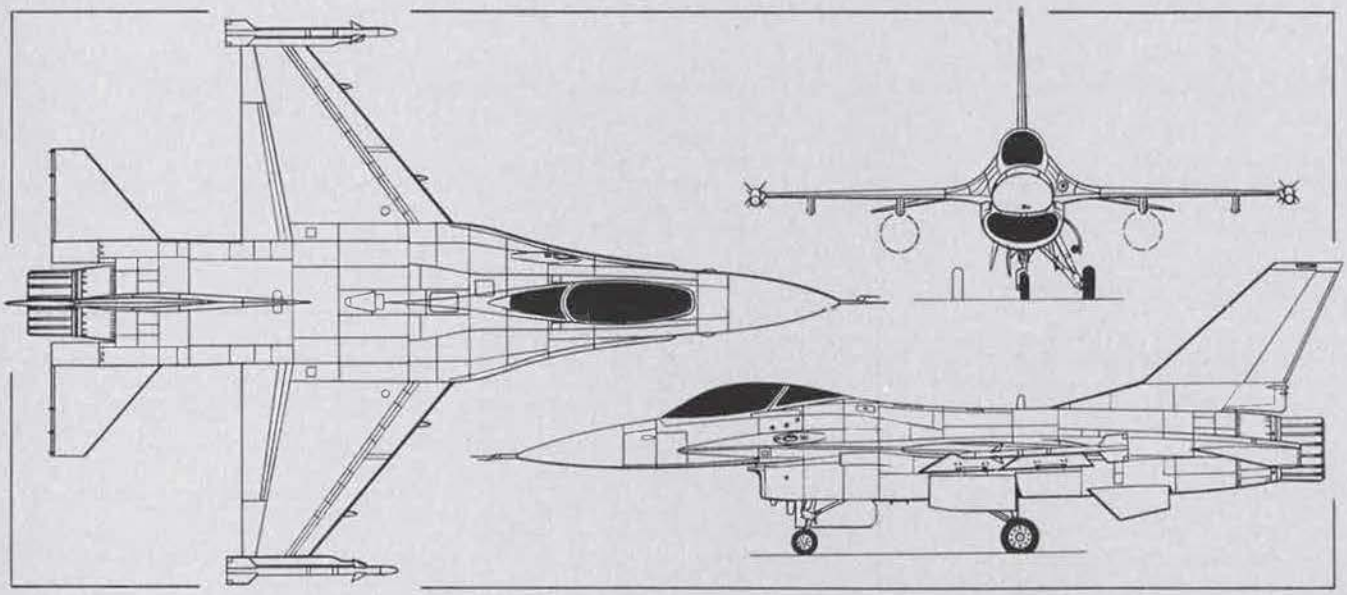
An important feature of this system, which has become known as a HUD sight, is its "snapshoot" air-to-air gunsight display, believed to be the only combat-proven tracer-line display in the world. It provides the pilot continuously with a simulated trace of the path which his bullets will take if the weapon is fired, superimposed on his view of the target, so enabling a burst of fire to be directed accurately and economically.

On 7 June 1975 a joint announcement by the four NATO countries of Belgium, Denmark, the Netherlands and Norway confirmed their selection of the F-16 to replace the F-104s in current service, the F-16 being selected in preference to offers of the Saab 37 Viggen and Dassault Mirage F1-E. The initial order is for 306 aircraft, with options for 42 more (Belgium 116, Denmark 58, the Netherlands 102, and Norway 72). Co-production arrangements with the consortium of the NATO countries provide for responsibility for production of 10% of the procurement value of the USAF's intended 650 aircraft, 40% of the procurement value of the aircraft required by their own air forces, and 15% of the procurement value of potential third nation sales. Final assembly lines will be established in Belgium and the Netherlands, and 66 potential subcontracts in the four European countries have been identified.

A joint proposal by LTV Aerospace Corporation and General Dynamics, for derivatives of the F-16 (Models 1600 and 1601) to meet the US Navy's Air Combat Fighter (NACF) requirements, was submitted on 13 January 1975. However, the Navy chose instead the twin-engined F-18, a derivative of the YF-17 submitted by McDonnell Douglas and Northrop Corporation.

The eight pre-production F-16A/Bs for the USAF will differ in a number of respects from the YF-16 prototypes. The structural strength of the YF-16s was deliberately increased by an additional 25% to permit the fullest and most rapid possible exploration of high-*g* manoeuvres; the F-16, which is required only to perform up to 7.33*g* manoeuvres at a gross weight of 22,500 lb (10,205 kg), has load factor capability up to a maximum of 9*g* at off-design Mach/altitude points and lower gross weights. The F-16 service life is double that of the YF-16. The F-16A fuselage has been lengthened by 10 in (0.254 m), and the radome by an additional 3 in (0.076 m), compared with the YF-16. The tandem two-seat F-16B is the same length as the F-16A, but its internal fuel tankage is re-

Provisional three-view drawing of the production-standard F-16A (Pilot Press)



duced by approximately 16% to make room for the second cockpit. The wing area of both pre-production models (F-16A and F-16B) has been increased by 20 sq ft (1.86 m²) over that of the YF-16. Other modifications in the F-16 include the addition of a self-contained jet-fuel engine starter, and increased external stores-carrying capability on nine stores stations.

The following description applies to the YF-16, F-16A, and F-16B, as indicated:

TYPE: Single-seat lightweight air combat fighter (F-16A) and two-seat fighter/trainer (F-16B).

WINGS: Cantilever mid-wing monoplane, of blended wing/body design and cropped-delta planform. The blended wing/body concept is achieved by flaring the wing/body intersection, thus not only providing lift from the body at high angles of attack but also giving less wetted area and increased internal fuel volume. In addition, thickening of the wing root gives a more rigid structure, with a weight saving of some 250 lb (113 kg). Basic wing is of NACA 64A-204 section, with 40° sweepback on leading-edges. Structure is mainly of aluminium alloy, with 12 spars, 5 ribs, and single upper and lower skins, and is attached to fuselage by machined aluminium tension fittings. Vortex lift and control are provided by sharp, highly-swept strakes extending along the fuselage forebody. This permits significant reduction in wing area. Variable wing camber is achieved by the use of leading-edge manoeuvring flaps that are programmed automatically as a function of Mach number and angle of attack. The increased wing camber maintains effective lift coefficients at high angles of attack. These flaps are one-piece bonded aluminium honeycomb sandwich structures, and are actuated by an AiResearch drive system using rotary actuators. The trailing-edges carry large flaperons (flaps/ailerons), which are interchangeable left with right and are actuated by National Water Lift integrated servo-actuators. The rate of flaperon movement is 80°/sec on the F-16.

FUSELAGE: Semi-monocoque all-metal structure of frames and longerons, built in four modules: forward (to just aft of cockpit), centre, aft, and inlet. Nose radome built by Brunswick Corporation. Highly-swept vortex control strakes along the fuselage forebody.

TAIL UNIT: Cantilever structure with swept vertical surfaces, constructed largely of graphite-epoxy composite laminate skins with full-depth bonded aluminium honeycomb sandwich core. Steel leading-edge caps on fin and tailplane. Glassfibre fin-tip. Small glassfibre dorsal fin and interchangeable graphite composite ventral fins. Interchangeable all-moving tailplane, with glassfibre tips. Split speed-brake inboard of rear portion of each horizontal tail surface to each side of nozzle, each deflecting 60° from the closed position. National Water Lift integrated servo-actuators for rudder and tailplane.

LANDING GEAR: Menasco hydraulically-retractable type, nose unit retracting aft and main units forward into fuselage. Nosewheel is located aft of intake, to reduce the risk of foreign objects being drawn into the engine during ground operation, and rotates 90° during retraction to lie horizontally under engine air intake duct. Oleo-pneumatic shock-absorbers on all units. Goodyear main wheels and brakes; B. F. Goodrich main-wheel tyres, size 25.5 x 8-14. Steerable nosewheel with B. F. Goodrich tyre, size 18 x 5.5-8. Eighty per cent of main unit components interchangeable. Graphite composite mainwheel doors. Brake-by-wire system on main gear, with Goodyear anti-skid units. Runway arrester hook under rear fuselage.

POWER PLANT: One Pratt & Whitney F100-PW-100(3) turbofan engine, rated at approx 25,000 lb (11,340 kg) st with afterburning, mounted within the rear fuselage. Fixed-geometry intake, with boundary layer splitter plate, beneath fuselage. A fixed-geometry intake was chosen as it was calculated that it would be 400 lb (181 kg) lighter than a variable-geometry intake designed for optimum performance; but it can be changed to a variable-geometry intake later, without difficulty, if desirable to improve high-speed performance. The underfuselage intake position was chosen because here the airflow suffers least disturbance throughout the entire range of aircraft manoeuvres, and because it eliminates the problem of gun gas ingestion. Foreign object damage is avoided by placing the nose gear aft of the inlet lip. Standard fuel contained in wing and five fuselage cells which function as two tanks; internal fuel weight is 6,934 lb (3,145 kg) in F-16A, and approx 16% less in F-16B. In-flight refuelling receptacle in top of centre-fuselage, aft of cockpit. Auxiliary fuel can be carried in drop-tanks on underwing and underfuselage hardpoints.

ACCOMMODATION: Pilot only, in air-conditioned cockpit, on Stencel zero-zero ejection seat (McDonnell Douglas Escapac 1H-8 in YF-16). Texstar bubble canopy, made of polycarbonate, an advanced plastics material. The windscreen and forward canopy are an integral unit without a forward bow-frame, and are separated from the aft canopy by a simple support structure which serves also as the breakpoint where the forward section pivots upward and aft to give access to the cockpit. A redundant safety-lock feature prevents canopy loss. This new windscreen/canopy design provides 360° all-round vision, 195° fore and aft, 40° down over the side, and 15° down over the nose. While this canopy imposes a supersonic drag penalty, it is considered to be more than offset by the improved rearward view afforded to the pilot. To enable the pilot to sustain high-*g* forces, and for pilot comfort, the seat is inclined 30° aft and the heel-line is raised. In normal operation the canopy is pivoted upward and aft by electrical power; the pilot is also able to unlatch the canopy manually and open it with a backup hand-crank. Emergency jettison is provided by explosive unlatching devices and two forward-mounted rockets. A limited-displacement, force-sensing control stick is provided on the right hand console, with a suitable armrest, to provide precise control inputs during combat manoeuvres. The F-16B offers two cockpits arranged in tandem and equipped with all controls, displays, instruments, avionics, and life-support systems required to perform both training and combat missions. The layout of the F-16B second station is essentially the same as that of the F-16A, and is systems operational. A single-closure polycarbonate transparency, made in two pieces and spliced aft of the forward seat with a metal bow-frame and lateral support member, provides outstanding vision from both cockpits.

SYSTEMS: Regenerative bootstrap air-cycle environmental control system, using engine bleed air, for pressurisation and cooling. Two separate and independent hydraulic systems supply power for operation of the primary flight control surfaces and the utility functions. Electrical system powered by engine-driven integrated drive generator, rated at 40kVA in YF-16. Westinghouse 40kVA and Lear Siegler 5kVA generators and ground control units in F-16, with Sundstrand constant-speed drive. Four dedicated, sealed-cell batteries provide transient protection for the fly-by-wire flight control system. Quadruple-redundant fly-by-wire control system, in which electrical circuits replace the conventional mechanical linkages, conveying direct electrical commands from the pilot's controls to integrated servo-actuators that operate the control surfaces. There is no mechanical backup to this system in the F-16, but four electrical channels provide quadruple redundancy. The fly-by-wire system is integrated into the basic aerodynamic configuration in a manner which exploits the total capabilities of flight control system technology through the control configured vehicle (CCV) principle. CCV in this application is concerned with the relationship of aircraft balance to static longitudinal stability, allowing the CG to be moved further aft than is normally possible with a conventional configuration. This results in a significant reduction in trim drag, especially at high load factors and at supersonic speeds. The effect is to reduce drag, which includes both the tail drag and the change in drag on the wing due to changes in wing lift required to balance the down-load on the tail. An on-board Sundstrand/Solar jet fuel starter (not on

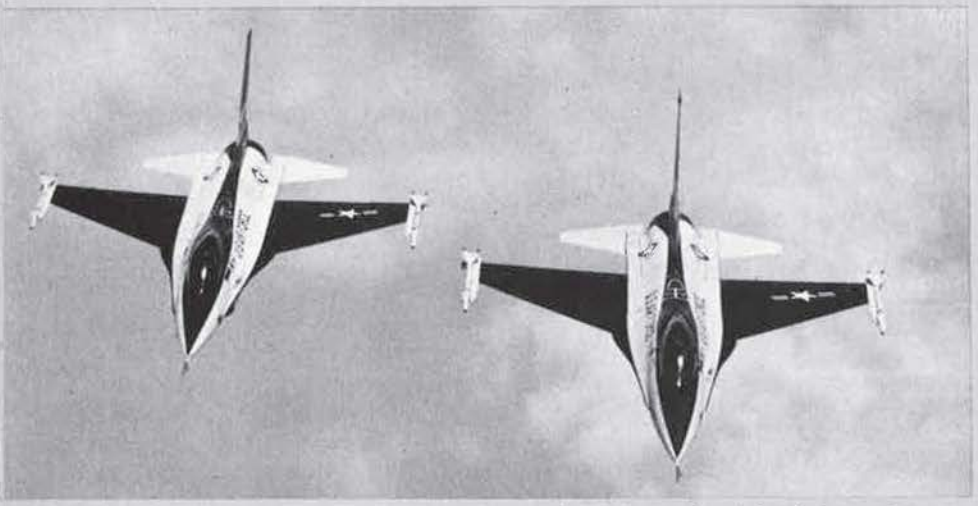
Second prototype YF-16, from which the USAF's new F-16A air combat fighter is to be evolved

the YF-16) will be provided in the F-16 for engine self-start capability. AiResearch, Sundstrand, or Hamilton Standard turbine compressor, and Sundstrand accessory drive gearbox. Simmonds fuel measuring system.

ELECTRONICS AND EQUIPMENT (YF-16): The prototypes carried minimal avionics to restrict weight and costs, but ample space exists for installation of additional equipment in production aircraft, as detailed below. It was planned to utilise as much off-the-shelf equipment as possible in the prototypes. Thus, the horizontal tail and flaperon actuators, and electro-mechanical servos in the control system, are modified versions of units used in the F-111. The nose-mounted air data probe, feeding an air data converter and a central air data computer, is similar to that of the Lockheed SR-71. The stick-grip, embodying control force transducers, is a modified version of that used in the LTV A-7; and the cockpit air-conditioning system is similar to that used in the A-7 or Northrop F-5. Other equipment fitted specifically in the YF-16s includes a General Electric SSR-1 nose-mounted pulse radar ranging system; Delco Carousel V (modified) inertial navigation system; and Marconi-Elliott digital head-up display and fire control sight system (second YF-16).

ELECTRONICS AND EQUIPMENT (F-16): Pulse-Doppler range and angle track radar, with planar array in nose. Competitive radars are under development for 1975 flight demonstration by Hughes and Westinghouse, with contract due to be awarded to winner in January 1976. Specification calls for a radar having a lookdown range, in ground clutter, of 15–20 nm (17–23 miles; 28–37 km), and a lookup range of 20–25 nm (23–29 miles; 37–46 km). Forward avionics bay, immediately forward of cockpit, contains radar, air data equipment, inertial navigation system, and flight control computer; rear avionics bay contains ILS, Tacan, and IFF. An Applied Technology and Dalmo Victor ALR-46 radar warning system, with Transco, Dorne and Margolin, or Sensor Systems threat warning and beacon antennae, will be installed. Communications equipment includes Magnavox ARC-164 UHF transceiver; Sylvania VHF; Andreac or Melcor AN/AIC-18 intercom; provisions for a Magnavox KY-58 secure voice system and a National Security Agency KIT-1A/TSEC cryptographic equipment; and Novatronics interference blanker. Sperry Flight Systems central air data computer. Singer-Kearfott modified SKN-2400 inertial navigation system; ILS; Collins or General Dynamics ARN-XXX Tacan; Teledyne Electronics APX-101 air-to-ground IFF transponder, with Hazeltine IFF control; Lear Siegler stick force sensors; Marconi-Elliott electronic head-up display set; a government-furnished horizontal situation indicator; Teledyne Avionics angle of attack transmitter; angle of attack indicator; Bendix, Lear Siegler, Clifton Precision, or Astronautics attitude director indicator; Delco fire control computer; gun camera; Marconi-Elliott, Kaiser, Texas Instruments, or Sperry Rand radar electro-optical display. Landing/taxying light on inside of each main-wheel door.

ARMAMENT: Armament was specified only for the second YF-16, which was fitted with a General Electric M61A-1 20 mm multi-barrel cannon in the port-side wing/body fairing, and was equipped with a "snapshoot" gunsight (part of the head-up display system) and 500 rounds of ammunition. There was a mounting for an infra-red air-to-air missile at each wingtip, one underfuselage hardpoint and four underwing hardpoints for the carriage of additional stores. The M61A-1 gun installation, with General Electric ammunition handling system, is retained in the F-16, as are the two wingtip missile stations and the underfuselage station, but the number of underwing hardpoints is increased to six, making nine weapon stations in all. The underfuselage station is stressed for a load of up to 2,200 lb (1,000 kg), the two inboard underwing stations for 3,500 lb (1,587 kg) each, the two centre underwing stations for 2,500 lb (1,134 kg) each, all at 5.5*g*; the two outboard underwing stations and the two wingtip stations 250 lb (113 kg) each, all at 9.0*g*. Total possible external weapon load, with reduced internal fuel, is 15,200 lb (6,894 kg), and a load of more than 11,000 lb (4,990 kg) can be carried with full internal fuel. Typical stores loads can include two wingtip-mounted AIM-9J/L Sidewinders, with up to four more on the outer underwing stations; Sargent-Fletcher 370 or 600 US gallon (308 or 500 Imp gallon; 1,400 or 2,270 litre) drop-tanks on the inboard underwing stations; a 150 US gallon (125 Imp gallon; 568 litre) drop-tank or a 2,200 lb bomb on the underfuselage station; a Martin Marietta Pave Penny laser tracker pod along the starboard side of the nacelle; and single or cluster bombs, air-to-surface missiles, or flare pods, on the four inner underwing stations. Stores can be launched from Aircraft Hydro-Forming MAU-12C/A bomb ejector racks, Hughes LAU-88 launchers, or Orgen triple or multiple ejector racks. Westinghouse AN/ALQ-119 ECM (jammer) pods and pod control system have been listed among probable equipment, and can be carried on the centreline and two underwing stations. Other low-cost ECM systems are being studied by Sanders and ITT/Itek. Tracor ALE-40 internal pyrotechnic/chaff dispensers have also been specified. Weapon delivery capabilities include air-to-air combat with gun and Sidewinder missiles, and air-to-ground attack with gun, rockets, conventional bombs, special weapons, laser-guided, and electro-optical weapons. Growth provisions are provided for radar-guided Sparrow air-to-air missiles.



Two General Dynamics YF-16 lightweight air combat fighters, colourful with their red wings and white fuselages

DIMENSIONS, EXTERNAL:

Wing span over missile launchers	31 ft 0 in (9.45 m)
Wing span over missiles	32 ft 10 in (10.01 m)
Wing aspect ratio	3.0
Length, overall, excl probe:	
YF-16	46 ft 6 in (14.175 m)
F-16A/B	47 ft 7.7 in (14.52 m)
Height overall:	
YF-16	16 ft 3 in (4.95 m)
F-16A/B	16 ft 5.2 in (5.01 m)
Tailplane span	18 ft 0.34 in (5.495 m)
Wheel track	7 ft 9 in (2.36 m)
Wheelbase	13 ft 1.52 in (4.00 m)

AREAS:

Wings, gross:	
YF-16	280.0 sq ft (26.01 m²)
F-16A/B	300.0 sq ft (27.87 m²)

WEIGHTS AND LOADINGS (F-16A):

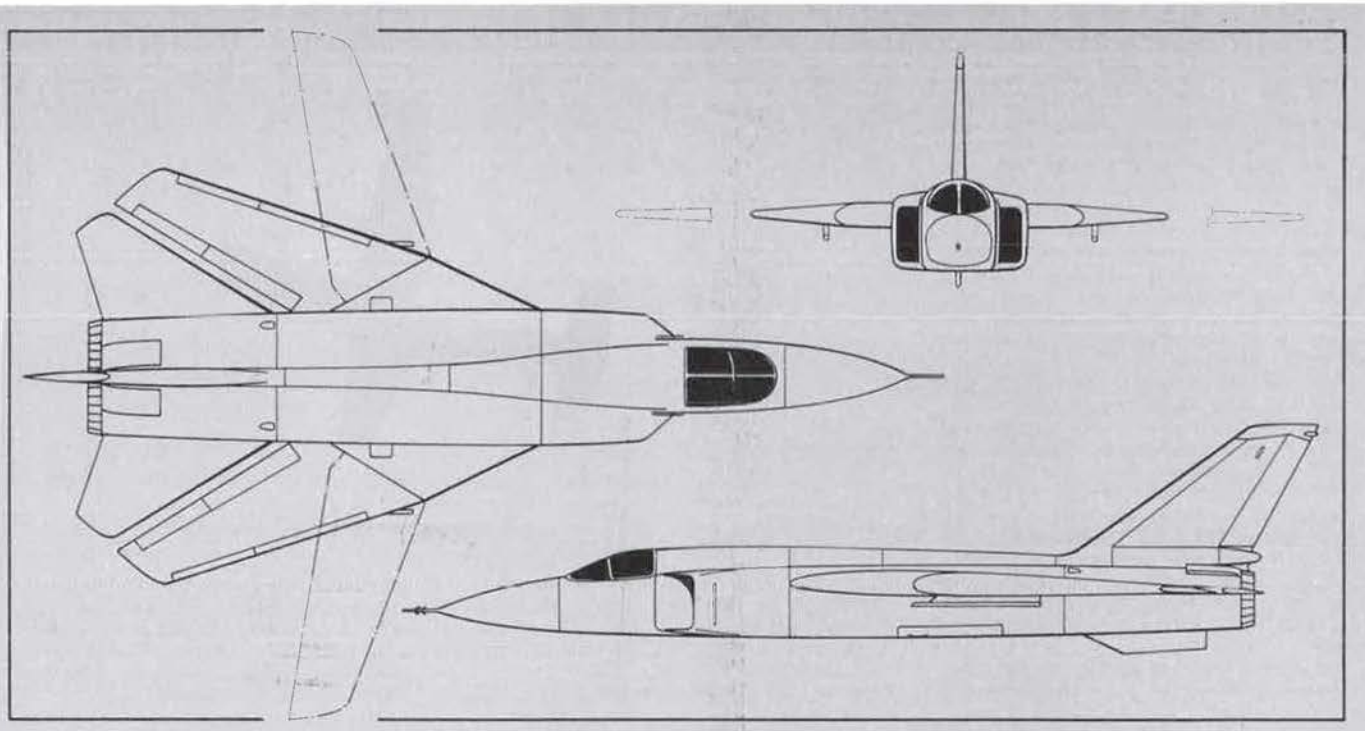
Operational empty weight	approx 14,060 lb (6,377 kg)
Max external load	15,200 lb (6,894 kg)
Structural design gross weight (7.33*g*) with full internal fuel	22,500 lb (10,205 kg)
Max T-O weight:	
YF-16, max weight at which flown	27,000 lb (12,247 kg)
F-16A with max external load	33,000 lb (14,968 kg)
Wing loading:	
at 22,200 lb (10,070 kg) AUW	74 lb/sq ft (361 kg/m²)
at 33,000 lb (14,968 kg) AUW	110 lb/sq ft (537 kg/m²)
Thrust/weight ratio (clean)	1.1 to 1

PERFORMANCE (YF-16, as assessed in NATO Steering Committee report, March 1975):

T-O weight, clean, with 2 Sidewinders	21,600 lb (9,797 kg)
External load with max internal fuel	11,500 lb (5,216 kg)
Thrust/weight ratio at 21,600 lb (9,797 kg)	1.1 to 1
Max level speed at 36,000 ft (11,000 m) with 2 Sidewinders	Mach 1.95
Max rate of climb in 5*g* turn at low level at Mach 0.7, with 6 Mk 82 bombs	42,000 ft (12,802 m)/min
Sustained turn rate at 20,000 ft (6,100 m), with max internal fuel and 2 Sidewinders	10.7°/sec
Sustained air turning radius at low level at Mach 0.7, with 6 Mk 82 bombs	4,500 ft (1,372 m)
T-O run with 4,000 lb (1,814 kg) external load	1,750 ft (533 m)
Landing run with 4,000 lb (1,814 kg) external load	2,650 ft (808 m)
Radius of action with 6 Mk 82 bombs	295 nm (340 miles; 547 km)

PERFORMANCE (F-16A):

Max level speed at 40,000 ft (12,200 m)	above Mach 2.0



Modified drawing of the Sukhoi Su-19 fighter-bomber (NATO "Fencer"), based on data that have become available since the drawing reproduced in the August Supplement was prepared (Roy J. Grainge)

Service ceiling
more than 50,000 ft (15,240 m)
Radius of action
more than 500 nm (575 miles; 925 km)
Ferry range with drop-tanks more than 2,000 nm (2,303 miles; 3,705 km)

MCDONNELL DOUGLAS

MCDONNELL AIRCRAFT COMPANY, DIVISION OF MCDONNELL DOUGLAS CORPORATION; Headquarters: Box 516, St Louis, Missouri 63166, USA

On the basis of experience gained with "Wild Weasel" versions of the F-4 Phantom and F-105 Thunderchief, for defence suppression in Vietnam, the USAF plans to replace four current squadrons of ECM-equipped F-4Cs and F-105Gs with F-4Es produced to Advanced Wild Weasel standard.

MCDONNELL DOUGLAS F-4G/WILD WEASEL

The USAF's Wild Weasel programme is concerned primarily with the suppression of hostile weapon radar guidance systems. The provision of airborne equipment able to fulfil such a role, and modification of the necessary aircraft to create an effective force for deployment against such targets, had first priority in tactical Air Force planning in the Spring of 1975.

The requirement for such a weapon system had been appreciated by Tactical Air Command as early as 1968, and feasibility studies were initiated in September of that year, following which eight sets of equipment were acquired for development, qualification testing, and flight testing in two F-4D aircraft. In the interests of force standardisation and airframe life, the F-4E Phantom has now been selected for modification to fulfil the Advanced Wild Weasel role and given the new designation F-4G. Technical studies of the F-4D and F-4E have shown the latter aircraft easier to modify, resulting in a more satisfactory installation. This includes the addition of a torpedo-shape fairing to the top of the tail fin to carry APR-38 antennae; more APR-38 antennae installed on the side of the fin and along the upper surface of the fuselage. Other modifications include changes to the LCOSS amplifier in the upper equipment bay, APR-38 CIS installation in the aft cockpit, APR-38 CIS installation in the forward cockpit, removal of the M61A-1 gun system to allow sufficient room for installation of APR-38 subsystems (receiver, HAWC, CIS), and the provision of suitable cockpit displays. The changes give the F-4G/Wild Weasel the capability to detect, identify, and locate hostile electromagnetic emitters, and to deploy against them suitable weapons for their suppression or destruction. Such aircraft would be able to operate independently in a hunter-killer role, but their main utilisation is likely to be as a component of a strike force where they would provide warning and suppression of hostile emitters, and have the capability of deploying their weapons against such targets.

The USAF is seeking funding in FY 1976 for the Advanced Wild Weasel concept, which will provide an expansion in the memory of the airborne processor and extended low-frequency emission coverage. The programme provides for the first F-4G operational kit installation in the Spring of 1976 and the second in the Autumn of that year, followed by 15 installations in 1977, 60 in 1978, and 39 in 1979, to provide a force of 116 aircraft.

CASA

CONSTRUCCIONES AERONAUTICAS SA; Head Office: Rey Francisco 4, Apartado 193, Madrid 8, Spain

CASA C.212 AVIOCAR

Spanish Air Force designation: T.12

The C.212 Aviocar twin-turboprop light utility STOL transport was evolved by CASA to fulfil a variety of military or civil roles, but primarily to replace the mixed fleet of Junkers Ju 52/3m (T.2), Douglas DC-3 (T.3), and CASA-207 Azor (T.7) transport aircraft in service with the Spanish Air Force.

The C.212 is able to fill six main roles—as a 16-seat paratroop transport, military freighter, ambulance, photographic aircraft, crew trainer, or 19-seat passenger transport—and has been certificated to joint military and civil standards by the Instituto Nacional de Técnica Aeroespacial (INTA), which was also responsible for the flight test programme. It has a STOL capability that enables it to use unprepared landing

CASA C.212 Aviocar military transport and general-purpose aircraft in the insignia of the Portuguese Air Force

strips of about 1,310 ft (400 m) in length, and has been optimised for operation in remote areas with a poor infrastructure.

On 24 September 1968, CASA was awarded a contract by the Ministerio del Aire for the development and construction of two flying prototypes and one structural test airframe. The first flight took place on 26 March 1971; the second prototype flew for the first time on 23 October 1971.

Production began with an initial quantity of 12 pre-production Aviocars, of which eight were ordered by the Spanish Air Ministry; the first of these made its first flight on 17 November 1972, and all had flown by February 1974.

By mid-1975, a total of 92 Aviocars had been sold, and 30 of these had been delivered. Production was then at the rate of four aircraft per month. Orders include 32 for the Spanish Air Force, plus 10 prototype and pre-series aircraft; 28 for the Portuguese Air Force, which has an option on a further 12; 6 for the Indonesian Air Force; 4 for the Jordanian Air Force; and 12 for the Venezuelan Air Force. The first Spanish Air Force Aviocar squadron is No. 461, based at Gando in the Canary Islands.

In order to promote sales in the Far East, CASA has negotiated the establishment of a C.212 assembly line by Lipnur in Indonesia, as well as full after-sales support in that area.

TYPE: Twin-turboprop STOL multi-purpose transport.

WINGS: Cantilever high-wing monoplane. Wing section NACA 65_3-218. Incidence 2° 30′. No dihedral or sweepback. All-metal aluminium alloy fail-safe structure. All-metal ailerons and two-section double-slotted trailing-edge flaps; max flap deflection 40°. Trim tab in port aileron. Rubber-boot de-icing of leading-edges.

FUSELAGE: Semi-monocoque fail-safe structure of light alloy construction.

TAIL UNIT: Cantilever two-spar all-metal structure, with dorsal fin. Tailplane mid-mounted on rear of fuselage. Balanced rudder and elevators. Trim tab in rudder and each elevator. Rubber-boot de-icing of leading-edges.

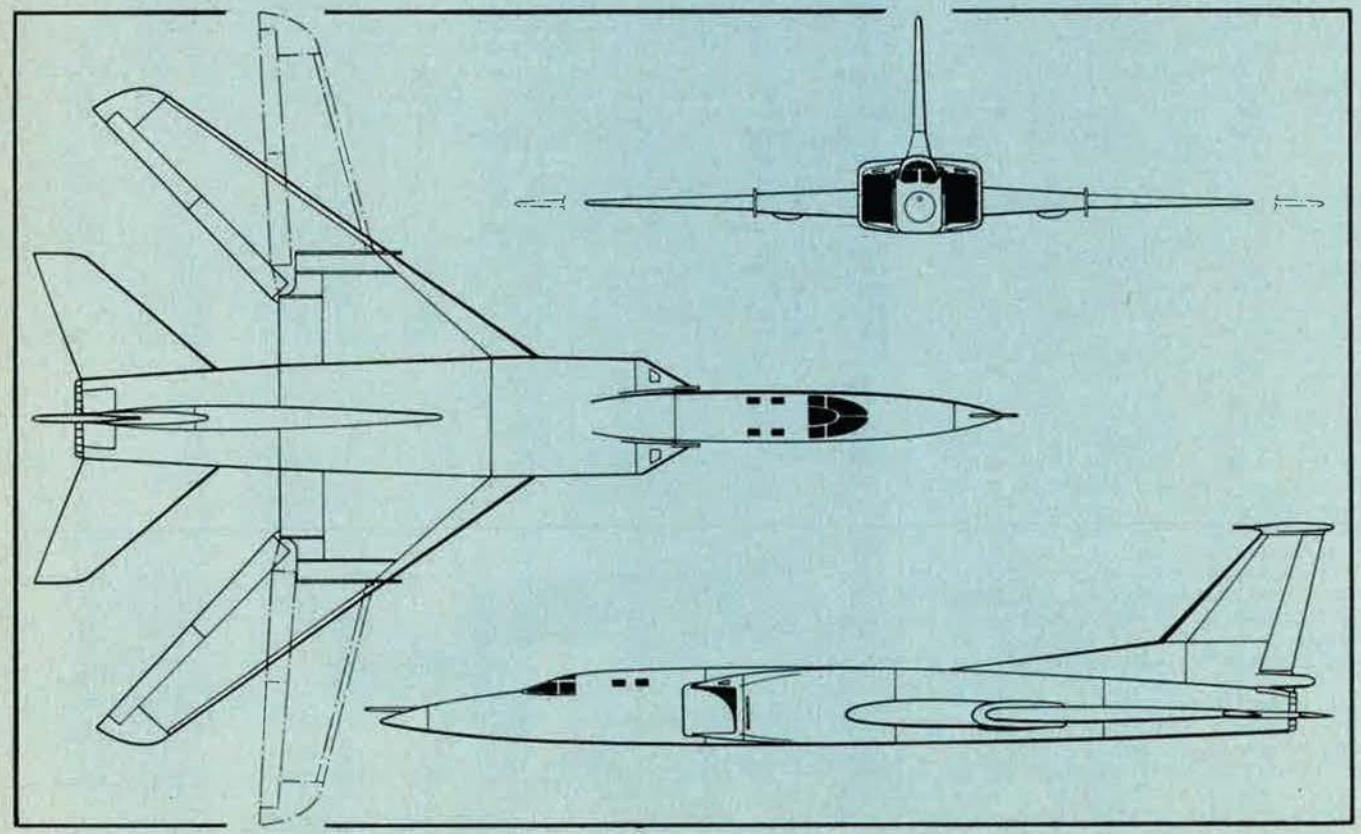
LANDING GEAR: Non-retractable tricycle type, with single main wheels and single steerable nosewheel. CASA oleo-pneumatic shock-absorbers. Dunlop wheels and tyres, main units size 11.00-12 (8-ply) Type III, nose unit size 8.00-7 Type III. Tyre pressure (all units) 45 lb/sq in (3.16 kg/cm²). Dunlop hydraulic disc brakes on main wheels.

POWER PLANT: Two 776 ehp (715 shp) AiResearch TPE 331-5-251C turboprop engines, each driving a Hartzell HC-B4-TN-5CL/LT10282HB+4 four-blade constant-speed (Beta-mode on ground) metal propeller (three-blade HC-B3TN-5E on prototype and early pre-series aircraft). Fuel in four outer-wing tanks, with total capacity of 462 Imp gallons (2,100 litres). Pressure refuelling point in starboard wing leading-edge, inboard of nacelle. Two overwing gravity refuelling points in each outer panel. Oil capacity 1.32 Imp gallons (6 litres) per engine.

ACCOMMODATION: Crew of two on flight deck. For the paratroop role, the main cabin can be fitted with 16 inward-facing seats along the cabin walls, to accommodate 15 fully-equipped paratroops and an instructor/jumpmaster. As an ambulance, the cabin would normally be equipped to carry 12 stretcher patients, 3 sitting casualties, and 2 medical attendants. As a freighter, the Aviocar can carry up to 4,410 lb (2,000 kg) of cargo, including light vehicles, in the main cabin. A roller loading system and tie-down fittings are provided. Photographic version is equipped with two cameras and a darkroom. Aircrew training version accommodation con-

Civil-registered version of the CASA Aviocar demonstrated at the 1975 Paris Air Show (Air Portraits)

Latest Jane's *three-view drawing of the Tupolev variable-geometry strategic bomber known to NATO as "Backfire-B", with landing gear pods deleted* (Roy J. Grainge)



sists of individual desks for an instructor and 5 pupils, in two rows, fitted with appropriate instrument installations. The civil passenger transport version has standard seating for 19 persons in seven rows of two to starboard of centre aisle, at 24 in (61 cm) pitch, plus five single seats on port side of aisle. Access to main cabin is via two doors on the port side, one aft of (and providing access to) the flight deck and one at the rear of the main cabin. In addition, there is a two-section underfuselage loading ramp/door aft of the main cabin; this door is openable in flight for the discharge of paratroops or cargo, and is fitted with external wheels, to allow the door to remain open during ground manoeuvring. There is an emergency exit door on the starboard side, opposite the main cabin rear door. All versions have a toilet at the forward end of the main cabin on the starboard side, with a baggage compartment opposite this on the port side. In the civil transport version, the interior of the rear-loading door can be used for additional baggage stowage.

SYSTEMS: Unpressurised cabin. Hydraulic system, pressure 2,000 lb/sq in (140 kg/cm²), operates main-wheel brakes, flaps, and nosewheel steering. Electrical system is supplied by two 3kW starter/generators. External power receptacle in port engine nacelle.

ELECTRONICS AND EQUIPMENT: Radio and radar equipment includes Bendix RTA 41B VHF, AN/ARC-34C UHF, VOR/ILS, and one ADF. Blind-flying instrumentation standard. Optional equipment includes Tacan, SIF/IFF, Collins 618S-4 HF, and a second ADF.

DIMENSIONS, EXTERNAL:

Wing span	62 ft 4 in (19.00 m)
Wing chord at root	8 ft 2½ in (2.50 m)
Wing chord at tip	4 ft 1¼ in (1.25 m)
Wing aspect ratio	9
Length overall	49 ft 10½ in (15.20 m)
Height overall	20 ft 8 in (6.30 m)
Tailplane span	24 ft 3¼ in (7.40 m)
Wheel track	10 ft 2 in (3.10 m)
Wheelbase	17 ft 10½ in (5.45 m)
Propeller diameter	8 ft 11½ in (2.73 m)
Distance between propeller centres	17 ft 4¾ in (5.30 m)
Passenger door (port, rear):	
Max height	5 ft 2¼ in (1.58 m)
Max width	2 ft 3½ in (0.70 m)
Crew and servicing door (port, fwd):	
Max height	3 ft 7¼ in (1.10 m)
Max width	1 ft 11⅝ in (0.60 m)
Rear-loading door:	
Max length	13 ft 1½ in (4.00 m)
Max width	5 ft 7 in (1.70 m)

DIMENSIONS, INTERNAL:

Cabin (cargo version, between flight deck and rear-loading door):	
Length	16 ft 4¾ in (5.00 m)
Width	6 ft 10¾ in (2.10 m)
Height	5 ft 7 in (1.70 m)
Volume	618 cu ft (17.5 m³)

AREAS:

Wings, gross	430.56 sq ft (40.00 m²)
Ailerons (total)	26.37 sq ft (2.45 m²)
Trailing-edge flaps (total)	79.44 sq ft (7.38 m²)
Fin, incl dorsal fin	45.75 sq ft (4.25 m²)
Rudder, incl tab	31.74 sq ft (2.02 m²)
Tailplane	79.22 sq ft (7.36 m²)
Elevators, incl tabs	38.32 sq ft (3.56 m²)

WEIGHTS AND LOADINGS:

Manufacturer's weight empty	8,157 lb (3,700 kg)
Basic operating weight empty	8,565 lb (3,885 kg)
Fuel	3,505 lb (1,590 kg)
Max payload	4,410 lb (2,000 kg)
Max T-O weight	13,889 lb (6,300 kg)
Max zero-fuel weight	12,952 lb (5,875 kg)
Max landing weight	13,448 lb (6,100 kg)
Max wing loading	32.3 lb/sq ft (157.5 kg/m²)
Max power loading	9.19 lb/ehp (4.17 kg/ehp)

PERFORMANCE (at max T-O weight except where indicated):

Max never-exceed speed	240 knots (276 mph; 445 km/h) EAS
Max level speed at 12,000 ft (3,660 m)	199 knots (230 mph; 370 km/h)
Max cruising speed at 12,000 ft (3,660 m)	194 knots (223 mph; 359 km/h)
Econ cruising speed at 12,000 ft (3,660 m)	170 knots (196 mph; 315 km/h)
Stalling speed, flaps up, at max landing weight	72 knots (83 mph; 133 km/h)
Stalling speed, flaps down	62 knots (72 mph; 116 km/h)
Max rate of climb at S/L	1,800 ft (548 m)/min
Rate of climb at S/L, one engine out	350 ft (106 m)/min
Service ceiling	26,700 ft (8,140 m)
Service ceiling, one engine out	13,500 ft (4,115 m)
T-O run	1,148 ft (350 m)
T-O to 50 ft (15 m)	1,588 ft (484 m)
Landing from 50 ft (15 m)	1,263 ft (385 m)
Landing run	679 ft (207 m)
Range at 12,000 ft (3,660 m):	
with max fuel and 2,303 lb (1,045 kg) payload	949 nm (1,093 miles; 1,760 km)
with max payload	258 nm (298 miles; 480 km)

HAWKER SIDDELEY

HAWKER SIDDELEY AVIATION LTD; Head Office: Richmond Road, Kingston upon Thames, Surrey KT2 5QS, England

Production of the Hawker Siddeley Harrier V/STOL combat aircraft will now extend through the 'seventies, following the UK government's decision to order 25 advanced models for operation from Royal Navy ships in the maritime strike/fighter/reconnaissance roles. The 223 Harriers ordered earlier for the Royal Air Force (105), US Marine Corps (110), and Spanish Navy (8) are scheduled for completion by Summer 1976. Subsequent work will include retrofitting the RAF aircraft with laser ranging equipment of the type being tested in a development Harrier from HSA's Dunsfold, Surrey, airfield.

Under study, for possible manufacture to meet an urgent RAF requirement, is an airborne early warning version of the Hawker Siddeley Nimrod.

HAWKER SIDDELEY MARITIME HARRIER

On 15 May 1975, the British government announced its decision to proceed with full development of a maritime version of the Harrier. The initial requirement is for 25 aircraft, primarily to equip the Royal Navy's new "Invincible" class of through-deck cruisers from 1979. Maritime Harriers are also expected to serve on board the aircraft carrier *Hermes*, which is to be converted for anti-submarine duties.

The first Maritime Harrier will begin flying in 1977 and will be a production aircraft, there being no prototype stage. Major changes compared with the Harriers in current service with the Royal Air Force and US Marine Corps will comprise a raised cockpit, revised operational avionics, and installation of multi-mode Ferranti radar in a redesigned nose that will fold to port for carrier stowage. Known by the code name "Blue Fox", this radar has been under development since March 1973, when the Electronic Systems Department of Ferranti was awarded a study and preliminary development contract. It is a derivative of the frequency-agile Seaspray radar in the RN Lynx helicopter, but embodies changes to suit its different role, with air-to-air intercept and air-to-surface modes of operation. Equipment of the Maritime Harrier will include ECM in a container near the tip of the tail-fin and underwing attachments for air-to-air missiles of the Sidewinder type.

The Royal Navy's **Harrier FRS. Mk 1** will have a Rolls-Royce Pegasus 104 vectored-thrust turbofan engine. This will give 21,500 lb (9,752 kg) st, like the Pegasus 103s fitted to current RAF Harriers. The two variants will differ little in design, except that the Pegasus 104 will incorporate additional anti-corrosion features and will generate greater electrical power.

Harriers have already accumulated thousands of take-offs and landings at sea, from a total of 21 different ships of eight naval services, in a wide range of weather, sea, and climatic conditions. These operations have proved that no changes are needed to the aircraft's V/STOL design features to permit routine deployment at sea.

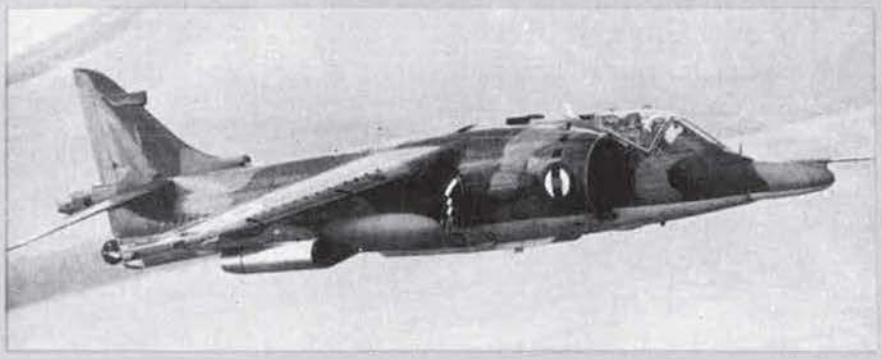
DIMENSIONS, EXTERNAL:

Wing span	25 ft 3¼ in (7.70 m)
Length overall	47 ft 3 in (14.40 m)
Length, nose folded	42 ft 6 in (12.95 m)
Height overall	12 ft 2 in (3.71 m)

HAWKER SIDDELEY AEW NIMROD

Hawker Siddeley Aviation has designed and proposed the construction of an airborne early warning (AEW) version of the Nimrod which is intended specifically for European defence. It has been made possible by the development by Marconi-Elliott Avionic of a new radar system which, in addition to an essential maritime capability, satisfies also the air defence requirements of central Europe. The aircraft could provide,

Hawker Siddeley Harrier development aircraft with laser ranging equipment in its nose



Model of Hawker Siddeley Harrier FRS. Mk 1 (Rolls-Royce Pegasus 104 turbofan engine)

at long range and at low or high altitude, detection, tracking, and classification of aircraft, missiles, and ships; interceptor control; direction of strike aircraft; air defence; air traffic control; and search and rescue facilities.

Designed specifically for installation in this modified version of the maritime reconnaissance Nimrod, the radar requires no major structural changes to the basic airframe. Modifications are confined to the extreme nose and tail, to permit installation of the newly-developed and identically-shaped scanners in fore and aft positions. The aircraft's performance is likely to be affected only marginally by the structural changes, and handling characteristics should be unaltered.

Mounting the scanners at the extremities of the airframe ensures good all-round coverage, and they do not suffer from airframe obscuration effects. Designed for very low sidelobe level, they are synchronised and each sweeps through 180° in azimuth, the IFF interrogator using the same scanners to aid correlation of IFF and radar returns. With automatic roll- and pitch-stabilisation by gyro platforms, which compensate for structural flexing, these scanners are able to overcome the cyclic error which is present in other systems.

The associated radar is a pulsed Doppler system that, in addition to the detection of aircraft, has a ship surveillance capability. The rate at which pulses are transmitted can be varied to provide maximum detection in differing terrain conditions or sea states. The system has also highly sophisticated anti-jamming features to cope with the growing efficiency of electronic countermeasures.

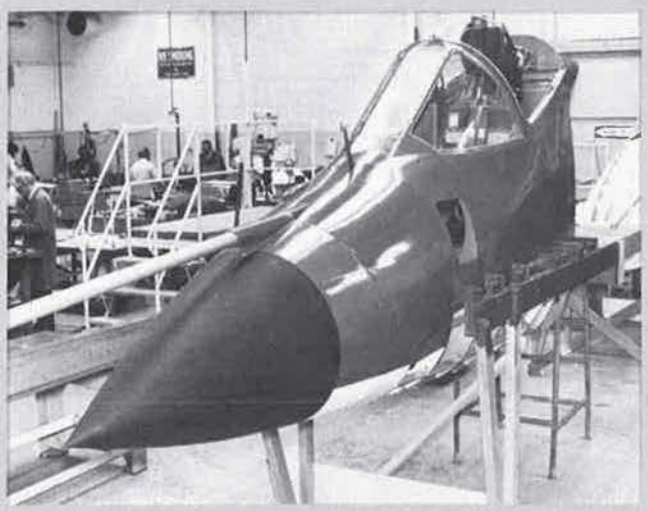
The radar passes target plots in terms of range, azimuth, radial velocity, and altitude to the advanced digital data handling system; this is based on an airborne computer that controls the flow of data from the scanners and correlates track information between the AEW aircraft and a surface control station. Four operator consoles are planned, but the number of these may be increased if required. Each has a tactical situation display, showing the tracks selected by the operator, and a tabular display for the selective presentation of detailed track and control information. Much of the data control is fully automatic; thus, association of radar, IFF and ESM, track initiation, tracking, and data storage require no action from the operator. Control of the data handling system is achieved by light pen and functionally arranged keyboards, the operator interfacing with the system to carry out system control, track classification, fighter control, and data link management.

High standards of communications and navigation are essential to complement the advanced radar and data handling system. For communications the AEW Nimrod will carry tactical UHF transceivers, SIMOP HF transceivers, pilot's U/VHF, RATT, secure voice com, LF receiver, and data links. Primary navigation avionics will include an inertial navigation system, long-range fixing aid, and Doppler. The secondary navigation system will include twin gyro magnetic compasses, air data computer, twin VOR/ILS, ADF, Tacan, autopilot, and a flight director. ESM equipment is housed in the pod at the top of the tail fin and in the two pods on the wing leading-edges.

The general appearance of the AEW Nimrod is shown in the accompanying illustration. Features of special significance for this role are the spacious cabin for avionics and crew, high transit speed, and sound low-speed characteristics.

DIMENSIONS, EXTERNAL:	
Wing span	114 ft 10 in (35.00 m)
Length overall	135 ft 0 in (41.15 m)
Height overall	30 ft 4 in (9.24 m)
PERFORMANCE:	
Endurance	in excess of 10 hr

Mockup of the raised cockpit and radar nose of the maritime Harrier FRS. Mk 1



Model of the projected AEW version of the Hawker Siddeley Nimrod (Brian M. Service)

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It started out as a routine, nighttime training flight for one of SAC's B-52s, out of Wright-Patterson AFB. Even after the hydraulic failure, things didn't look too bad. But they quickly got worse as the seven-man crew tried to bring the big Stratofortress safely back to base . . .

FIFTEEN SECONDS TO ETERNITY

BY CAPT. WILLIAM G. HECKATHORN, USAF

"CRASH on the runway! Crash on the runway!" These sickening words sounded over various radio frequencies at 2:07 a.m., on a spring night at Wright-Patterson AFB, Ohio. A giant B-52 bomber had tried to make an emergency landing. It crashed and exploded, lighting up the early morning sky with soaring yellow and orange flames. I was one of the men aboard the B-52 that night.

Routine Mission

It all started more than nine hours earlier as a routine training mission. Our crew showed up two and a half hours before takeoff. Capt. Charles B. Brown, a Standardization Pilot (IP), and 1st Lt. James Roger Villines, a Standardization Navigator (IN), greeted us: "Hi, guys. Guess what?"

We groaned. We were getting a no-notice standardization check. For the entire mission we would be evaluated on our performance, putting pressure on the whole crew. We knew what was in store for us.

Everything progressed normally as we received the weather briefing for our route of flight, and then an aircraft briefing from maintenance. There were no major discrepancies. Preflight was accomplished, engines started, all systems checked and cross-checked, and we taxied to the runway. At 7:45 p.m., our "super" bomber, with the call sign of Spa 12, lifted from the runway, rapidly gaining altitude like a tremendous elevator.

The first scheduled activity was an air refueling with a KC-135 tanker. After we leveled off at 27,000 feet, we started preparing for the rendezvous with our airborne gas station. As radar navigator, I was responsible for this rendezvous, using our radar system while communicating with the tanker via UHF radio.

We spotted the tanker on radar and exchanged pertinent information over the radio. I continued the electronic rendezvous with the tanker, although I had heard our pilot, Capt. Robert E. Smith, Jr., and the copilot, 1st Lt. John D. "Dan" Weaver, Jr., discussing a problem. On the pilot's panel, the number one main and auxiliary rudder/elevator hydraulic failure lights were lit. This meant half the rudder/elevator system was not working because of hydraulic failure.

I guided our bomber behind the tanker into "precontact" position, slightly behind and below. The pilots, assisted by our Electronic Warfare Officer (EWO), Capt. Paul C. Hoffman, used another radio to inform Spa Control, our home Command Post, of our problem. After consulting manuals and discussing our delicate situation, it was decided we should abort the mission and return to the Wright-Pat area, where we could burn off fuel and land.

The local Air Traffic Controller monitoring our flight was informed of our situation and intentions. I told the tanker that the refueling was aborted. The navigator, 1st Lt. Robert E. Pace, gave the pilots a heading as we slowly turned toward our base. At this point, all the standardization checks were terminated because of the emergency situation.

Everything seemed under control. The pilots were having little trouble with the aircraft. We obtained clearance to descend into a restricted area where we could orbit safely while burning off fuel until we were light enough to land. Normal landing weight for a B-52 is 270,000 pounds, but we received permission to land at 290,000 pounds.

Hydraulic Failure

Then it happened! At 11:05 p.m. the pilot spoke suddenly, "Look at that! The number two main and aux rudder/elevator hydraulic failure lights are on!"

The B-52 rudder and elevator flight controls are powered by two independent primary and two auxiliary hydraulic systems. Each of these four systems has a monitor light. If any light goes on, that system has failed.

"Maybe I should get into the right seat," Captain Brown, the IP, said

as he took over and started putting his experience to work. Charlie moved into the copilot's seat, and copilot Dan Weaver went back to the empty gunner's seat. Charlie and Bob Smith cross-checked all systems and then called Center to inform them of the new problem. Simultaneously, the EWO, Paul Hoffman, told Spa Control what had happened and that we now had lost the entire rudder/elevator hydraulic system. The pilots continued to check all other aircraft systems.

To complicate matters, thunderstorms appeared on my radarscope, to the west and north. I wasn't about to take any chances by flying close to one. I kept changing the aircraft heading so we could avoid the weather but still stay in the vicinity of Wright-Patterson.

The tempo of activity in the Command Post increased when Paul told them of our new crisis. The wing commander and vice commander, our squadron commander, the supervisor of flying, maintenance experts, technical representatives, and many others were listening to our problem and trying to assist. If anybody could help, they could, for they had B-52 simulators and an incomprehensible amount of knowledge available.

We were all beginning to realize just how serious our situation had become. The crew was quiet except for my guidance away from weather, and for communications with the ground. To further complicate matters, another Wright-Pat B-52 had an emergency and also was seeking help. The Command Post decided we had priority, so the other bomber was directed north to Wurtsmith AFB, Mich., where it landed successfully.

Everyone began thinking about what to do in case we had to bail out. The nav and I had silently figured a track that would put our plane over water so we could bail out safely and keep the resulting crash from injuring anyone on the ground. If the situation deteriorated further, we had a plan.

Then a message came from the wing commander on the ground: "Spa 12, this is Alpha. You might want to consider putting Captain Brown in the left seat. It's your decision. Think about it and let me know what you decide."

Even though an IP is qualified in both pilots' seats, in an emergency he would probably revert to occupying the position he knew best, the left seat. It would also seem logical to have the most experienced pilot in control. With the IP in the left seat, Dan would have to take the right seat again, since Bob Smith wasn't qualified as a copilot.

"Spa Control, we're going to do a double seat change, putting Captain Brown in the left seat and Lieutenant Weaver in the right."

"Copy, Spa 12. Be careful and take your time. Call us when you're finished as the tech reps have some words for you."

"Wilco."

Flying a Cripple

Charlie got out of the right seat and Dan got in. When Dan had control, Bob Smith turned the left seat over to Charlie. Then Bob went to the empty gunner's seat and strapped in tight.

"Spa Control, we've changed seats and await your instructions." Charlie was feeling out the flying characteristics of the crippled bomber, now without rudder or elevator control. It would be difficult to make a descent with the precision required for a landing.

"Roger. Our tech reps have some instructions that should help with controllability. Let us know when you're ready to copy. Then try the procedures and practice flying with them."

The instructions were to set the air brakes to an intermediate position, trim for level flight, lower the gear, and then use the throttles and air brake to vary airspeed and hence the rate of descent. This gave a semblance of elevator control.

Charlie was working hard now. This was a touchy procedure as electric trim inputs caused severe pitching. Everything was finally set to the proper positions and Charlie was flying fairly comfortably at 6,000 feet. As he became more familiar with the bomber's responses, he again called the Command Post.

"OK, Spa Control. Everything is set, and I'm learning to handle this bird."

"Rog. As you still have to burn off more fuel, why don't you practice a few descents at higher altitudes until you get the hang of it? They should resemble a no-flap approach."

"Wilco." Charlie practiced, trying to descend slowly, using the prescribed procedures. At first, control was difficult and some fairly serious pitch oscillations occurred. But he finally gained control and confidence. It was now 1:30 a.m. and Charlie had been in the seat more than an hour.

"If you feel ready, go ahead and try to bring it in now that your weight is down." The Command Post wanted us to land soon to preclude anything more happening.

Above, morning-after view of the underside of the cockpit section of "Spa 12." This section, carrying all seven crewmen, broke loose on first impact and skidded some 5,000 feet down the runway, coming to rest on the grass. The author and the other two navigators escaped from this hatch. Meanwhile (left), the wreckage of the rest of the B-52 looked like this after it exploded and burned alongside a taxiway.

The other four crewmen aboard the doomed B-52 escaped from the top of the cockpit, shown here. The white substance is firefighters' foam.

"Rog. We'll request a Ground Controlled Approach [GCA] and try to land." Since we were an emergency aircraft, we were alone in the sky. Center was vectoring all other aircraft away from us. Wright-Patterson's ground facilities were also assisting to their utmost. The weather was deteriorating as visibility dropped to only two miles with a layer of scud at 600 feet above the ground.

Controlled Crash

"This is your GCA controller. Do not acknowledge further transmissions." Thus, he started guiding us down with headings and rates of descents. After a few terse moments, he said: "You're well above glide slope and right of course. Do not attempt to land. Execute a missed approach."

Charlie was trying with everything he knew, but this B-52 was like none he'd ever flown. Our lives depended on his skill.

"I think I've got it now. I'm going to try another GCA," Charlie informed the advisers in the Command Post. He and Dan discussed the first approach and how to improve it.

The second GCA seemed perfect as Charlie kept the plane on glide slope and heading. I was using my radar and bombing equipment as a

backup to the GCA, and everything seemed normal. Descent was around 700 feet per minute and lineup with the runway was good. Charlie had the runway visually.

Then a decision height was reached and Charlie decided everything looked good enough to land. The runway appeared as bright-colored lights against a black night. We all tensed and braced for the expected hard landing.

At first it seemed like a normal but hard touchdown. There are no windows in the lower compartment, but the nav and I noticed that the altimeter dropped rapidly the last 100 feet. The pilots later said that everything seemed fine until we were slightly above the runway. Observers at the edge of the runway reported that suddenly the nose seemed to dip and we dived into the ground as though a big wind had pushed the tail into the air. It was 2:07 a.m., and time stopped for us.

Dan Weaver remembers the time of impact: "We nosed over as if the nose hit right after the gear. We seemed to rotate upside down as the runway was over my head instead of under my feet. Sparks were flying everywhere outside the cockpit. Then we started rolling. I blew my escape hatch while we were still rolling."

As soon as the aircraft stopped, Dan was unstrapped and out of his blown hatch. Charlie did not follow him immediately so Dan called back inside the wreckage to see if he was all right. Charlie shouted: "I'm OK, but I'm stuck in my seat. I can't get unstrapped. I'm going to cut the parachute harness."

"I'll come in and help you." Dan climbed back into the tangled mass, thinking of fire and explosion. Together they undid the harness and climbed out of the wreck. As Charlie ran away from the wreckage, he felt severe pain in his back.

While the pilots were working their way out, Bob and Paul were also having trouble escaping from the rear of the upper compartment. Paul was hanging in his seat and couldn't reach the overhead escape hatch since the aircraft lay on its left side. Bob Smith couldn't get his hatch to jettison from the gunner's seat since it was jammed by the ground.

Then Paul noticed a small light

The author, Captain Heckathorn, is a SAC B-52 radar-navigator, now assigned to the 320th Bomb Wing at Mather AFB, Calif. At the time of the incident he describes in this article, Captain Heckathorn was with the 34th Bomb Squadron of the now-dissolved 17th Bomb Wing at Wright-Patterson AFB. The author was one of the seven men aboard the ill-fated B-52 that night; all seven survived and returned to duty.

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toward the front of the aircraft where the pilots had already exited. He pointed toward it and, as Bob saw it, they both climbed through the mess that had been a cockpit moments before, and out through Dan's blown hatch.

They found Charlie and Dan, and, seeing that no one was seriously injured, started worrying about the downstairs crew members.

Downstairs, we'd also gone through a nightmare. After the initial impact, we seemed to start spinning violently. Anything that was loose flew through the air—flashlights, checklists, paperwork, pencils. Our bodies were violently buffeted, but our shoulder harnesses and seat belts held us tightly.

Noise—Then Quiet

In the midst of this, there was a bright, blinding flash in my face. I thought the radarscope had exploded and that I'd be blind if I lived. Everything turned dark. Warm liquid ran down my face. Until now, our terror had been heightened by the horrendous noise as we rolled along the runway. But, with the loss of lights, there suddenly seemed to be a peaceful hush. Thoughts raced through my head. "Why haven't we exploded? Where's the fire?"

Observers said it was less than fifteen seconds until we stopped rolling. It seemed like an eternity. Furthermore, it took another lifetime to escape from the wreck. Everything was totally confused as my mind raced. "We've stopped. Get out before we explode! Move! There's going to be a fire! Move!!"

Somehow in the dark, I released my seat belt, shoulder harness, and parachute. I couldn't get my oxygen hose to disconnect from the parachute, but it finally came unlatched. Then I heard Bob, hanging in his seat above me, trapped. "Help! I'm stuck! I can't get unstrapped!"

It was pitch black. Through the confusion, Roger kept yelling, "Does anyone have a flashlight?"

Everyone had lost his in the crash, but, luckily, I carry a small flashlight in a flight suit pocket. I finally got it out, turned it on, and stood on the left bulkhead of our compartment. I slipped my oxygen mask off and found I could still see, but the compartment was hazy and had a pungent odor. Bob was unstrapping himself in the light's beam. Roger was out of his seat trying to find a way out of the airplane.

Simultaneously we both saw the grating over the normal entrance hatch and realized we could get out the hatch unless it were jammed. While Bob freed himself, Roger got the hatch open. He stumbled out, with Bob and me right behind him.

Still thinking of fire and explosion, we started running away from the wreckage as fast as we could. After about 100 yards, we stopped and turned. What we saw amazed us! A short stubby cigar-shaped object was all that remained of the B-52. A crash truck was covering the "cigar" with lights and foam. To the right was a sea of flames—the main part of the aircraft. The cockpit had broken from the fuselage about five feet behind the crew compartment. The rest of the aircraft had exploded. I dropped to my knees and thanked God for His help.

We wondered where the other crew members were and ran toward the crash truck to see if they had escaped. Due to the position of the cockpit, they had run in the opposite direction from us. We were all shaken, but exhilarated to be alive.

Quickly we were inspected by medics and rushed to the hospital for further examinations. Charlie Brown had several collapsed vertebrae and was in the hospital for a week. Bob Smith injured his knee during the crash roll and escape. My eyes were slightly burned and my eyelashes and eyebrows seared off by the flash fire near the radarscope. Everyone else, miraculously, was uninjured.

Those few minutes after the crash —the roll, the escape from the wreck, and the recovery by rescue personnel —seemed an eternity. But we all survived and have returned to duty. ■

Two follow-on VTOL Harriers are under development—the McDonnell Douglas AV-8 Plus and the Hawker Siddeley Sea Harrier. It is too early to tell which will become . . .

the Harrier's heir apparent

BY STEFAN GEISENHEYNER
AIR FORCE MAGAZINE
EDITOR FOR EUROPE

SINCE late July, McDonnell Douglas has been advertising a new version of the Harrier AV-8A, dubbed the AV-8 Plus. This new aircraft under development for the US Marine Corps is the latest version of the free world's only operational V/STOL fighter-bomber. The reader may remember the development history of this British aircraft, which, at least in concept and outward appearance, has changed little since the first Hawker Siddeley-designed and -built P.1127 took off vertically for the first time in November 1960.

The obviously successful concept led early in 1962 to a tripartite developmental program involving the US, Britain, and Germany. Nine experimental aircraft, named Kestrel, were built and tested jointly in Britain during mid-1965. Six of these aircraft were later moved to the US, where they were evaluated by the USAF, US Navy, and Army in 1966 and '67.

The Kestrel had been designed from the outset as an experimental lightweight V/STOL strike and reconnaissance aircraft. It was single-place, with a high wing, and had bicycle landing gear with outriggers at the wingtips. A single engine with four thrust vector nozzles provided lift and/or thrust. The Rolls-Royce-built engine was the Pegasus 5 and in its early versions delivered 15,200 pounds of static thrust.

At a gross takeoff weight of 12,400 pounds, the thrust was barely enough to achieve VTOL. The highest permissible Mach number was 0.87. With STOL takeoff, the takeoff weight could be increased to 15,500 pounds. But for military purposes this did not offer the desired weapon payload.

Thus, a further promising development of the aircraft relied fully on increased engine thrust performance. The design goal was initially set at 20,000 pounds of thrust. In 1967, Rolls-Royce succeeded in attaining 19,200 pounds with the Pegasus 101 model, and one year later 20,500 pounds with the 102 model. In 1971, the 103 model producing 21,500 pounds became available. All three engines are of the same size and therefore the older models may be exchanged for new ones as they become available.

In 1967, the RAF ordered the P.1127 in quantity. It was given the name "Harrier" and was powered by the 101 model engine. The order included the understanding that uprated engines would become available in due time. This promise was eventually filled, and today 105 Harriers are flying with the squadrons or are on order. The 103 model

A hovering Harrier poses for its photo; below, HMS Eagle.

—British Official Photograph: Crown Copyright Reserved

Above, a Harrier shows off its versatility by landing on the flight deck of the Royal Navy assault ship, HMS Fearless, *in the Thames. At right, descent in an uncleared area.*

engines are successively being retrofitted to all service aircraft.

The US Marine Corps ordered its first Harriers in 1969. The first twelve were initially delivered with the 102 engine. Since then, a total of 110 aircraft, all fitted with the 21,500-pound-thrust 103 engine, are either in service or on order. The aircraft has been given the US designation AV-8A. The Spanish Navy has eight aircraft on order, which are being supplied out of US stocks. Excluding a number of two-seat trainers and development aircraft, the Harrier sales now total 223.

The performance of the Pegasus 103-powered Harriers has vastly improved compared to that of the P.1127 and the Kestrels. The aircraft is transonic and, due to its excellent thrust/weight ratio of better than 1:1 under maximum VTOL takeoff conditions, features an outstanding climb performance. It can carry ordnance loads of up to 8,000 pounds if STOL is selected and has a ferry range of 2,300 miles.

This standard Harrier has now been in operational service for about six years. It fulfilled the expectations technology promised, and, in the hands of the pilots, it has developed capabilities even its inventors did not imagine. The use of thrust vectoring in flight is still being explored, and future designs will allow full use of the unique ability to disregard standard energy management within the flight envelope.

Joint Plans for Harrier Successor

In 1972, a plan became known to develop a new aircraft on the basis of existing Harrier technology, *i.e.*, the stable "four-poster" thrust-vector concept. McDonnell Douglas and Pratt & Whitney intended to team up with Hawker Siddeley and Rolls-Royce to design a successor featuring a supercritical wing, higher performance engine, and better takeoff performance.

This project, given the designation

AV-16A, was to replace the first-generation Harriers and serve in addition as ship-based fighter-bombers. The venture got off to a slow start because the British government was then beginning to run into its present financial difficulties.

For almost two years, the US authorities sought a cooperation agreement from Britain. Under the terms offered, the UK would not only contribute funds and its share of development work, but would act as an equal partner with the US firms in profit and risk. The estimated cost of developing the AV-16A system was to be less than $450 million.

In June of last year, the British Ministry of Defence rejected the US cost-sharing offer. It was explained that the RAF would not need a new V/STOL fighter before 1985, whereas the USMC has a requirement for such an aircraft as early as 1980–81. This argumentation seems incredible in view of the relatively low sum that Britain would have had to pay—reportedly running to about $23 million per year during the development cycle, or one-third of the total.

However, a nominal sum is being contributed to the US program to retain the option to reenter the AV-16A development process at any time during the coming two years. As of late May, there still had not been a decision on the US/UK Advanced Harrier cooperation planning, according to the British Minister of Defence.

In light of most recent events, British participation in the AV-16A program is remote. Britain decided in May of this year to order a so-called Sea Harrier for the new through-deck cruisers, *i.e.*, sea control ships, of the Royal Navy. *(See also "Jane's Supplement," p. 49 of this issue.)*

Twenty-five aircraft are on firm order and the first flight of a sea-going Harrier will take place in mid-1977. The Sea Harrier is a low-risk derivative of the RAF's standard Harrier. In the airframe only certain parts that are prone to saltwater corrosion will be replaced.

Sea Harrier vs. AV-8 Plus

The Sea Harriers will be powered by the Pegasus 104, which will differ little from the 103 model currently in service with the RAF. Design features to meet the different requirements of maritime operations have been incorporated. These include additional anticorrosion measures and extra electrical power generation. Takeoff thrust rating for the Pegasus 104 is 21,500 pounds.

More important are the changes in avionics, which have to be adapted to the maritime roles. These are about evenly divided between air-to-air and air-to-surface tasks with limited reconnaissance capability. Regarding deployment, it can be said that any ship's deck capable of landing a helicopter can take a Harrier. This has been amply proved in the past by VTOL operations from cruisers, helicopter carriers, and other seagoing platforms.

A good international market is envisioned by Britain for this aircraft—particularly nations that use modern British-built warships. Prospective customers are being approached now, and the Imperial Iranian Navy is presently considered to be the prime prospect, as it may buy one of the British through-deck cruisers.

It remains to be seen, however, if the more modern and aerodynamically far superior McDonnell Douglas AV-8 Plus, which for all purposes is the AV-16A, might not draw the customers the Sea Harrier now caters to—even if it is not available before 1980 and provided that the USMC buys it. An early indication of this trend is the intention of Spain to purchase additional AV-8s, depending on the US decision to proceed with the development of the AV-8 Plus.

The McDonnell Douglas design offers an aircraft capable of meeting every multimission requirement of the USMC for V/STOL fighter-bombers based on ships or land. It features a supercritical wing and the proven, but uprated, Pegasus. Providing improved VTOL performance, these attributes will double the range and weapon payload of today's Harrier, give it a higher cruise speed, and increase loiter time.

Most important is the option to use in-flight thrust vectoring throughout the flight envelope for better maneuverability. The USMC has a requirement for 350 aircraft of this class. At the moment, it seems very likely that the AV-8 Plus will be bought because it is the most readily available VTOL fighter in existence.

Whereas the Marines use the Harrier and will use its VTOL successor as assault ship and land-based close-support aircraft, the Sea Harrier will probably be deployed in units having two to four aircraft on the through-deck cruisers of the Royal Navy now under construction.

Actually, the Sea Harrier as well as the AV-8 Plus may go to sea on any merchant vessel offering a planked-over landing space. In time of need, this would be the optimal deployment and a most cost-effective solution to offer convoy protection against most threats—provided that enough VTOL aircraft of adequate combat capability are available. And here the AV-8 Plus represents the attributes of the second-generation developments.

Thus, the perplexing decision of the British government not to participate in the US program might—provided it continues—reduce British industry's role in the VTOL field to that of a subcontractor.

There certainly would have been a risk involved in going along with McDonnell Douglas and Pratt & Whitney planning, but this is smaller than the danger of the Sea Harrier being outperformed in the air and in the marketplace by the AV-8 Plus. ■

I would like to identify some of the more prevalent myths about the B-1 bomber and explain why they are just that—myths. . . .

First, there are the myths that have to do with the role of manned bombers in assuring our nation's security. They usually include a statement like: "Bombers are obsolete in the missile age."

But are they really obsolete? Hardly. Why not? Because it is the combination of strategic forces together with perceived national resolve that deters a nuclear attack on this country. . . .

[A potential attacker] finds it is virtually impossible to plan a surprise first strike that would so incapacitate us that we could not effectively retaliate. Hence, if he is sane, he cannot find a net advantage in attacking us. Deterrence prevails and, indeed, détente is possible. . . .

Simply stated, an enemy cannot attack both our missiles and our aircraft without giving us sufficient warning to launch one or the other, or both. If, for example, he were to time all of his warheads to arrive on their targets simultaneously, we would have about a half hour to get all of our alert bombers and tankers into the air and safely away from their airfields—a lot more time than is actually needed. If the detection of an attack should be in error, those bombers are under positive control and would return to their bases. . . .

But what if an enemy should elect to attack our bomber bases with "short time of flight" submarine-launched missiles? Then, he would have to contemplate receiving a full retaliatory force of our ballistic missiles. In this case we wouldn't have to worry about being in error—that first missile impact at a bomber base would remove any doubt that the attack was real.

You can conjure up all sorts of possible scenarios, but the important point is that none of them makes the notion of a surprise attack attractive. . . .

There's another popular myth, which postulates that bombers are worthless because they would not get to their targets for several hours. . . . [That myth fails] to recognize the most important point—that deterrence is the objective. We deter with a combination of forces where each has unique capabilities to survive and to penetrate.

Now, recognizing that deterrence is the primary objective, the unique capability of the bombers to be en route to their targets but recallable could make the difference between success and failure in deterring an all-out missile exchange. Those several hours of en-route times could very well be the time needed to negotiate a nonviolent solution. . . .

There is another collection of myths that has to do with the cost of the B-1. . . . What are the facts? In comparable dollars, the planned buy of 244 B-1 aircraft will cost less than two-thirds as much as was paid for the less capable force of 742 B-52 aircraft produced between 1952 and 1962. . . . In 1975 dollars, the cost of a B-1—including its share of development costs, ground-handling equipment, flight simulators, spare engines, spare parts, and all the other items that are included in the cost—would be about $63 million, whereas the cost of a B-52, were we to buy one today, would be close to $35 million.

But to compare the unit cost of a B-1 with the unit cost of a B-52 is no more meaningful than to compare the unit cost of a Boeing 707 with the unit cost of a Lockheed Constellation. The management decisions of the airlines are based on fleet costs of the newer aircraft vs. fleet costs of the older, less efficient aircraft—not unit costs. In like fashion, the Air Force requirement for the B-1 is based on a smaller force of more capable aircraft in our operational units. . . .

An equally important consideration is what it costs to operate [aircraft]. The operating and support costs for the B-1 force would be less than one-third of the cost to operate and support the B-52 force at its peak, and less than sixty percent of what it would cost to operate and support the current B-52 force. Over the course of the effective lifetime of the B-1, of some thirty years or more, those savings will be very significant.

Then, there is also the myth that B-1 costs are out of control and that overruns are rampant. But, inflation aside, the cost of the entire B-1 program—development and production—has increased less than twelve percent since the program went on contract in June of 1970. That's less than two and a half percent per year. . . .

Now, what has changed significantly since 1970 is inflation. . . .

B-1 cost estimates have increased accordingly. Furthermore, those estimates include not just current inflation, but inflation forecasted out to 1985. And it is the inclusion of a future decade of inflation that does much to give the appearance of cost overruns, which are not, in fact, the case.

Today, inflation appears to be moderating, . . . [but] the cost of the B-1 does not correlate directly

THE B-1: MYTH AND REALITY

Before his retirement on September 1, Maj. Gen. Harry M. Darmstandler, Special Assistant to the Chief of Staff for B-1 Matters, talked to the Commonwealth Club of California about the vast fund of public misinformation and distorted opinion that has surrounded the B-1. Here are excerpts from his discussion of . . .

with the Consumer Price Index or the Wholesale Price Index. For example, the B-1 is predominantly an aluminum airplane; hence, it is sensitive to the growth of foreign cartels in bauxite from which aluminum is made. Since 1970, the price of aluminum has increased about fifty percent. We have the potential for similar cost problems with titanium.

So the B-1, like the rest of the economy, will continue to be a slave to heterogeneous price pressures. Does this earn the B-1 the appellations of "mismanaged" and "overrun"? I think not.

Then, there are a variety of myths about the B-1 and the environment. . . . Take the myth of the B-1 imperiling the ozone layer. The fact is that the B-1 will not operate in the ozone layer except on very rare occasions. . . . When we . . . fly the B-1, . . . [training] tasks [will] include takeoffs, landings, air refuelings, and low-altitude penetration profiles—none of which comes close to the ozone layer. Only on such rare occasions as ferrying the aircraft from one base to another, or a short supersonic dash, would we contact the ozone layer. . . .

There are some environmentalists who allege that the supersonic B-1 bomber will be a fuel guzzler. Although the B-1 is fully capable of supersonic flight at medium to high altitudes, that is not its primary mission! The demanding design requirement is high subsonic speed at low altitude. . . . Actually, the B-1 is very efficient. One reason is that it has the most advanced technology engines in the free world. In terms of fuel economy, that translates into a B-1 consuming about one-quarter less fuel than a B-52 for the same time of flight. And by spending more time on alert and less time in the air, the B-1 force will consume less than one-quarter of the fuel used by today's force of B-52s. And, that is a significant saving—close to a half-billion gallons a year!

I might add, the B-1 engines are smokeless and have virtually complete combustion. . . .

There is one other set of myths that I would like to address briefly. . . . They involve alternatives to the B-1. For those of you who have heard or read about a modernized B-52, or a stretched FB-111, or a standoff air-launched cruise missile that could do the bomber job cheaper, I would like to point out that study after study—by the Air Force and the Department of Defense and by informed independent organizations—have conclusively demonstrated that the B-1 bomber is the most cost-effective way to do the bomber job in the 1980s and beyond. And why not? After all, the B-1 was designed with that as its objective. . . .

A modernized B-52 would be too big as seen on radar and too slow for the advanced Soviet air defenses that we foresee in the next decade. The FB-111, even if stretched, is just too small . . . to have enough range and it's too small to carry a big enough payload. The standoff air-launched cruise missile isn't likely to survive in a big, slow, carrier aircraft. It also doesn't look like it will offer the flexibility needed to penetrate heavy terminal defenses with high confidence.

So, when you add it all up—the facts, the capabilities, the anticipated defenses—it comes out that the B-1 bomber is the best way to go. ■

BY MAJ. GEN. HARRY M. DARMSTANDLER, USAF (RET.)

Seventeen years ago, a group of Air Force supporters chartered a foundation to provide scholarships for young men who needed, but couldn't afford, additional academic preparation to qualify for admission to the Air Force Academy. Here is the heartwarming success story of . . .

The Falcon Foundation

BY COL. BARNEY OLDFIELD, USAF (RET.)

THE Falcon Foundation began in the mind of Lt. Gen. James E. "Buster" Briggs, who, as a two-star general, had been the second Superintendent of the Air Force Academy. General Briggs recognized, according to Maj. Gen. Robert J. Smith, USAFR (Ret.), of Dallas, the Foundation's first President, that many applicants would have everything the Academy wanted in a cadet—good character, physical fitness, potential for leadership—but would lack the academic base for entrance and for staying the demanding course. If high entrance standards were to be maintained, then many of those who came from community high schools across the country just couldn't make it in, let alone remain. They needed additional academic preparation—and in too many cases their families couldn't afford it.

And where military families were involved, constant changes of station caused many a son who wanted to continue the uniformed tradition to attend three different high schools in as many states before graduation. A foundation that could provide scholarships for a year of continued study was the answer.

"General Briggs was determined," Smith recalls, "that such a foundation would have as its basic purpose this intensified training of a needing applicant in basic subjects—mathematics, English, physics, chemistry." Of course, if he could run the hundred in 9.5, or throw a forward pass sixty yards, or would fit more comfortably under a basket than in a cockpit, that was all right, too. But it was the "whole-man concept" that was sought, the ultimate objective being a qualified, career, commissioned officer.

General Briggs didn't want the foundation formed in Colorado. He didn't want it to appear to be a creature of either the Academy or the Air Force. Perhaps because Texas has been the traditional "mother-in-law of the Air Force," General Briggs suddenly dropped out of the sky in May 1958 in Dallas. With him were the Academy's Judge Advocate, Col. Christopher Munch; its Academic Dean, Brig. Gen. Robert McDermott; and the Director of Athletics, Col. George Simler.

General Briggs immediately convened a meeting including such Texans as Troy W. Post, a onetime Army Air Corps major in finance and big in investments; Post's associate, retired Maj. Gen. Charles Lawrence; an attorney named LaVergne "Larry" Guinn; and Tennessee-born Robert J. Smith, lawyer, Federal Reserve member, on more boards of directors than he could count, and whose reputation as a "layer on of hands" in fund-raising was close to that of the legendary Midas.

Munch and Guinn wrote the bylaws and sought and secured both the Charter and tax-exempt foundation status with the Internal Revenue Service. A month later, with the foundation's structure in hand, a second meeting in Dallas was attended by the originals—plus two: Vice Chief of Staff Gen. Curtis LeMay, and DCS/Personnel and Administration Gen. Emmett "Rosie" O'Donnell. Smith remembers LeMay as his usual taciturn self, listening through it all, then pulling his cigar out of his mouth and glowering at Guinn: "Lawyer," he said, "don't let Smith or anybody else get the Air Force in trouble over this!" Guinn paled a little, but apparently took the instruction to heart as any fear on that score has proved to be groundless.

At the Air Force Association Convention in Dallas in September 1958, the Falcon Foundation's existence and purpose were officially announced. The first scholarship was named for a World War II Colorado navigator, James David Garcia, killed in a B-29 takeoff crash on Guam. It was underwritten by an endowment of $100,000, established by his father-in-law, Thomas E. Milsop, a steel magnate. The Falcon Foundation was off the ground, but not exactly flying—yet.

I first became aware of the Falcon Foundation scholarship program

when a memorandum landed on my desk at Litton Industries shortly after I had retired from the Air Force in 1962. It was a mimeographed broadside asking for funds. The signature block said simply: "Carl A. Spaatz, General, USAF (Ret.)." A note from Litton Board Chairman Charles B. "Tex" Thornton was attached. It asked: "Shouldn't we do this?"

It happened that Thornton had been having serious and sensitive conversations with that same General Spaatz on another matter. Gently put, the gist of it was that General "Tooey," as the first Chief of Staff of the USAF, should become forever a part of the Air Force future, as symbolized by the Air Force Academy. He was being asked to think about foregoing his rights to a last resting place in Arlington and to consent to burial on the Academy grounds.

General Spaatz thought well of the idea, and agreed. This made "Tex" Thornton's question easy for me to answer affirmatively, with the stipulation that the annual scholarship award carry the name of the "General Carl A. Spaatz Falcon Foundation Scholarship."

On September 9, 1964, during the Air Force Association's Annual Convention, that year in Washington, "Tex" Thornton, with General Spaatz present, announced establishment of the scholarship and the name it would bear. "We hope it will do as much for the tradition of the United States Air Force as did the man for whom we name it," Thornton said.

General Smith believes that move by "Tex" Thornton marked the Foundation's watershed. Any sponsor could follow that kind of a lead. Litton commissioned the famous combat artist, Howard Brodie, to do a sketch of Spaatz, and arranged for its presentation to the Air Force Academy in a special ceremony. That established a ritual that has continued unbroken to the present, each scholarship being named for an airman of renown, his portrait presented to the Academy to be hung in the rotunda of the academic building, Fairchild Hall. Every cadet passes this collection every day of the academic year so that every Falcon scholar walks in the shadow of the eminent airman whose name will always be a part of him and what he becomes.

Falcon Foundation founders: at left, LaVergne Guinn and, at right, Maj. Gen. Robert Smith, with AF Secretary James Douglas and Gen. Thomas D. White.

Each "name" scholarship has its own story, but that of USAF's fourth Chief of Staff, Gen. Thomas D. White, ranks as the most serendipitous. The scene was an air display at Carswell AFB, Tex., and it was cold. Everybody was standing first on one foot, then on the other, when *Newsweek*'s Robert D. Campbell (recently promoted to Publisher-President of *Newsweek*) and I found ourselves on the same mission—finding a latrine. He asked how Litton had gone about establishing the Spaatz scholarship. I gave him the basic elements.

"I've been thinking about General Tommy White," Campbell said. "He was on our editorial board, you know, after he retired. I think we ought to set up one of the Falcon scholarships in his name." The notion had my enthusiastic seconding, of course.

In a time of permissiveness, the Falcon Foundation has never wavered. In its "Basis for Selection" item one is "motivation to enter and graduate from the United States Air Force Academy and thereafter to follow a lifetime career as an officer in the United States Air Force," and item six "financial inability of applicant, his parents, guardian, or relatives to provide preparatory schooling necessary for passing entrance examinations of the United States Air Force Academy." All four of the other criteria are identical to those used to pick Rhodes Scholars.

Five years ago, a declaration was added, which each applicant must sign, saying he does not use, either on an occasional or addictive basis, any one of a list of drugs, and that he will not use them, except under the direction or prescription of a licensed physician, while attending any preparatory school financially supported by the Falcon Foundation.

Prep schools that have participated in the Falcon program include New Mexico Military Institute, Northwestern Prep, Culver, Staunton, Bullis, Wentworth, and Marion Institute. Whenever there is student recalcitrance of any kind, the Falcon Foundation accepts the school's judgment.

One of the most loyal supporters of the Falcon Foundation is Maj. Gen. James Stewart, USAFR (Ret.). When he retired from the Reserve, he committed all his military retirement pay to the Foundation—more than $5,000 a year. Jimmy Stewart carried Hollywood's banner with distinction as a combat pilot in World War II, and through the years has starred in many movies that shower great credit on the Air Force uniform. As long as he lives, what-

THE FALCON FOUNDATION'S SPONSORED SCHOLARSHIPS

NAME	SPONSOR
MEMORIAL—MILITARY	
1. Frederick L. Anderson	Lear Siegler, Inc. Robert T. Campion, President
2. Frank Maxwell Andrews	Braniff Airways Harding L. Lawrence, Chairman and Chief Executive Officer
3. Henry H. Arnold	(Temporarily unsponsored)
4. Claire Lee Chennault	Continental Airlines, Inc. Robert F. Six, President
5. Oliver Echols	Northrop Corp. Tom V. Jones, Chairman and President
6. Muir Stephen Fairchild	Troy V. Post
7. James Edmond Fechet	Troy V. Post
8. Benjamin D. Foulois	United Aircraft Corp. Harry J. Gray, President and Chief Executive Officer
9. James David Garcia*	Thomas E. Milsop
10. Randolph Lovelace	Iron Gate Chapter, AFA Milton Seaman, Treasurer
11. William Mitchell	Troy V. Post
12. Emmett O'Donnell, Jr.	Continental Airlines, Inc. Robert F. Six, President
13. Mason Mathews Patrick	Troy V. Post
14. Karl A. Richter	Fairchild Hiller Corp. Republic Aviation Div. E. H. Uhl, President
15. George B. Simler	First National Bank of Colorado Springs Thomas S. Moon, President
16. Carl A. Spaatz	Litton Industries, Inc. Charles B. Thornton, Chairman
17. Hoyt Sanford Vandenberg	Lockheed Aircraft Corp. Daniel J. Haughton, Chairman
18. Thomas Dresser White	Newsweek Magazine Robert D. Campbell, Publisher
MEMORIAL—DISTINGUISHED	
19. Igor Sikorsky	Sikorsky Aircraft Gerald Tobias, President
20. Theodore von Kármán	Aerojet-General Corp. Joseph J. Lipper, Vice President
21. Wright Brothers	Gen. Frederick L. and Elizabeth Anderson Foundation
HONOR—MILITARY	
22. Charles F. Born	Texas Instruments, Inc. P. E. Haggerty, Chairman
23. Benjamin W. Chidlaw	TRW Inc. Horace A. Shephard, Chairman and Chief Executive Officer
24. James H. Doolittle	TRW Inc. Horace A. Shephard, Chairman and Chief Executive Officer
25. Ira C. Eaker	Litton Industries, Inc. Charles B. Thornton, Chairman
26. Harold L. George	Republic National Bank James W. Aston, Chairman
27. Hugh Knerr	Iron Gate Chapter, AFA Milton Seaman, Treasurer
28. Curtis E. LeMay	Lear Siegler, Inc. Robert T. Campion, President
29. Thomas S. Moorman*	Air Academy National Bank J. D. Ackerman, Chairman
30. Lauris Norstad	Iron Gate Chapter, AFA Milton Seaman, Treasurer
31. Earle E. Partridge	North American-Rockwell Corp. Robert T. Anderson, President
32. E. V. Rickenbacker	Eastern Air Lines, Inc. Floyd D. Hall, Chairman
33. Laverne G. Saunders*	Marie Heye Clemens Fund Leonard D. Henry
34. Robert J. Smith*	Sam Poncher
35. Nathan F. Twining	Boeing Aircraft Corp. T. A. Wilson, Chairman
HONOR—DISTINGUISHED	
36. Troy Victor Post	Troy V. Post
MAJOR CONTRIBUTIONS—UNDESIGNATED	
Coleman Co., Inc. Clarence Coleman, President	Midwest Oil Foundation A. E. Johnson, Chairman
The LTV Corp. Paul Thayer, Chairman and Chief Executive Officer	James Stewart

* These scholarships have been established in perpetuity by the sponsor through an endowment of $25,000 or more.

The author, Col. Barney Oldfield, USAF (Ret.), is now in his thirteenth year with Litton Industries following a lengthy career as a USAF public information officer. He is credited with conceiving the idea of naming Falcon Foundation scholarships for renowned Air Force leaders. Colonel Oldfield supports a scholarship of his own at his alma mater—the University of Nebraska.

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ever the USAF pays him, Jimmy Stewart is giving back to help create the new leadership the Air Force will always seek and will always need.

The Falcon Foundation idea, conceived by General Briggs and fostered by Gen. Robert J. Smith, has achieved a momentum of its own. Now in its eighteenth year, the Foundation has made scholarship support available to 500 young men, 353 of whom have been admitted to the Academy, making the program seventy-one percent successful in its main goal. Of those entering, the attrition rate during their four years is approximately the same as the average for the class in which they are members.

Every year, the Academy Superintendent gets a bundle of fan mail from those who went to prep school on Falcon scholarships. Lt. Thomas Mirczak wrote: "I was fortunate after graduation to be selected to further my studies at UCLA, where I obtained a master's degree in business. . . ." And Lt. James R. Cooper: "After graduation, I enrolled at Purdue and within a year acquired a master's degree in aerospace engineering. . . ." And Capt. John Graham, Jr.: "Their help was more than just monetary. It gave me confidence that someone was backing me. . . ." And Capt. Bill Marvel, one who failed to get an appointment just out of high school, but with Falcon aid did make it on a second try: ". . . my thoughts and my thanks to the Foundation and its donors. . . . To them I shall be forever indebted."

Next year, the Falcon Foundation plans to name a scholarship for General Smith, who has retired from his longtime role as President. On September 27, 1975, J. B. Montgomery became the new President, with General Smith as Chairman of the Board in perpetuity. ■

Sophisticated new flight simulators and how the Air Force plans to use them to curb flying hours were important topics of the AFA/NSIA symposium on "Trends in Systems and Logistics." This concluding report on the event also highlights how USAF plans to adjust to the energy crisis . . .

DOGFIGHTS AT ZERO MACH

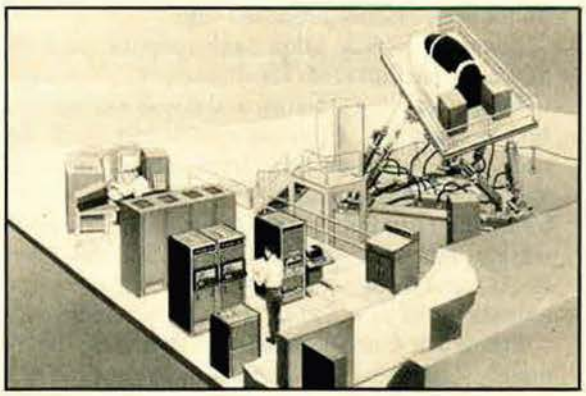
BY EDGAR ULSAMER
SENIOR EDITOR, AIR FORCE MAGAZINE

FLIGHT simulation, confined to a secondary role in training flight crews in the past, is of pervasive importance to the Air Force in the era of scarce and costly fuel, according to Brig. Gen. Norman C. Gaddis, Special Assistant for Flight Simulation Matters to the USAF Chief of Staff. Over the next five years, Air Force investments in sophisticated flight simulators can be expected to exceed $1 billion, he told an AFA/NSIA-sponsored symposium on "Trends in Systems and Logistics," held at Wright-Patterson AFB, Ohio, on June 24, 1975.

With fuel costs up by more than 300 percent in two years and DoD decreeing a twenty-five percent reduction in flying hours by 1981, the role of USAF's simulators is changing from merely enhancing the quality of aircrew training to "reducing flying time per se," according to General Gaddis. The current family of Air Force simulators, in the main, consists of devices based on mid-1950 computer technology that are "capable of only limited training in switch manipulation and emergency and instrument procedures," and were designed as "a supplement to, rather than as a substitute for, flying," he said.

The new C-5 and C-141 simulators, General Gaddis explained, "are the only ones we have with a visual device and . . . which the student spends less time in the aircraft than in the simulator." (A simulator's visual devices seek to replicate with reasonable fidelity and minimum distortion what the pilot would see through his windscreen if he were flying a real airplane under varying weather and combat conditions. Various methods, including computer-generated imagery, are used to create a full-width panorama that is synchronized with all the pilot's flying actions.)

The Air Force's Scientific Advisory Board recently examined airlines' procedures for simulator-based training and upgrading of pilots and concluded that USAF could "benefit by



Advanced simulators can duplicate complex air-superiority engagements.

Brig. Gen. Norman C. Gaddis is USAF's ranking flight simulator expert.

Dr. Michael I. Yarymovych stressed the importance of "energy efficiency."

studying the airlines' experience," he said, adding that "we are applying those lessons to Air Force aircraft with a similar mission."

Pointing out basic differences between USAF and airline simulator applications, he said that in the case of the latter the "reduction of flying hours by increased use of simulator time has been primarily in the transition training time that an airline captain requires to check out in new equipment. When checked out, [he] then maintains his proficiency during normal revenue flights. This averages sixty to seventy hours per month.

"In the Air Force, however, we are being asked to replace flying hours that are used to maintain basic aircraft weapon system proficiency as well as transition training. For example, an F-4 pilot normally flies about twenty hours a month. A twenty-five percent reduction may well have a serious effect on the pilot's ability to perform" his job, General Gaddis said.

Air Force flying hours at present are less than at any time since 1941, even though new simulators have neither been developed nor their ability to perform as a surrogate for flight training fully explored, General Gaddis said. There is particular uncertainty in the case "of our fighter aircraft, where simulator benefits are largely unknown." Although the Air Force has not yet established how much flying training can be traded off for intensified use of sophisticated simulators, the "key to increased benefits is a visual capability to extend simulator use into training areas currently only possible by flying airplanes. We feel we will get high payoffs only when we get useful visual devices on our simulators."

A Question of How Much

"The need for visual simulation is . . . well documented, [but there are] problems. Technology is just beginning to provide the detail and brightness displayed on a wide enough field of view and a large enough area of operation to meet the needs for many Air Force missions. With the acquisition of more capable visual devices, the amount of actual flying that can be duplicated should increase. The question of how much is possible cannot be answered until such simulation capabilities have been evaluated through research projects presently under way," General Gaddis said.

Areas requiring additional research include digital radar, infrared, low-light-level TV, adaptive flight training systems, and advanced instruction techniques. Continuing research will be needed to establish "the irreducible minimum amount of flying necessary to keep our support forces at required levels of readiness. Even if we had perfect simulators, we would still have to do some flying to exercise the logistics, maintenance, and . . . other sustaining elements."

Preliminary analysis by the operating commands "indicates that savings in flying time are possible [through] modern training capabilities. . . . We have numerous modifications and procurement programs planned. These . . . include new simulators for the B-52s, KC-135s, and the C-130. The new simulators will include advanced instructional features [in] motion systems as well as visual devices. We also plan to modify all C-5 and C-141 simulators with visual devices similar to those now in use in the transition training units and with the airlines. FB-111 and A-7 simulators will also have visual devices added. All F-4E simulators will have numerous modifications to bring them up to the same configuration as the aircraft, and they will also have visual devices added," General Gaddis announced.

In addition, he said, the Air Force is acquiring "state-of-the-art, motion-based simulators with visual attachments for undergraduate pilot training." This will lead to a new generation of T-37 and T-38 simulators at all undergraduate pilot training facilities. First installation is scheduled for 1976, and the entire changeover is to be completed by 1980, General Gaddis said, pointing out that "the new simulators, along with improvements to our existing weapon system simulators, are estimated to account for nearly an eighteen percent reduction in flying hours when completed." First of the new, sophisticated Air Force simulators is an air-to-air combat training system that is currently undergoing full-scale testing at Luke AFB, Ariz. It meets a key criterion in air battle training: "To convey in a realistic, emotional sense the stresses of combat by causing the pilot to forget that he is only flying and fighting in a simulator," General Gaddis said.

The Luke AFB simulator is at present confined to one-on-one engagements, but could eventually be expanded to permit multiple engagements. Technically, General Gaddis explained, the most challenging simulator task is the air-to-ground mission, because of the difficulties associated with ground target acquisition and scoring the effectiveness of a simulated attack against such targets.

The Air Force's policy approach to the intensified use of simulators is support of "the DoD goal to conserve our energy resources through a twenty-five percent reduction in flying hours, [but] we will be cautious and will avoid any degradation in the quality of our operational forces in the process," according to General Gaddis.

Toward Greater Fuel Efficiency

USAF's flying accounts for only about two percent of the total national fuel consumption, but because of its high public visibility has generated pressures "upon the Air Force to take the lead not only in conserving energy but also in developing new means for reducing fuel consumption," Dr. Michael I. Yarymovych, the Air Force's former Chief Scientist, told the sym-

posium. As a result, the Air Force formulated the concept of "energy effectiveness," meaning that "when a proposed system costs the same and performs in essentially the same way as its competitor, it still may win or lose depending on how much energy it consumes compared to the competitor," Dr. Yarymovych, now Assistant Administrator for Laboratory and Field Coordination of the US Energy Research and Development Administration (ERDA), explained.

But USAF's concern regarding fuel goes beyond costs and public image because energy shortages within the next decade "could lead to chaos and tremendous shifts of international power and financial structure throughout the world," according to Dr. Yarymovych. He believes that in the future the US may put less reliance on allies for refueling rights, prepositioning war reserves, and so on. America may be faced with the need to support friendly nations but find no "stepping stones . . . for getting to them, at least not for a reasonable financial or political price."

In part, at least, the solution will have to come from new technology, especially as it improves global transportation capability, Dr. Yarymovych predicted. "This strongly suggests a need for an air vehicle with a capacity exceeding that of the C-5 and with a self-contained global range—a vehicle that can fly to any point on earth and return without refueling. Many alternatives should be examined . . . such as a large conventional airplane, or a surface-effects machine, or a load-distributed 'flying wing,' or a lighter-than-air ship, [or] a hybrid of these. Until recently, technological limitations kept us from developing an operational version of such a vehicle; but new emerging advances in aerodynamics, materials, and energy sources point to such a concept being feasible in our next generation mobility forces."

There are, Dr. Yarymovych said, "opportunities in the propulsion area to make significant reductions in specific fuel consumption by developing new engines or improving the performance of existing engines. Such concepts as the Advanced Turbofan Engine, which would be at least twenty percent more efficient than current engines, or the Variable Cycle Engine, could bring significant fuel economies."

Also under examination are such alternate fuels as petroleum substitutes manufactured from shale or coal. It is reasonable to expect, he said, "that the nation will tend toward exploiting its vast coal resources and, therefore, that the use of coal to produce synthetic fuel should become a priority in fuels research. It is not the Air Force's responsibility to develop these synthetic fuels, but to see to it that the fuels that are being developed in the commercial sector are responsive to the Air Force needs."

USAF's former Chief Scientist was skeptical about the potential for dramatically new fuel sources for aircraft because the "very high energy density of hydrocarbon [petroleum-based] aircraft fuel is pretty hard to beat. There has been a great amount of interest in hydrogen fuel. However, hydrogen is a very problematical energy transfer medium because of its low density and high cost of production. Only in airplanes of very large size, like the global-range transport or those like the supersonic transport that consume large amounts of fuel, would the use of hydrogen fuel be reasonably competitive."

As the Air Force's physical presence on a global scale is reduced by less flying and fewer bases, the need for communications and data-processing will increase, he suggested. Pointing out that the Air Force was headed toward an era of "computational plenty," Dr. Yarymovych asserted that computer capacity "has been improving by a factor of a thousand per decade," while costs have dropped by a factor of ten.

Predicting continuation of these trends, he said "what we can compute today in a sugar-cube-size volume we will be able to do in 1985 at the same speed on the head of a pin, or 1,000 times faster in the sugar-cube volume, for one-tenth the cost."

The result of these advances "will be reduced support manpower and maintenance costs. We can expect 'soft machines' that have goal-seeking components and employ adaptive-network computer architecture, with the result that computers will be capable of executing programs written for any other computer, without rewriting or revalidating any software."

Dr. Yarymovych told the symposium that "the future world . . . will demand that we have global means of communicating by satellite at high data rates to take full advantage of computational plenty. The need and the remarkable advantages offered by precise positioning of targets, weapons, and weapon platforms by means of the Global Positioning System will lead to much wider use of military space systems than is the case at the present time."

A lively and informative question and answer session ended the symposium, moderated by AFA Executive Director James H. Straubel. ■

Copies of the speeches at the AFA/NSIA Logistics Symposium are now available, as are answers to those questions that couldn't be answered at the Symposium because of time limitations. To get your copy, send $5 (to cover the costs of reproduction and first-class postage) to Mr. Charles Cruze, Director of Development, Air Force Association, 1750 Pennsylvania Ave., N. W., Washington, D. C. 20006. Ask for the "Dayton Symposium."

The Bulletin Board

By John O. Gray
MILITARY AFFAIRS EDITOR, AIR FORCE MAGAZINE

Manpower Squeeze on Again

Air Force plans to hold a new RIF board this fall to screen non-Regular officers for forced separation during the first half of calendar 1976. There will be two increments. Authorities said they hope to keep the number eliminated to below 1,000, but they had no precise fix on how many must go.

Aggravating the always demoralizing RIF situation is the fact that many excellent performers will be caught in the upcoming firings. "We're digging into real quality," a high personnel official told AIR FORCE Magazine in spelling out the new exit plans. "These are fine officers—we've weeded out the others in previous force-outs," he added. Unlike the Army, Air Force has not kept Regular officers immune from RIF.

The board will line up potential RIFees in order of those "whose departure will hurt the Air Force least," the personnel executive said. Plans call for the first increment to leave in early spring and the second next June. The initial FY '76 increment of 612 RIFees separated in July 1975.

Air Force was waiting for Congress to return from vacation in September and establish firm personnel strength goals; without them, the service didn't know whether it must drop to below budgeted end-FY '76 officer strength of 100,000, a target already 5,000 under last July's level.

Hq. USAF personnel officials, meantime, came up with another unique way to cut officer strength voluntarily. This one—still under study at press time—would let non-Regular officers passed over once for temporary major take their $15,000 severance pay and separate, rather than wait for the probable second passover the following year. This could trigger numerous exits twelve months early, and reduce the upcoming RIF by an equal number of persons.

Overweight Members Warned

The USAF Inspector General has warned overweight members that failure to trim down could cost them their careers. A recent TIG Brief, published by the office of IG Lt. Gen. Donald G. Nunn, also told commanders that weight control "is a continuous program and is not a once-a-year concern."

The taxpayers "expect a lean, well-conditioned fighting force," General Nunn said.

Inspections, he continued, have revealed "inexplicable discrepancies" between recorded weights, heights, and ages and these same statistics when determined by the inspectors. They revealed that many persons who should have been placed on weight-control programs weren't.

Some members are kiting their ages to give them a higher maximum weight, the Brief said in describing devices various unnamed units are using to stretch or bypass the rules of USAF's physical fitness and weight-control projects.

The IG said these programs are mainly for the welfare of the individual. "Looking at obesity from the career standpoint in this period of greater personnel selectivity, the overweight individual must realize that his chances for retention are considerably reduced." And if forced out, he'll find himself at a disadvantage getting a civilian job, Nunn added. He called for "a conscientious application" of AFR 50-49, the weight-control directive.

German Gen. Ernst Berber (right), CINC, Allied Forces, Central Europe, is welcomed by Gen. George S. Brown, Chairman of the Joint Chiefs of Staff, in a full-honors ceremony at the River Entrance to the Pentagon during General Berber's recent visit to the US.

Aero Club Round-Up

USAF aero clubs have fewer members and aircraft than five years ago, but they are safer, more stable, and more economical than civilian light plane groups. That summarizes an up-to-date aero club report USAF authorities provided AIR FORCE Magazine.

The service currently has fifty-five aero clubs with 7,571 members, compared with seventy-three clubs and 10,550 members in 1970. Today's clubs operate twenty-two different types of aircraft, or 356 altogether. USAF says it encourages clubs to operate the same makes of aircraft to simplify maintenance.

The cost of belonging to an aero

club has increased, but remains well under civilian club charges. Initial aero club membership fee is $25 and monthly dues are $10, up from an average of $23.12 and $7.66, respectively, in November 1973. The aero club Cessna 150 that rented for almost $10 an hour in 1973 now costs $11–$12 an hour, depending on location.

Air Force noted that larger numbers of members are taking leave and trips in aero club aircraft, beating commercial travel fares badly. For example, an Air Force family of four might reserve their club's Cessna 172 for "extended trip use," flying perhaps 2,000 miles round-trip. Cruising at 110 mph would take eighteen hours; at $15 per hour, the flying time cost is only $270.

Aero club members, under steady USAF pressure, continue to maintain much better safety records than in the general aviation industry. For instance, the aero club accident rate the past two years was 3.4 and 5.9 (per 100,000 flying hours), compared with a general industry rate of 14.8 and 14.0. "The Air Force aero club system offers our personnel the best possible aircraft, rates, and safe flying environment of any provided throughout the military or the civilian community," Air Force authorities said.

The Many-Sided Pay Front

Military leaders and federal civilian executives whose pay has been frozen at $36,000 a year will now receive regular cost-of-living raises. So will congressmen and other government leaders drawing larger salaries. Until the recent approval of the executive pay bill, persons in these jobs received their last boost in 1969. About 17,000 persons, including the Vice President who has been drawing $62,500, are affected by the new law. The President and his $200,000 salary are not.

Size of the first raise, slated to be effective October 1 along with the annual increase for government employees and military personnel, was in doubt at press time. The President had urged that federal raises be held to five percent this year, but the Chief Executive's pay advisers recommended an 8.66 percent hike. A resolution of the matter was expected in September.

Meantime, federal unions reportedly were about to enlist service members to pressure the government into providing the full 8.66 percent increase.

Dr. James P. Gilligan (center), Deputy Assistant Secretary of the Air Force for Reserve Affairs, tours the Willow Grove Air Reserve Facility, Willow Grove, Pa., with Col. Theodore G. Behling (right), 913th Tac Airlift Group Commander, and (left) Maj. Edward J. McNulty, aircraft maintenance officer.

Military retirees at the same time are looking forward to another raise, perhaps as early as January. They received a 7.3 percent increase last January and a 5.1 percent hike this past August. The summer jump in the CPI, which set the stage for an apparent early 1976 boost, has caused new concern among Administration officials seeking to slow down the fast-rising outlays for federal compensation.

In other pay matters:

- USAF told retirees and near-retirees to expect resolution of the retired pay inversion problem "sometime in the fall." The expectation was that Congress would approve a measure stating that: (1) members retired after January 1, 1971, but before enactment, will have their retired pay recalculated and, if appropriate, increased on the measure's effective date; and (2) members retired after enactment "will be assured" of retired pay at least equal to what they would have received if retired any time earlier in their careers after January 1, 1971.
- Bigger checks are going to 320,000 service widows receiving dependency indemnity compensation (DIC) and 2,200,000 veterans getting disability compensation, following the President's recent approval of ten to twelve percent increases. A typical DIC raise, for the widow of an O-3, went from $301 to $337 per month. A typical compensation increase for a veteran who is forty percent disabled amounts to $12—from $122 to $134 per month.
- USAF members and other government employees are feeling the impact of the 1974 law that permits garnishment of pay checks of fathers who don't pay court-ordered alimony and child support. More than 400 USAF people—mostly retirees—found their pay tapped for this purpose the first half of this year.

AWOLs Plunge

Hq. USAF personnel authorities are encouraged with the latest AWOL figures, which show Air Force's "over-the-hill gang" dropping from 11,585 in FY '74 to 6,679 in FY '75—a thumping forty-two percent cut, compared with a five percent reduction in personnel strength during the same period. The first half of calendar 1975, AWOLs were down to 2,708, Headquarters reported. Repeat offenders continued to worry authorities; 1,496, or 22.4 poroont, of the FY '75 AWOL incidents involved repeaters. More than 400 of this group took off while awaiting disposition of charges for a previous AWOL offense, Headquarters said in telling commands that "increased attention is needed in this area."

Advanced Ratings Examined

With flying hours cut way back, younger USAF pilots can't meet the criteria for advanced ratings (1,300 hours first pilot by seven years for senior wings, 2,300 hours first pilot by fifteen years for command wings).

So, some quarters want the rules eased. Air Force is reluctant to do so. Officials explained that "on-time attainment" of these ratings for years was a rated officer utilization policy, which ensured that each officer was properly used in flying duties. However, last year's Aviation Career Incentive Act dropped the flying hours and now measures utilization in years of "operational flying duty."

Thus, officials say, advanced pilot

ratings no longer hold real meaning, other than pride and prestige for wearers. Still, Headquarters has "several alternate criteria" for advanced ratings under study, should it decide a change is needed. Meantime, the service no longer keeps track of how many officers hold advanced ratings. Latest count, in 1973, showed 9,000 senior pilots and 8,000 command pilots.

Star Hike Cycle Moving

The next round of USAF star selections is under way. It started with a "Headquarters initial" temporary brigadier general screening board August 25–29. Next in line: a "central" temporary BG screening board October 7–10, a "final" temporary BG selection panel November 10–14, and a December 8–12 board that will choose officers for temporary major general, permanent BG, and permanent MG. USAF said it will "select to promote" to its 380-star ceiling for FY '76. "The same 380 ceiling is expected for FY '77," USAF's personnel office said.

For developing command and control procedures that nearly double missile attack warning time, the 14th Aerospace Defense Force, Ent AFB, Colo., received the Presidential Management Improvement Award from Deputy Defense Secretary William P. Clements, Jr. Here, Maj. Gen. J. E. Paschall, then Commander, accepts the plaque.

"Gratuity" Pay Unchanged

One element of military compensation that hasn't changed in nearly nineteen years—and probably won't for many more—is death gratuity pay. Still, many people think it should be increased to match general cost boosts.

Since January 1957, this pay—designed to cover survivors' immediate expenses caused by death of the member—has been limited to six months' base pay, or $3,000, whichever is less. Participants at last year's USAF Career Motivation Conference urged the Air Force to prod the government to double the stipends.

Air Force, in a recent report, said no, that the present payment is ample. Headquarters noted that Uncle Sam also provides mortuary and burial entitlements plus household goods and travel moves for next of kin. And the recent increase of government life insurance to $20,000 should cover any other unforeseen expenses, USAF added.

USAF makes about 1,100 death gratuity payments each year. In nearly all cases the maximum $3,000 is paid.

National Cemetery Expansion

A new national cemetery that will provide 360,000 graves is under development on a 750-acre tract of land at former Otis AFB, near Falmouth, Mass. First interments are expected in FY '77, according to the Veterans Administration. VA took control of the National Cemetery System from the Army two years ago. The Otis property is the first new national cemetery site selected in twenty-five years. Three other sites are being sought—in California, Pennsylvania, and the Washington, D. C., area. There are 103 national cemeteries, but the new one in Massachusetts is the first in New England, VA said.

"Leave Selling" Cutback Nearer

The Defense Department and Congress appear to be nearing agreement on slashing the amount of accumulated leave enlisted members can "sell" to the government. The attraction: an estimated $75 million in savings the first year the change is in operation. Career NCOs, however, view the proposition as a cut of an important fringe benefit (*see June '75 "Bulletin Board"*).

Enlisted people for years have received lump-sum terminal-leave payments, for up to sixty days' unused leave, at the end of each enlistment—or perhaps five times during a career. Officers have normally collected just once, at separation or retirement.

Defense recently asked Congress to limit enlisteds' accrued leave to sixty days for sellback purposes. The plan got a warm reception when it was presented to the influential House Appropriations Committee, although it will be handled by the Armed Services Committee. Defense officials said the plan would nudge military personnel to use up more of their leave.

The Pentagon's proposal also (1) boosts leave payment rates for all enlisted people to equal current quarters and subsistence rates, and (2) exempts leave paid for before date of enactment—it would not count toward the sixty-day limit. A separate section permits them to sell back any part of the unused accrued leave (within the new sixty-day total) and carry over the rest into the next enlistment.

Defense estimates the "repetitive payments" for unused enlisted leave cost $155 million in FY '75 and act "as incentives" for members to save leave rather than take it. It is the intent of Congress and Defense that it be used, the Pentagon reiterated.

Air Staff Mergers

USAF's Management Improvement Group, set up earlier this year to find ways to improve the quality of life in service, has gone out of business. But its major functions have been incorporated into a new, permanent division headed by WAF Brig. Gen. Chris C. Mann. It's under the Deputy Chief of Staff for Personnel.

Service Academy Budgets Under Fire

The service academies' preparations for going coed next year are grabbing the headlines, but another important story concerning the national showplaces at West Point, Annapolis, and Colorado Springs also is brewing. It involves academy staffs, programs, and cadet pay and what they all cost.

Until recently, the three service schools had largely escaped the government's many-pronged drive to curb cost increases of military projects. That's changing. The General Accounting Office and the House Appropriations Committee, perhaps the two most tenacious watchdogs of the public purse, are searching for ways to reduce the $100,000 that GAO says it now costs to produce an academy graduate.

Not many years ago the outlay was generally advertised at about half that figure. Reducing academy faculties and staffs is one of several approaches being examined. Another is a possible cut in cadet-midshipman pay—now about $4,000 annually.

Concern over academy expenditures was evident during recent hearings on the FY '76 military appropriations bill. Assistant Defense Secretary (Manpower and Reserve Affairs) William K. Brehm was the chief witness. What is the Pentagon doing about reducing academy expenses? he was asked.

The Secretary cited increased reimbursements for cadet uniforms, civilian manpower cuts, and a few other actions at the Military Academy; cuts in the Naval Academy band; and deletion of "several" manpower spaces at the Air Force Academy. He said other steps were "under study."

The Committee members seemed unimpressed. They asked about civilianizing some of the faculty at West Point and Colorado Springs which, except for twenty slots at the former, are all military. The idea is that this would curb faculty turnover and increase the present level of teaching experience. Service witnesses defended the present system.

The fact that the major share of each school's budget goes for other than strictly academic pursuits next came under discussion. Rep. J. Kenneth Robinson (R-Va.) said "the most serious finding" of the GAO report is that only twenty-nine percent of the Military Academy's budget, thirty-four percent of the Air Force Academy's, and thirty-nine percent of the Naval Academy's are spent on academic instructional programs. Civilian universities, he went on, spend more than half their funds for this purpose.

Secretary Brehm correctly noted that military and civilian institutions have different missions and aren't comparable. And, of course, the service academies operate commissaries, family housing, and other support activities that are foreign to civilian schools.

Also under scrutiny are the academy preparatory schools. Should they be continued? Mr. Robinson asked. But he appeared to have a preconceived answer, declaring that the prep schools seemed "to be oriented toward the recruiting of minority personnel, athletes, and others who would not otherwise be qualified to enter the academies."

Air Force's Maj. Gen. Oliver W. Lewis and DoD's Vice Adm. J. G. Finneran sprang to the defense of the prep schools. General Lewis, newly appointed head of the USAF Personnel Council, noted that USAF's prep school is a much needed commission opportunity route for airmen. Admiral Finneran, the DoD Deputy Assistant Secretary for Military Personnel Policy, said that years ago he taught at the Naval Academy Prep School. One of the payoffs of that experience: Eight of his students are now Navy admirals and one is a Marine Corps general.

Perhaps the most sensitive issue is cadet-midshipman pay, long calculated at one-half of second lieutenant basic pay. While various bonuses and special pays have been tampered with over the years, no basic military pay has been cut in modern times.

Yet, Committee staffer Derek J. Vander Schaaf asked Secretary Brehm: Is the Pentagon thinking about "maybe reducing the pay or terminating pay while in the Academy, as a way to bring the cost per graduate down?"

It's not receiving any serious consideration, Mr. Brehm replied.

Mr. Vander Schaaf persisted. He suggested it might be reasonable to cut the monthly stipend of $317.10 (pre-October 1, 1975, rate) to $100 a month plus books, uniforms, and supplies, the same as ROTC scholarship students receive. (Academy cadets with two or three years' previous military experience draw up to $400 per month.)

Service officials protested that academy cadets incur heavy expenses for uniforms, books, laundry, student activities, etc. One noted that with a near year-round program, cadets—unlike most college students—can't work in the summer or off duty to earn college expense money.

Still, it would appear that much of the public probably agrees with the Committee's implication—that ROTC-type expense money on top of a free four-year education is ample. But would a cut in cadet pay hurt recruiting? The matter didn't come up, though it seems unlikely. Academy cadets in 1967 drew only $150 a month, yet there were many more "qualified" applicants than could be accepted, according to Defense Department statistics.

The Air Force Academy in 1967, for example, had 6,045 candidates for admission, of whom 2,237 were qualified. Of these, 951 received appointments and 850 accepted. For the USAFA class of 1978, which enrolled 1,500 freshmen in June 1974, there were 7,562 candidates, of whom 2,257 were qualified. The other academies reported similar figures.

To button down the mandatory expenses of cadets during their four years in school, General Lewis provided a chart covering FY '75. The major items were federal withholding and Social Security taxes, uniforms, books, dry cleaning, and laundry.

The cadet outlays varied sharply from class to class. At the USAFA, for example, freshmen in FY '75 had approximately $2,400 each in required expenses, but sophomores were tapped for only $1,125 (the principal difference: lofty uniform requirements the first year). Junior USAFA class members spent $1,475 (including $275 for class rings) and FY '75 seniors each spent approximately $1,250.

Cutting cadet pay, should that occur, would not produce big budgetary savings, of course. Each of the three schools spent about $18 million for that purpose last year. But the economy watch continues for any and all size cuts that might prove feasible for military personnel programs. A cadet pay cut from, say, $4,000 to $2,000 a year would save a total of about $25 million annually at the three schools.

Actually, the Appropriations Committee may have more ambitious plans for curbing Military and Naval Academy cost increases. Near the end of the hearing on academy matters, the Committee fired this question at Mr. Brehm:

"Assume . . . the Department of Defense was forced to reduce the cost per graduate from the $100,000 level the GAO report shows to somewhere in the neighborhood of $80,000. A twenty percent reduction over the next three or four years. How would you prefer to go about that? Would it be through a reduction of cadet pay, through procurement and overhead cost reductions, physical plant support, a combination of the two, or some other way?"

Secretary Brehm said he had "no idea." He added, "I am aware of no opportunities for trimming that would begin to develop that kind of a cost reduction."

But the Committee, as managers of other military personnel programs well know, has the muscle to "direct" specific cuts. It sounds as though the lawmakers have that in mind. ■

The Bulletin Board

Projects begun by the MIG Group, such as more prestige for NCOs, are continuing under the new organization. Included is what officials say will be an improved promotion policy for supergrade airmen, to be attained by combining features of the WAPS promotion system (heretofore only for E-7s and below) and a selection board system.

Also due soon are results of a MIG survey of Air Force civilians and their views of Air Force life. More than 13,000 persons had responded to the survey at the end of August.

General Mann's organization has also absorbed staff functions dealing with equal opportunity, race relations, and drug and alcohol abuse. Headquarters said this move "broadens the scope of and institutionalizes the former position of special assistant for social actions" and "will give strength and permanency to these vital programs."

In another Air Staff merger, the housing assignments and utilization office has been moved from under the DCS/Personnel to the Directorate of Engineering and Services. The engineers have long handled construction and maintenance of housing.

Technicians Organized

The renewal of interest in military unions *(see September issue "Speaking of People")* has focused attention on unionism among "technicians" in the Reserve Forces. These people wear two hats; their main jobs are as civilians serving with National Guard and Reserve units. But during unit drill periods (and mobilization, if that occurs) they put on their uniforms and assume military status.

According to the Pentagon, 15,200 of the 22,500 Air Guard technicians are "represented by unions." The same applies to nearly 5,000 of the 6,550 Air Reserve technicians. But authorities point out that some—they don't know how many—are not actually union members. They explained that under the contracts, "once a union has been granted exclusive recognition for a unit, it will represent all eligible individuals in that covered unit, regardless of whether or not they are members of the union concerned."

Headquarters of the USAF Reserve said there have been no problems caused by the union affiliation of the technicians. But Reserve officials firmly oppose union status for these people while they wear the uniform.

Enlisted Widows Home

Opening-day ceremonies for the Air Force Enlisted Widows Home Foundation, Ft. Walton Beach, Fla., are scheduled for October 13, and Foundation officials are looking forward to greeting representatives of NCO wives clubs, USAF officials, and local dignitaries. They also hope to get in some good fund-raising licks, for the Foundation recently acquired a $1.3 million mortgage with purchase of Teresa Village, a 100-unit apartment complex. It is located four and one-half miles from Eglin AFB and just outside the business district of Ft. Walton Beach.

First resident of the new facility is Mrs. Donna Loveland, widow of the late TSgt. Lee S. Loveland (Ret.). She moved in this past summer.

CMSgt. Nick Masone (Ret.), the Foundation's executive director, is spearheading the fund-raising drive. He said the Board of Directors is considering selling ten-year bonds. Meantime, persons wishing to make tax-free donations can send them to the Air Force Enlisted Widows Home Foundation, 354 Woodrow St., Ft. Walton Beach, Fla. 32548.

Short Bursts

Despite some publicity on the topic, don't look for early launching of a Pentagon plan to offer service members a free round-trip to the US as an incentive for extending overseas tours. Air Force authorities, at the request of the Defense Department, have been examining the proposition as a possible way of increasing overseas tour lengths and cutting travel costs. Under consideration first is a test, perhaps early next year, whereby personnel on Guam could fly to California and return via MAC aircraft.

From the Navy comes word of progress in its never-ending efforts to increase sea pay. Rebuffed time after time, Navy has a new plan, which has Defense Department blessing. (Still needed is approval of the Office of Management and Budget and Congress.) Sea pay for years has ranged from $8 to $22.50 monthly, depending on enlisted rank. The new plan would give an extra $100 monthly to large numbers of sailors, but nothing to enlisteds of other services who also draw the $8–$22.50 overseas. Some quarters see the measure, if it becomes law, giving Navy an edge at recruiting offices.

For establishing a system of purchasing deuterium to be used in development of chemical lasers, Xavier F. Corlis (right) of the Air Force Weapons Laboratory, Kirtland AFB, N. M., received the Presidential Management Improvement Award from Deputy Defense Secretary William P. Clements, Jr.

During the first half of this year, ten USAF members were electrocuted, the Inspector General has noted in a plea for greater care. Worst of the incidents occurred April 10, place not identified, when two members went sailboating. The metal mast of their boat struck an overhead power line and both were killed, the IG reported.

When Turkey halted operations at USAF bases there, some 1,700 Air Force members were in the assignment pipeline to that country. Most were expected to proceed on schedule in subsequent months. However, more than 600 were being held at their Stateside bases pending outcome of the political situation in Turkey. Others, on leave or at ports en route to embargoed units in Turkey, received new assignments, some Stateside, some in Europe. By late August, thirty-nine USAF units in Turkey had opened up for inbound assignments, but thirty-seven others remained under suspension. While dependent travel was halted, personnel counselors were advising families that the ban might be lifted before much longer.

About 94,000 women veterans have not used their GI Bill for education or training and the first deadlines are nearing, the Veterans Administration has warned. In addition, some of the 80,000 female veterans who have used the current GI Bill may be eligible for a special retroactive payment from VA—a marital allowance of $30 a month covering a long period up to late 1972. VA regional offices countrywide will provide details. Deadline for completing GI Bill education or training is May 31, 1976, or ten years from the veteran's date of discharge, whichever is later.

The Privacy Act of 1974 went into effect September 27, 1975. It sets up a complex system allowing individuals to examine most records US agencies, including the military services, have on them. And challenge material that is untimely or inaccurate. USAF has produced a film on the subject, which should help in explaining it. That's tough to do; the Defense Department's basic directive on the Privacy Act program, for instance, runs on for thirty-four single-spaced pages.

Service members seeking White House Fellowships are in for the toughest kind of competition—only fourteen of 2,300 applicants were appointed last year. Twelve USAFers—all officers—have been chosen for the one-year posts over the years. Among executive agencies, only military personnel are eligible. Write the President's Commission on White House Fellows, 1900 E. St., N. W., Washington, D. C. 20415.

Senior Staff Changes

RETIREMENT: M/G Louis O. **Alder.**

PROMOTIONS: To **Major General:** James L. **Brown;** James P. **Mullins;** John J. **Murphy;** Malcolm E. **Ryan, Jr.;** Thomas M. **Ryan, Jr.;** Thomas P. **Stafford;** Benjamin F. **Starr, Jr.;** Hoyt S. **Vandenberg, Jr.;** Wayne E. **Whitlach.**

To **Brigadier General:** Kenneth D. **Burns;** Kelly H. **Burke;** Charles C. **Irions;** Chris C. **Mann;** John R. **Paulk;** Andrew **Pringle, Jr.;** Walter B. **Ratliff;** George L. **Schulstad;** Robert L. **Thompson, Jr.;** Ewell D. **Wainwright, Jr.**

CHANGES: M/G Timothy I. Ahern, from DCS/Plans and Programs, J-5, NORAD, and DCS/Plans and Programs, Hq. ADCOM, Ent AFB, Colo., to Dir., Opnl. Rqmts. & Dev. Plans, DCS/R&D, Hq. USAF, Washington, D. C., replacing M/G Lovic P. Hodnette, Jr. . . . **B/G Rufus L. Billups,** from Dep. Dir. of Transportation, DCS/S&L, Hq. USAF, Washington, D. C., to Cmdr., Def. General Supply Center, DSA, Richmond, Va. . . . **B/G Carl H. Cathey, Jr.,** from Dir., Recon. & Elect. Warfare, DCS/R&D, Hq. USAF, Washington, D. C., to Dep. Dir., Dev. & Acq., DCS/R&D, Hq. USAF, Washington, D. C., replacing B/G John C. Toomay . . . **B/G William P. Comstock,** from Asst. DCS/Plans and Programs, J-5, NORAD, and Asst. DCS/Plans and Programs, Hq. ADCOM, Ent AFB, Colo., to Acting DCS/Plans and Programs, J-5, NORAD, and Acting DCS/Plans and Programs, ADCOM, Ent AFB, Colo., replacing M/G Timothy I. Ahern.

B/G Howard M. Estes, Jr., from Dep. for Space Def. Systems, SAMSO, AFSC, Los Angeles, Calif., to DCS/Data Automation (Asst. for Advanced Logistics Systems), AFLC, Wright-Patterson AFB, Ohio . . . **M/G Lovic P. Hodnette, Jr.,** from Dir., Opnl. Rqmts. & Dev. Plans, DCS/R&D, Hq. USAF, Washington, D. C., to Air Dep., Allied Forces Northern Europe, Kolsaas, Norway, replacing retiring M/G Kendall S. Young (retiring M/G Jack K. Gamble previously announced for this assignment) . . . **M/G James S. Murphy,** from Cmdr., 20th NORAD Region, with additional duty as Cmdr., 20th Air Div. ADCOM, Ft. Lee AFS, Va., to Cmdr., National War College, Ft. McNair, Washington, D. C. . . . **M/G Robert A. Rushworth,** from Cmdr., AFFTC, AFSC, Edwards AFB, Calif., to Cmdr., AFTEC, Kirtland AFB, N. M. . . . **M/G Thomas P. Stafford,** from Dep. Dir., Flight Crew Ops., NASA, Houston, Tex., to Cmdr., AFFTC, AFSC, Edwards AFB, Calif., replacing M/G Robert A. Rushworth. ■

This all-girl weapons-loading team, of the North Dakota ANG's 119th Fighter Interceptor Group, gave the Aerospace Defense Command Weapons Loading Competition, Tyndall AFB, Fla., a new look. The quartet includes (from left), A1C J. Sander, A1C D. Thomas, Sgt. E. Rising, and Sgt. P. McMerty. The event ended August 30.

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AT&T Long Lines Department
Applied Technology, Div. of Itek Corp.
Avco Corp.
BDM Corp., The
Battelle Memorial Institute
Beech Aircraft Corp.
Bell Aerospace Co.
Bell Helicopter Co.
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Bendix Corp.
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General Dynamics, Electronics Div.
General Dynamics, Fort Worth Div.
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GE Aircraft Engine Business Group
General Motors Corp.
GMC, Allison Div.
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GMC, Harrison Radiator Div.
GMC, Packard Electric Div.
General Research Corp.
General Time Corp.
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Goodyear Tire & Rubber Co.
Grimes Manufacturing Co.
Grumman Corp.
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Hermes Electronics Ltd.
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Hoffman Electronics Corp.
Honeywell, Inc.
Howell Instruments, Inc.
Hudson Tool & Die Co., Inc.
Hughes Aircraft Co.
Hughes Helicopters
IBM Corp.
ITT Aerospace, Electronics, Components & Energy Group
ITT Defense Communications Group
International Harvester Co.
Interstate Electronics Corp.
Kaman Corp.
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Kelsey-Hayes Co.
LTV Aerospace Corp.
Lear Siegler, Inc.
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Airman's Bookshelf

Whose Fantasy?

The Superwarriors: The Fantastic World of Pentagon Superweapons, by James W. Canan. Weybright & Talley, New York, N. Y., 1975. 361 pages, indexed. $12.50.

It is surprising to learn that the esteemed McGraw-Hill World News assigned a gee-whiz journalist to cover the Pentagon for *Business Week* a few years ago. His name is James W. Canan, and his book, *The Superwarriors*, reads like one that was conceived by a publisher's agent, who then went out and tried to find someone to write it, for the publisher's market. There are reporters in the Pentagon far more sophisticated than Mr. Canan.

The book is not well done. The index has twenty-three entries for Robert S. McNamara, portrayed as a Secretary of Defense who stood up nobly against the military mind. There is a single unimportant mention of the C-5 transport, which was built under McNamara's Total Package Procurement concept, possibly the most catastrophic contracting idea ever introduced. Mr. Canan, a reporter for a magazine catering to the industrial reader, ignores TPP and the dust it stirred in the aerospace industry, where, he hopes, *Business Week* is read.

The gee-whiz journalism results in a good many nonsentences that should have been stopped. It would be interesting to see what a McGraw-Hill editor would do with this paragraph, starting on p. 26 of *The Superwarriors:*

"The Tom Terrifics of all military forces are found in the tactical fighter wings. These are the dogfighters. Swordsmen of the skies. Artists of the afterburner. Swivel-necked, eagle-eyed fusiliers in their Phantoms, Mirages, MiGs. All the way back to Rickenbacker and von Richthofen. When they engage the enemy, it is for all the chips. There is no such thing as finishing second. They lose, and they don't go home. A special breed of cat. As the bomber pilots and the missileers jokingly put it, the fighter pilots are great guys to have around in the clutch, but you wouldn't necessarily want your sister to marry one. Free spirits. Lots of ego. Cocky. Get their kicks playing tag with missiles and shells."

Reporters who have been around fighter pilots have a word for this. Hogwash. Hyperbole. Badly written. It is true the job is perilous; a Russian-built SAM, commonly called a flying telephone pole, is something to strike terror into the heart of a man. And the men who sense this terror are among our most skilled and resourceful. They make jokes about it in the BOQ, but their real concern is about our own effort to overcome the menace. At the beginning of the war in Vietnam, we were dropping bombs with the techniques of World War II. By the end of the war, the bombs were smart. Yet, it appears that Mr. Canan thinks the superwarriors, as he calls them, demand too much when they call for help from an expensive technology.

The improvements coming along are called, in many cases, gold plating, and that helps in his effort to express contempt for the leaders of our armed forces. In casting aspersions, Mr. Canan roars all over the battlefield, going through a disorganized file of clippings, press releases, and notes from his Pentagon interviews.

In one of these places, he finds that the senior Senator from Missouri is Stuart K. (sic) Symington. Well, when Mr. Symington first met the Washington press corps in 1945, he called himself W. Stuart Symington. By the time he became Secretary of the Air Force in 1947, as we recall it, he called himself Stuart Symington, and he is so listed in the *Congressional Directory.* It is a common reference book, available to any reporter.

—Reviewed by Claude Witze, Senior Editor of AIR FORCE Magazine. Mr. Witze first was accredited to the Defense Department as a correspondent during World War II.

The Bicentennial Challenge

The End of the Postwar Era, by Alastair Buchan. Saturday Review Press, E. P. Dutton & Co., Inc., New York, N. Y., 1974. 347 pages. $8.95.

When he wrote this book, Alastair Buchan, Professor of International Affairs at Oxford University, realized the uncertainties involved in writing about the immediate past and immediate future. One "is inevitably the victim of the present," he noted. All too true. This book was written before President Nixon resigned. Nonetheless, enough signs were about that Buchan anticipated this event with the result that the book does not suffer from obsolescence.

Far from it. This is a wide-ranging and insightful work. When did the postwar era end? Several years ago, writes Buchan, under impetus of two forces: the Soviet Union's gaining strategic parity with the United States and the Sino-Soviet rift, "just short of open conflict."

The postwar era was marked by a bipolar relationship between Russia and America, dating with intensity from the Korean War. This landmark conflict broke the US defense budget ceiling, set by the Truman Administration at about $14 billion, and American defense funding more than tripled. Moreover, the United States adopted a global conception of her responsibilities. Buchan observes that "we might now look back with nostalgia to the simple character of international politics in the years of the Cold War, despite its dangers."

Human affairs and international politics are now more complex. Though a strategy of nuclear deterrence, made possible by technological advance, has enabled the world to survive without general war, there are severe problems. One, according to Buchan, is the apparent inability of the American citizen to influence decisions. The result is alienation, "compounded by the mass media, which form the agenda of popular debate and make the task of political leadership increasingly difficult."

At the same time, the Soviet Union has become the equal of the United States in long-range strategic forces and consequently more confident of her position, while America has become more uncertain of her interests. The question is whether Western societies have the internal coherence and faith in their own ideals "to confront those societies that are led from the top downwards."

Airman's Bookshelf

According to Buchan, the most critical questions of external policy facing the United States are strategic relationships with the Soviet Union, maintaining adequate military forces, assurance of energy resources, reversal of the adverse balance of trade, and evolution of a new international monetary system of which the dollar is not necessarily the linchpin.

The United States confronts these complex issues when our people are unsure of their leadership, appear disillusioned with the concept of national power, and are in midstream of what seems to be a genuine crisis of self-confidence.

The reader will finish this book convinced America has come to a severe testing. In this respect, Buchan merely corroborates the daily headlines. Yet one can feel that despite profound technological, political, and social changes that continue to buffet this Republic, the American people retain sufficient faith in their traditions, institutions, and ideals to pull through.

As this nation approaches its Bicentennial, there is no more appropriate place to look for sustenance and rebirth of a spirit of community than to the ideas and philosophy that motivated America's Founding Fathers.

—Reviewed by Herman S. Wolk, Office of Air Force History.

Understanding Insurgency

A Theory of Conflict, by Brian Crozier. Charles Scribner's Sons, New York, N. Y., 1974. 238 pages plus index. $12.50.

Crozier's work presents a tough-minded view of human nature and man's propensity to engage in conflict. The "conflict" which he examines is rebellion against the state, which he maintains is inevitable.

In his introduction, Crozier lays out his assumptions about human nature in five specific "axioms" that place him in the company of those thinkers from Thomas Hobbes to Robert Ardrey who have emphasized the innateness of man's aggressiveness. Crozier does hold, however, that man's *behavior* is subject to change although his nature is not, that "human progress is dependent upon free inquiry," and that man has an overwhelming need for order. He points out that Communist states are *totalist* (totalitarian), repressing free inquiry and hence stifling or bringing to an end all human progress per his axiom.

Because of man's overwhelming need for order, the state is necessary and any state is better than none. The state has a moral right to defend itself, but rebellion against it is inevitable because of man's natural envy and aggression, which are always in conflict with his need for order. His view of man's history tells Crozier that "war is normal, peace the exception."

In the process of developing his theory of conflict, Crozier reviews the various forms of political structure, ultimately reducing them to three: pluralist, authoritarian, and totalist (contemporary Communist states fall in the latter category). He favors pluralist forms of government while pointing out the vulnerabilities such states have to rebellion. Changes instituted by totalists seem almost irreversible, while that is not so in pluralist states and not quite so for authoritarian states.

Crozier's analysis of a number of revolutions lends credence to his theory of conflict. His delineation of the causes of rebellion and his description of the symptoms of pending insurgency make excellent reading for those who wish to understand the nature of contemporary violent and nonviolent upheavals. His proposals for the reduction of conflict are as tough-minded as his assumptions about human nature, and they will make modern liberals extremely uncomfortable. Few could find fault, however, with his proposal for "a public philosophy" aimed at the public good.

Those who wish to understand "wars of insurgency" better will find this work of Crozier's indispensable. However much one might disagree with the author's final proposals, one must admire the hard-hitting writing style, the striking realism, and the sweeping review of political philosophies and historical rebellions. *A Theory of Conflict* qualifies as "a new *Leviathan,*" and the book deserves a wide reading.

—Reviewed by Col. Malham M. Wakin, Professor and Head, Dept. of Political Science and Philosophy, USAF Academy.

New Books in Brief

A-7 Corsair II in Action, by Lou Drendel. From first flight to combat in just over two years is quite an accomplishment for a modern aircraft. It was an omen of things to come for the Corsair II. Here is her story from first flight in 1965 through Vietnam. Some 100 photos show Corsair development from the A-7A to the A-7E. Squadron/Signal Publications, 3461 E. Ten Mile Road, Warren, Mich., 1975. 50 pages. $3.95.

Aviation and Space Museums of America, by Jon L. Allen. Pictorial guide to permanent aerospace exhibits in twenty-two states and three Canadian provinces. Text summarizes significant aerospace achievements while providing the history, location, schedule, and admission fees of fifty-seven museums and collections open to the general public. The book includes 120 photos and a list of aerospace-oriented organizations and publications. Arco Publishing Co., New York, N. Y., 1975. 287 pages. $12 hardcover. $6.95 paperback.

Concept, Algorithm, Decision (A Soviet View), by V. V. Druzhinin and D. S. Kontorov. Sixth in a series on Soviet military thought, the book, translated and published under auspices of the US Air Force, calls for a more scientific approach to military decision-making. Factors such as the destructiveness of modern weapons and greater decision-making responsibilities require that the technical and eventually the creative aspects of military decision-making be automated, the Soviet authors say. US Government Printing Office, Washington, D. C., 1975. 296 pages. $2.80.

Intervention or Abstention, edited by Robin Higham. A collection of scholarly essays examining US foreign policy decision-making on whether or not to intervene in other nations' affairs. A common thread is that US policy has been *ad hoc* and inconsistent from region to region and often in the same parts of the world. The University of Kentucky Press, Lexington, Ky., 1975. 221 pages. $14.75.

Moscow and the Palestinians: A New Tool of Soviet Policy in the Middle East, by Augustus R. Norton. Since the Yom Kippur war, Moscow has increasingly viewed the Palestinians and the PLO movement as a means to manipulate future political

developments in the Middle East. This shift in Soviet policy has been influenced by the USSR's deteriorating position in the Mideast. By identifying itself with the Palestinians, Russia is in a position, without foreclosing any of its options, to gain from a failure of the Palestinian problem as well as from a solution, the author contends. Center for Advanced International Studies, University of Miami, 1730 Rhode Island Ave., N. W., Washington, D. C. 20036, 1974. 26 pages. $1.50.

Pictorial History of Japanese Military Aviation, by Eiichiro Sekigawa, edited by John W. R. Taylor and David Mondey. From its beginnings to Pearl Harbor, Japanese military aviation is highlighted. The author discusses the development of Japan's aviation industry and the political and economic reasons that led her to war in 1941. Ian Allan, Ltd., London, England, 1974. 224 pages. $9.

Soviet Sources of Military Doctrine and Strategy, by William F. Scott. An annotated bibliography of Soviet newspapers, journals, and books on military doctrine and strategy between 1960 and 1974. Commentary on the articles indicates how Soviet military doctrine and strategy have evolved over the past fifteen years. Crane, Russak & Co., New York, N. Y., 1975. 72 pages. $2.75.

The US Air Force—Selected US Government Publications. A set of twelve color prints of airplanes, Air Force installations, and views from the air. Size: 17" x 22". US Government Printing Office, Washington, D. C., 1975. $4.25.

Why Did You Start Without Me?, by Mary Lee Strickland O'Neal. The daughter of Brig. Gen. Auby Strickland writes tenderly of her father, remembering him as a man who tempered tough discipline with liberal doses of love. His career spanned the growth years of the air age, beginning with the crude planes of the twenties and ending with the jets of the Cold War era. The book is based on Mrs. O'Neal's high school journal, begun during WW II. The Naylor Co., San Antonio, Tex., 1975. 196 pages. $7.95.

Wilbur and Orville Wright, A Chronology, compiled by Arthur G. Renstrom, Library of Congress. A chronology and flight log tracing the careers of the Wright brothers from Wilbur's birth on April 16, 1867, to the centennial of Orville's birth on August 19, 1971. Based on an extensive survey of the Library's Wright Collection and on other documentary sources. US Government Printing Office, Washington, D. C., 1975. 234 pages. $2.30.

Among the recently published *Adelphi Papers* are Number 112, "Defense Budgeting: The British and American Cases," by Richard Burt; Number 114, "The Middle East and the International System: I. The Impact of the 1973 War"; and Number 115, "The Middle East and the International System: II. Security and the Energy Crisis." Each of the latter two papers includes articles by several authors. The International Institute for Strategic Studies, 18 Adam St., London WC2N 6AL, England. Each paper approximately 40 pages. Number 112, $1.00 postpaid; Numbers 114 and 115, $1.50 postpaid.

—Reviewed by Robin Whittle

METAMORPHOSI

BY BRIG. GEN. ROSS G. HOYT, USAF (RET.)

For almost two decades prior to World War II, US development of the bomber took precedence over the fighter, with near-disastrous results during the early days of the bomber offensive in Europe. A dyed-in-the-wool pursuit man traces how, though painfully slowly, fighters finally caught up.

"HERE comes the last remaining member of a vanishing race of Americans." That was the greeting I often received from the Douhet-oriented advocates of bombardment aviation when I met them in the corridors of the old Munitions Building back in 1933. There, in addition to my duties in the Operations Section, I was Pursuit Representative in the Office of the Chief of the Air Corps.

Although the greeting was given in a joking manner, it reflected an attitude of the strong and voluble proponents of the bomber, including those in upper echelons of the Air Corps. They believed that the bomber could perform high-altitude, precision, daylight missions against strategic objectives deep in enemy territory without pursuit support.

Following that reasoning, it could be assumed that *our* pursuit planes also would be ineffective against enemy bombers invading *our* airspace. Therefore, to the bomber proponents, it seemed logical there was no requirement for pursuit. One airframe adapted to bombardment, reconnaissance, and cargo purposes with one powerplant would simplify development/procurement and reduce costs. That made a very attractive picture in those days of pitifully limited budgets.

Also, the air arm of the 1920s and 1930s was a newcomer on the military scene, and from necessity was controlled by men transferred from other branches, whose careers depended upon conformity with the views of the War Department. There was no role envisioned for the airplane other than as an auxiliary to the old, established branches of the service. No airman had ever served as Chief of Staff of the Army, and no true proponent of pursuit aviation served as chief of the Army air arm during the years between the wars.

The development and procurement of aircraft and the strategy and tactics of employment were dominated by those who were convinced that the bomber could operate without pursuit support. There was even a movement at one time to phase the single-place pursuit out of existence, replace it with a multiplace airplane, and abolish the course in pursuit tactics at the Air Corps Tactical School. Fortunately, the movement died aborning.

1933 Air Defense Exercises

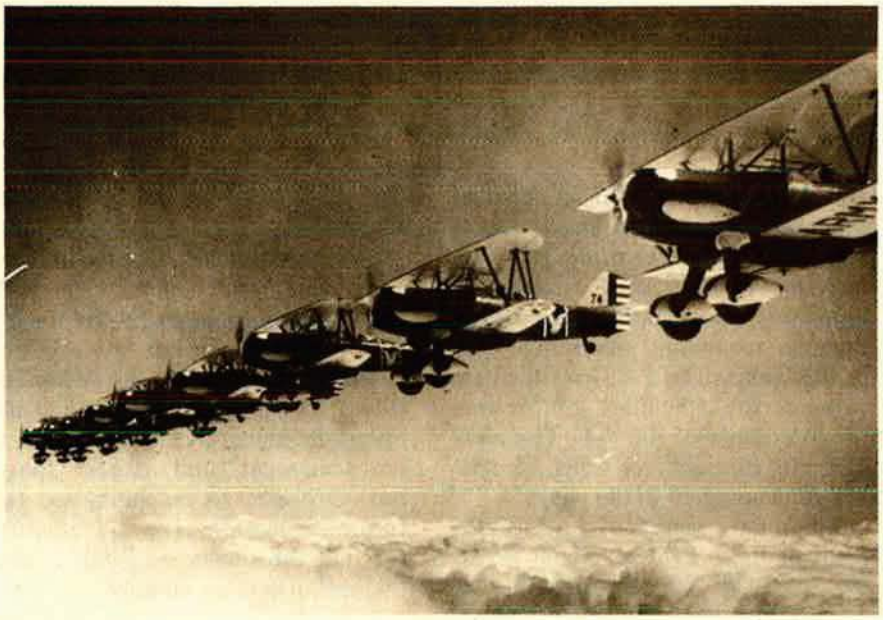
The year 1933 produced contradictory evidence in the controversy surrounding the efficacy of the single-place pursuit airplane.

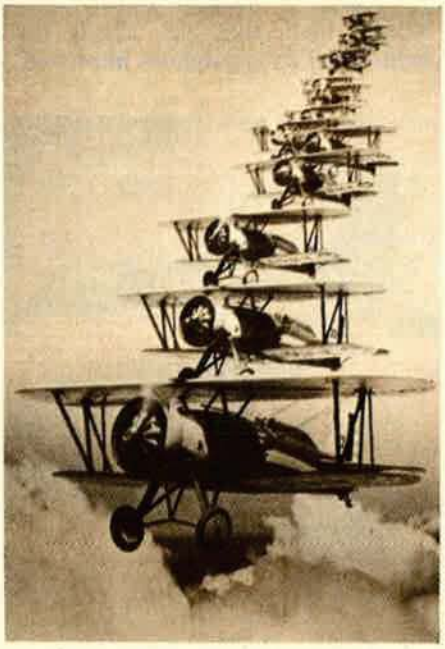
Early in the 1930s, then-Capt. Claire Chennault, instructor in pursuit tactics at the Air Corps Tactical School, proposed that pursuit, operating in cooperation with a properly disposed ground radio and telephone intelligence net surrounding an installation to be defended, could "scramble" and intercept enemy aircraft entering over the net. In May 1933, two exercises were conducted to test Chennault's proposal: one on the West Coast and the other at Fort Knox-Bowman Field, Ky., known as the Antiaircraft-Air Corps Exercise.

At the completion of the West Coast exercise, the commanding officer of that operation concluded that single-place pursuit was ineffective against high-flying bombers. He recommended to the Chief of the Air Corps the development without delay of a multiplace pursuit airplane. As a result, in 1937 the Bell XFM-1 five-place pursuit plane appeared on the horizon and, like the comet Kohoutek, disappeared with rapidity.

The Fort Knox Antiaircraft-Air Corps Exercise, in which I participated as Group Operations Officer of the First Pursuit Group (the pursuit organization involved in the exercise) and as Group Commander in the air, resulted in opposite conclusions. Much of the success of the pursuits in the Fort Knox operation can be attributed to the employment of two radio-equipped reconnaissance planes, which I, as Operations Officer, ordered to orbit the "enemy" airdromes at high altitude and report their takeoff and subsequent locations to a central intelligence agency. This agency, in turn, relayed the information to the Group Commander and vectored the pursuits to an interception. All "enemy" aircraft enter-

OF THE FIGHTER





One of the classic biplane pursuit aircraft of the early 1930s was the Curtiss P-6E Hawk (above), shown here in the colors of the 17th Pursuit Squadron, Selfridge Field, Mich. The author, General Hoyt, is leading the flight in this photo. In addition, he designed the Snow Owl motif on these aircraft. The P-6Es cruised at 175 mph, had a range of 570 miles, and carried a pair of forward-firing .30-caliber machine guns. Boeing's P-12 (at right), one of the Air Corps's last biplane pursuits and the first to be produced in quantity—366 in all—came along a little before the P-6. Like the P-6 and like many of the fighters that would follow, its range was too short for bomber escort duty.

ing the intelligence net were intercepted, and simulated attacks made before they arrived over Fort Knox.

We were not aware at the time, but those reconnaissance airplanes were an excellent simulation of radar, not yet perfected, which six years later enabled the British Fighter Command to inflict devastating losses on the Luftwaffe. That was the first proof in the crucible of war that bombardment could not operate with impunity. It demonstrated that defensive fighters, given sufficient warning to take off and gain altitude, could successfully intercept incoming aircraft before they reached their objective.

Progress in Pursuit Planes

The first notable change in the pursuit airplane came in late 1933, when the P-26 appeared. It was a low-wing, all-metal monoplane with a radial engine. Like its fabric-covered biplane predecessors, it had fixed landing gear and an open cockpit. Its armament consisted of two .30-caliber guns mounted in the nose, synchronized to fire through the propeller disc. This had been standard since World War I and reduced the potential rate of fire by about half. It was a good interim airplane in all phases of peacetime pursuit training. Because of its small-caliber armament, it gained the sobriquet "Peashooter." The P-26 participated, briefly and ineffectively, in combat during the opening days of World War II in the Philippines.

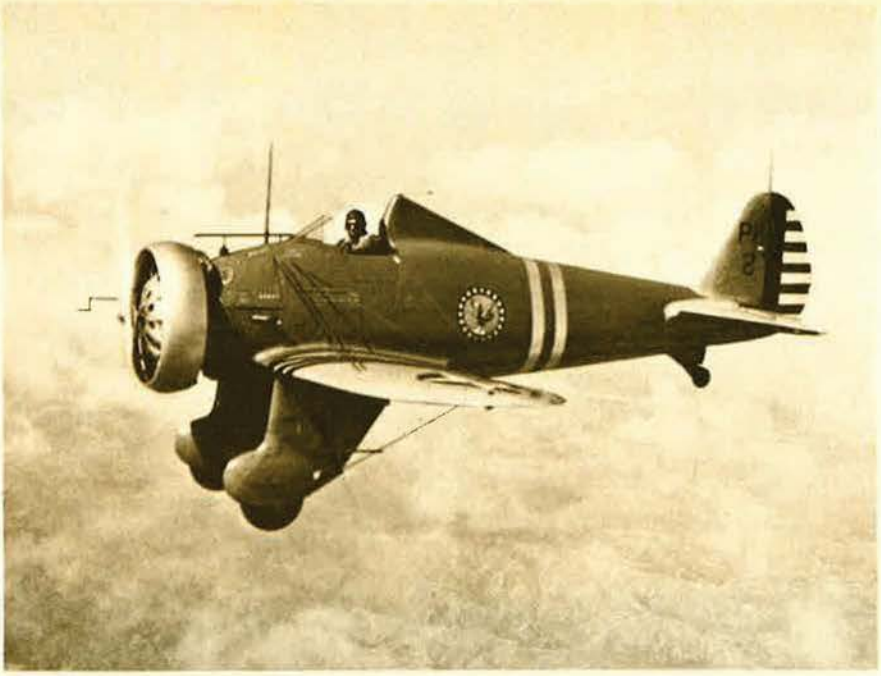
After fifteen years of peacetime neglect, the performance of the pur-

suit airplane (speed, climb, service ceiling, range, and armament) was seriously deficient. The deficiencies were directly attributable to the emphasis on developing the bomber at the expense of pursuit, and indirectly to those who had adopted the Air Corps Tactical School concept: high-altitude, precision bombing of hostile objectives defended by pursuit, without their own pursuit support. This concept persisted throughout the years between the wars and well into World War II.

In contrast to the armament of our P-26, the British and Germans were greatly improving the firepower of their fighters by increasing the number of guns, and mounting them in the wings to approximately double their rate of fire. This tremendous increase in volume and spread of fire partially overcame the lack of efficient sighting equipment. Belatedly, we followed their example. The Germans had also adopted 20-mm cannon mounted in the wings.

The immediate successors to the P-26, in 1935 and 1936, were the Seversky P-35 and Curtiss P-36. They were also low-wing, all-metal monoplanes and the first fighters to be equipped with retractable landing gear and closed cockpits. They were a long stride forward in performance. However, the first P-36s with their two .30-caliber synchronized guns were still "peashooters." In succeeding models, the armament was increased to six .30-caliber guns: two synchronized and two free-firing in each wing. It was still a "peashooter."

The first P-35 had one .30-caliber and one .50-caliber gun mounted in the nose and synchronized. Later, one .30-caliber, free-firing gun was mounted in each wing. These two airplanes were the first Air Corps pursuits to mount free-firing guns in the wings. The P-35 was the first to adopt the .50-caliber gun. It was the forerunner of the P-47 Thunderbolt with its eight free-firing .50-caliber guns mounted in the wings.



The P-26, while earning many firsts, was by no means a world leader in armaments, as its nickname, "Peashooter," implied.

There were aspects of the development of these fighters, which led to the P-38, -39, -40, -47, and -51, that were inexplicable and contradictory. Here was a weapon system considered ineffective; yet, slowly the fighter and its capabilities improved. The reasons for the paradox are obscure.

The improvement in peacetime development and capabilities was brought about mainly by the unofficial recommendations of Fighter Evaluation Boards to the manufacturers. Designers were urged to incorporate higher performance, heavier armament, and greater range into airplanes to be submitted for future evaluation. The manufacturers had the engineering talent and the willingness to comply.

Less Than a "Fortress"

The advent of the B-17 "Flying Fortress" in 1935, and its spectacu-

The P-35, with its retractable landing gear and closed cockpit, was a long step forward for the pursuit pilots, but it still lacked range and armament.

lar, nonstop flight from the Boeing Co. at Seattle to Dayton, Ohio, were greeted with enthusiasm by the advocates of bomber operations without fighter escort. They believed their concept had been further substantiated.

The appellation "Flying Fortress" proved to be a misnomer insofar as defensive armament was concerned. Five .30-caliber flexible guns (again, "peashooters") were provided: one in the nose and one in each of four blisters on the fuselage aft of the wing. They were proved inadequate against attack by fighters before we entered World War II, especially attacks approaching head-on.

Early in 1940, an exercise was conducted in California involving the 20th Fighter Group and the 7th Bombardment Group to test the relative effectiveness of their respective armaments. Both of these groups were equipped with camera guns.

I was commanding officer of the 20th Fighter Group and led it in the exercise. The group, flying P-36s, was formed in a column of squadrons in loose formation to permit some maneuvering of individual elements and with enough spacing between squadrons to allow preceding squadrons to clear. The squadrons made mass, head-on attacks. The multitude of gun-camera pictures obtained by the fighters demonstrated, theoretically at least, the effectiveness of the fighter attacks. Closing, passing, and departure speed of the fighters was so great it was extremely difficult for the B-17 gunners to bring their flexible guns to bear.

The exercise raised the ire of the bombardment commander, who declared that such tactics were dangerous. (Apparently the German fighter pilots over Regensburg and Schweinfurt in 1943 had not been warned of that danger.) However, in later models of the B-17, defensive armament was increased to thirteen .50-caliber flexible guns including two in a "chin" turret to improve forward firepower. Fighter escort was still mandatory on the long-range strategic bombing missions of WW II to prevent intolerable losses to enemy fighters.

The Evidence Piles Up

As our entry into the war drew nearer and more inevitable, the Commanding General of the Air Corps directed his War Plans Division to prepare plans for an air offensive against priority objectives vital to the war effort of the German Reich, and to gain air superiority. It is significant that the members of the Air War Plans Division were mostly, if not all, strong advocates of the concept of high-altitude, deep penetration, daylight, precision bombing without fighter support. The Air War Plans Division selected bombing objectives vital to the enemy. Whether or not fighter escort was required was considered a tactical decision to be made by the commander in the field. In any event, their plans were strategic, and, at the time they were formulated in 1939, there were no fighters capable of furnishing escort on long-range strategic missions. The gravity of that oversight was soon to become apparent.

Striking evidence refuting the Air Corps Tactical School concept had been presented prior to our entry into WW II by the overwhelming losses inflicted on the Luftwaffe by Royal Air Force fighters during the Battle of Britain. That action was scrutinized by US Air Corps observers.

Another demonstration of the effectiveness of fighters against invading bombers occurred over the airport at Rangoon, Burma, less than three weeks after Pearl Harbor.

On Christmas Day, 1941, I was en route by air from Chungking (where I had been Air Force Representative on the Military Mission to Nationalist China) to Australia, where I was to become Director of Allied Air Operations under Gen. George Brett during the early days of the war, when we were "firing and falling back" from the Philippines. (We were doing a lot of falling back, but there was very little to fire with.) We had just landed at Rangoon when the sirens sounded, and we headed for the trenches! Fifty-two Mitsubishi bombers came over to pattern-bomb the airport. They were in tight defensive formation, strictly in accord with teaching of our Air Corps Tactical School.

Twenty-six P-40s of Chennault's American Volunteer Group (AVG) stationed at Toungoo, Burma, intercepted the bombers. From the bottom of a slit trench on the airport, I saw several bombers shot down. Reports stated twenty-six Mitsubishis were destroyed or forced down. No better proof of the effectiveness of the fighter could be offered. A ground intelligence net similar to the one employed at Fort Knox gave the AVG fighters sufficient warning of the Japanese bombers' approach to take off and meet them at altitude.

In 1940, the author led the 20th Fighter Group's P-36s, similar to this one, demonstrating with camera guns the deficiency of bomber defensive armament.

Vindication and Victory

The USAF entered the air war in the European Theater with the B-17E operating from a base in

Brig. Gen. Ross G. Hoyt, USAF (Ret.), was involved in the development of fighter aircraft and the command of fighter units through most of his Air Force career, which extended from 1918 to the closing days of World War II. He participated in or led many pioneering flights of the 1920s and '30s, and was one of the refueling pilots who made possible the Question Mark *endurance record set in 1929. General Hoyt described that experience in our January 1974 issue. He and Mrs. Hoyt now live in Washington, D. C.*

England. On August 17, 1942, twelve B-17Es made a daylight raid against Rouen, France, less than forty miles inside the French coast. Whether or not fighter escort was provided had little bearing on the success of that mission or the ability of bombers to operate unescorted. The bombers were in enemy airspace for only a brief period. The mission was hailed by USAAF authorities in Britain as "the beginning of the end." It was the beginning, but a lot of air was to go down the slipstream before the end came.

The British Spitfire, German Messerschmitt, and our own fighters were designed for and cast in defensive roles. Their range, therefore, was inadequate for fighter escort on long-range bombardment missions. The error in not developing the performance of the fighter in pace with that of the bomber and the error of the concept that bombers could perform missions deep in enemy territory without fighter support soon became painfully if not tragically obvious.

The Luftwaffe's error was somewhat offset by geography. Me-109s could be moved to advanced airfields near the continental coast, and furnish, for brief periods, fighter support for the German bombers over Britain. The targets of the British bombers, however, were located deep in German territory, beyond the range of British fighters. The British learned early on that daylight bombardment of targets deep in German territory, without fighter support, resulted in intolerable losses. Therefore, they adopted the policy of area bombing at night.

The British had urged from the beginning that our Bomber Command join theirs in night area bombing. This was contrary to the concept of our strategists, who maintained our Bomber Command mission was the oft-repeated one of daylight, precision bombing for which it had been equipped and trained. This was only partly true. We were trained, but only partially equipped. It became immediately evident once the bomber offensive began that long-range fighters were urgently needed for escort. They were not available.

The unescorted raids on Regensburg and Schweinfurt in August and October 1943 alone suffered losses of more than a hundred bombers and their crews. Such losses could not be tolerated. Not all the losses were due to enemy fighters, but there were enough to prove the infeasibility of long-range, deep penetration, unescorted bombing missions. Such missions were canceled until fighter escort became available.

Crash programs were launched to increase the range and production of the P-38, P-47, and P-51 Mustang. The origin, design, and development of the P-51 is of special interest.

The P-51 Mustang

In 1940, the British contracted with North American Aviation for a fighter that would fulfill their escort requirements. A single-seat fighter, later to be known as the P-51 Mustang, was designed, and the first prototype was built in the phenomenal time of 120 days, starting from scratch.

This was extremely fortunate for us and was seized upon by the USAAF. By the end of the war, the P-51 equipped all but one of the 8th Fighter Command groups. The performance of the P-51—speed, range, firepower, and versatility—was equal to and in many ways superior to other fighters powered by reciprocating engines. Development of the jet-powered fighter is another phenomenal story.

During my tenure as Commanding General of the 8th Fighter Command's Air Defense Wing, the deficiency in range of our fighters, not only for bomber escort, but also for fighter sweeps to help gain air superiority, was forcefully demonstrated. Our P-47s were limited to mostly uneventful shallow sweeps.

The P-38 saw extensive service in both the European and Pacific theaters. Heavily armed, it could provide deep penetration escort when equipped with external tanks.

P-51s became the workhorse of the US fighter force, equipping all but one of the 8th Fighter Command groups by the war's end. Its speed, range, firepower, and versatility were equal to and in many ways superior to other fighters before it.

When we obtained auxiliary, belly fuel tanks and could penetrate deeper into enemy territory, business picked up, as did our aerial victories.

On August 3, 1943, the wing, consisting of the 4th, 56th, and 78th Groups, made its first deep penetration sweep. Enemy fighter reaction was violent. The exact figures are not available, but the number of German fighters destroyed increased tremendously. My personal files contain congratulatory messages, which were passed on to the individual groups where the credit for success of the mission belonged. Later, the entire wing was moved temporarily to airfields in the Land's End area, and furnished fighter escort for a bomber raid on the submarine pens at St. Nazaire. These fighter missions would not have been possible without the increased range.

Late 1943 and 1944 saw enough long-range fighters available to support the deep penetration bombing of objectives vital to the German war effort. The destruction of those objectives and the destruction by our fighters of Luftwaffe fighters rising to their defense, together with devastating victories on the long-range sweeps of our Fighter Commands, rendered German industry and airpower impotent.

So the metamorphosis of the fighter airplane from an ineffective "peashooter" to an overpowering offensive weapon and the metamorphosis of the general concept of the role, capabilities, and employment of the fighter were finally complete. But the transformation resembled more that of the seventeen-year locust than the butterfly. ■

The author with a P-1C known as the Curtiss Hawk Hoyt Special. Equipped with extra tanks and christened "Newlaska" by Mrs. F. Trubee Davison, wife of the Assistant Secretary of War for Air, this fighter, with then-Captain Hoyt at the controls, took off from Mitchell Field, N. Y., July 18, 1929, on a flight to Nome, Alaska, and return. Flying day and night, as much as 1,000 miles between refueling stops, Hoyt was forced down on July 21 by fuel trouble at Valemount, B. C., the midpoint of the return trip. This flight demonstrated the potential of the fighter for long-range bomber escort, a potential not yet realized at the start of World War II.

By Don Steele
AFA AFFAIRS EDITOR

THE GENERAL THOMAS P. GERRITY CHAPTER, OKLAHOMA . . .

cited for consistent and effective support of the Air Force and AFA's mission, most recently exemplified in its cosponsorship of the Bicentennial Dining-Out at Tinker Air Force Base.

AFA's **General Thomas P. Gerrity Chapter** of Oklahoma City, Okla., together with the **Oklahoma City Chamber of Commerce** and the **Oklahoma City Air Logistics Center,** cosponsored a Bicentennial Dining-Out in the Tinker AFB Officers' Club. The guest of honor was **the Hon. Tom Steed,** US Representative from Oklahoma's 4th District. The guest speaker was the **Hon. David P. Taylor,** Assistant Secretary of the Air Force (Manpower and Reserve Affairs). **Maj. Gen. James G. Randolph,** Commander, Oklahoma City Air Logistics Center, introduced the speaker; and **Edward H. Cook,** President of the Oklahoma City Chamber of Commerce, was the President of the Mess. Distinguished guests included **Sens. Henry Bellmon** (R-Okla.) and **Dewey F. Bartlett** (R-Okla.), and **US Rep. John Jarman,** from Oklahoma's 5th District. In recognition of this outstanding program, **AFA President Joe L. Shosid** names the General Thomas P. Gerrity Chapter as AFA's "Unit of the Month" for October.

In the upper photo at the right, **Secretary Taylor,** center, visits with some of the many distinguished guests and program participants. They are, from left, **Stanley L. Campbell,** Vice President for AFA's Southwest Region; **Congressman Steed;** Chapter President **Ivan Nelson; Secretary Taylor; General Randolph; Brig. Gen. Jack Kraras,** President of the Arkansas State AFA; and Oklahoma State AFA President **David Blankenship.**

In the middle photo, **Mr. Cook,** left, presents **Congressman Steed,** center, the original "sea letter" of the ship *General Hamilton,* which was signed by President Thomas Jefferson and Secretary of State James Madison in 1805. Mrs. Steed and Senator Bellmon are on the right.

General Thomas P. Gerrity Chapter's Dining-Out.

Presentation at Gerrity Chapter's Dining-Out.

AFA's eleventh annual **State President's Orientation Meeting** was held at the Marriott Twin Bridges Motor Hotel in Arlington, Va., July 25–26. Twenty-five states with chartered State Organizations were represented at the two-day meeting. AFA Executive Director **James H. Straubel** chaired the sessions at which the State Presidents were briefed by AFA department heads on the responsibilities and operation of their respective departments within AFA headquarters. Speakers included **Maj. Gen. Guy E. Hairston, Jr.,** Director, Air Force Office of Information; **Col. Harry J. Dalton, Jr.,** Deputy Director, Air Force Office of Information; and **AFA President Joe L. Shosid.** The photo at the bottom of this page shows the group as it was being briefed on the Aerospace Education Foundation by Mr. Straubel.

State Presidents' Orientation Meeting.

Lt. Gen. William F. Pitts, Commander, Fifteenth Air Force (SAC), March AFB,

Calif., was the guest speaker at the **Washington State AFA's 1975 Convention** in Seattle. During the convention luncheon, State President **Ted Wright,** left, presented **David Levitch,** right in the accompanying photo, a Certificate of Appreciation for his many years of active participation in the Washington State AFA. Mr. Wright was reelected President of the State AFA for another year.

The **New Jersey AFA's 1975 Convention,** held in the Playboy Club-Hotel at Great Gorge, featured an address by AFA President **Joe L. Shosid**. Between official convention functions, Mr. Shosid, seated in the photo at top right, New Jersey State AFA President **Joe Bendetto,** left, and **Robert L. Carr,** right, Vice President for AFA's Northeast Region, took time to visit with one of the Playboy Club bunnies. During the business session, Mr. Bendetto was reelected for another term.

The newly established **Igor Sikorsky Chapter's Charter Night Dinner** featured a presentation by **Sergei Sikorsky,** son of the aviation pioneer for whom the Chapter is named. In addition to Mr. Sikorsky, left in the photo to the right, program participants included Chapter President **Kenneth J. Kelly,** center, and Connecticut State AFA President **Margaret McEnerney,** right, who presented the charter. During the program, Mr. Sikorsky was made an honorary member of the Chapter.

The final event at the Bicentennial Open House held recently at Webb AFB, Tex., was the **Big Spring Chapter's annual banquet. Rep. Omar Burleson** (D-Tex.) was the guest speaker. Special guests included Big Spring Mayor **Wade Choate** and the members of the USAF Thunderbirds. Following his presentation, Congressman Burleson, left in the middle photo on the right, received a hand-carved Big Spring plaque. The plaque was presented by Chapter President **Ralph Brooks,** at the right. More than 400 AFA members and guests attended the banquet in the Webb AFB Officers' Open Mess.

AFA's largest Chapter, the **Alamo Chapter of San Antonio,** Tex., recently received the largest membership rebate check ever issued by AFA headquarters. During the recent membership drive, the Chapter recruited more than 2,000 new members, to bring its total Chapter membership to more than 5,500 members. Admiring a facsimile of the check are, in the photo at the bottom of column two, from left, **Lt. Gen. George H. McKee,** Commander, Air Training Command, who kicked off the recent drive; **Wayne Lough,** Chairman of the Membership Drive; **Frank Manupelli,** President of the Chapter during the Membership Drive; and **William Roth,** the current President of the Chapter.

Gen. Russell E. Dougherty, right in the photo at the bottom of column three, Commander in Chief, Strategic Air Command; **Robert Runice,** center, AFA's **Ak-Sar-Ben Chapter President;** and **Lt. Gen. James M. Keck,** Vice Commander of SAC, admire the **Bruce K. Holloway Humanitarian Trophy,** which General Dougherty will present at a later date to the 3d Air Division at Andersen AFB, Guam, in recognition of the total involvement of the Division's military and civilian personnel and their dependents in humanitarian efforts supporting the airlift and the reception of refugees from Vietnam and in subsequent Operation New Life. The Ak-Sar-Ben Chapter cooperated in establishing the award, named in honor of SAC's sixth Commander in Chief.

Maj. Gen. William Schoning, Commander, 1st Strategic Aerospace Division, was the guest speaker at the

Washington State AFA's 1975 Convention.

New Jersey State AFA's 1975 Convention.

Igor Sikorsky Chapter's Charter Night.

—Photo by Lewis R. Berlepsch

Big Spring, Tex., Chapter's annual banquet.

Alamo Chapter, San Antonio, Tex.

Bruce K. Holloway Humanitarian Trophy.

—Official US Air Force photo

Robert H. Goddard Chapter's awards banquet.

Robert H. Goddard Chapter's Annual Honors and Awards Banquet recently held in the Vandenberg AFB Officers' Club. During the program, California State AFA President-elect **John Lee** installed the Chapter's officers for 1975. Program participants included, from left in the photo at top left, California State AFA President-elect **Zack Taylor; Mr. Lee; General Schoning; MSgt. Bjorn B. Nilsen,** 6595th Aerospace Test Wing, the Chapter's "Military Man of the Year"; retiring Chapter President **Otto C. Ledford;** and newly elected Chapter President **Bob Hull.**

Steel Valley, Pa., Chapter.

Steel Valley Chapter President Pat Logan, center in the accompanying photo, thanks Pennsylvania State Reps. **Bernard Novak,** left, and **Donald Abraham,** second from left, for inviting him to speak to the Pennsylvania House of Representatives about the Chapter's continued efforts to obtain a full accounting of American airmen and soldiers missing in action in Southeast Asia. Mr. Logan was accompanied by **Maryann Lash,** second from right, and **John Hickey,** right, Chapter Vice President and Treasurer, respectively. During his presentation, Mr. Logan thanked the

Blue Barons Chapter, Colo.

Middle Georgia Chapter.

Wright Memorial Chapter presentation.

—Official US Air Force photo

Charleston Chapter golf tournament.

House for adopting a resolution urging the citizens of the Commonwealth to join the Chapter in observing its **"Prayer Week" for MIAs.**

During a recent meeting of the **Blue Barons Chapter,** Colorado, **Maj. Gen. Charles C. Pattillo,** left in the photo on the facing page, then Commander of the Lowry Technical Training Center at Lowry AFB and now the Vice Commander of PACAF, was named an Honorary Member of the Chapter and received its top award. The awards were presented by Chapter President **Noel Bullock,** right.

The Hon. George Busbee, Governor of the state of Georgia, was the guest speaker at a recent meeting of AFA's **Middle Georgia Chapter,** in the Robins AFB NCO Club. More than 325 members, guests, and local civic leaders attended. Shown in the photo (opposite) are, from left, Chapter President **Herman C. Strawser,** AFA National Director **Dr. Dan Callahan,** and **Governor Busbee.**

Prior to his departure from Wright-Patterson AFB, Ohio, for a new assignment as Comptroller of the Air Force, **Maj. Gen. Charles E. Buckingham,** right in the photo on the facing page, then AFLC's Chief of Staff, received a framed reproduction of the contract between the Army and the Wright brothers for purchase of the first military aircraft. The memento, given in appreciation of the General's outstanding support of the **Wright Memorial Chapter** and AFA's 1975 Membership Campaign, was presented by Chapter Vice President **Joseph Losier,** left, and AFA National Director **Jack Withers,** center.

The Hon. James B. Edwards, left, Governor of South Carolina, is shown, in the photo in column three of this page, receiving an AFA membership from **Grady L. Patterson, Jr.,** a Past President of the **South Carolina State AFA,** a brigadier general in the South Carolina Air National Guard, and State Treasurer of South Carolina. The membership was presented on behalf of AFA's **Charleston Chapter** in recognition of the Governor's active support of the military reserve forces and a strong national defense posture.

The newly elected officers of AFA's **H. H. Arnold Memorial Chapter** of Tullahoma, Tenn., lost no time in rolling up their sleeves and getting to work. Shown (upper right) planning the Chapter's program and activity schedule for the coming year are, seated from left, **Chuck Norman,** Vice President; **Tom Bigger,** President; **Roy Worthington,** Treasurer; and **Alfred Eskew,** Councilman. Standing from left, **Bob Boyer,** Councilman; **Lt. Col. Norman Sorensen,** Program Chairman; **Ross Roepke,** Secretary; and **Maj. John Walmsley,** Publicity Chairman. Not shown are **Maj. Carl Schultze,** Membership Chairman; **Dr. Robert L. Young,** Councilman; and **George Orr,** Councilman.

—Official US Air Force photo

H. H. Arnold Memorial Chapter, Tenn.

During recent ceremonies at Charleston AFB, S. C., **Maj. Gen. C. T. Ireland,** USAF (Ret.), center in the photo on the facing page, President of AFA's **Charleston Chapter,** presented a check for $1,000 to **Brig. Gen. Tedd L. Bishop,** right, Commander, 437th Military Airlift Wing (MAC), for the base's youth center, and another check for $5,000 to **Brig. Gen. Thomas B. Kennedy,** USAF (Ret.), left, for the Coastal Carolina Council of the Boy Scouts of America. The money was raised during the annual Charleston AFB Invitational Golf Tournament, which was sponsored by the Charleston Chapter. ■

Charleston, S. C., Chapter presentation.

AFA State Contacts

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma, Tuscaloosa): **James B. Tipton,** 3032 Hill Hedge Dr., Montgomery, Ala. 36111 (phone 263-6944).

ALASKA (Anchorage, Fairbanks, Kenai): **Edward J. Monaghan,** 2401 Telequana Dr., Anchorage, Alaska 99503 (phone 279-3287).

ARIZONA (Phoenix, Tucson): **Robert J. Borgmann,** 2431 E. Lincoln Cir., Phoenix, Ariz. 85016 (phone 955-7845).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Jack Kraras,** 120 Indian Trail, Little Rock, Ark. 72207 (phone 225-5575).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hawthorne, Hermosa Beach, Long Beach, Los Angeles, Marysville, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Liston T. Taylor,** 4173 Oakwood Road, Lompoc, Calif. 93436 (phone 733-2723).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Ft. Collins, Grand Junction, Greeley, Littleton, Pueblo): **James C. Hall,** P. O. Box 30185, Lowry AFB Station, Denver, Colo. 80230 (phone 366-5363, ext. 459).

CONNECTICUT (East Hartford, Stratford, Torrington): **Margaret E. McEnerney,** 1476 Broadbridge Ave., Stratford, Conn. 06497 (phone 377-3517).

DELAWARE (Dover, Wilmington): **George H. Chabbott,** 33 Mikell Dr., Dover, Del. 19901 (phone 421-2341).

DISTRICT OF COLUMBIA (Washington, D. C.): **James M. McGarry,** 2418 N. Ottawa St., Arlington, Va. 22205 (phone 534-2663).

FLORIDA (Bartow, Broward, Daytona Beach, Ft. Walton Beach, Gainesville, Homestead, Jacksonville, Key West, Miami, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa, West Palm Beach): **Jack Rose,** 5723 Imperial Key, Tampa, Fla. 33615 (phone 855-4046).

GEORGIA (Athens, Atlanta, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **James D. Thurmond,** 219 Roswell St., Marietta, Ga. 30060 (phone 252-9534).

HAWAII (Honolulu): **Larry Ronson,** 21 Craigside Pl., Apt. 7A, Honolulu, Hawaii 96817 (phone 525-6160).

IDAHO (Boise, Burley, Pocatello, Twin Falls): **Larry L. Leach,** 6318 Bermuda Dr., Boise, Idaho 83705 (phone 344-1671).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, O'Hare Field): **Charles Oelrich,** 711 East D St., Belleville, Ill. 62221 (phone 233-2430).

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KENTUCKY (Louisville): **John B. Conaway,** P. O. Box 13064, Louisville, Ky. 40213 (phone 895-0412).

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MAINE (Limestone): **Alban E. Cyr,** P. O. Box 160, Caribou, Me. 04736 (phone 492-4171).

MARYLAND (Baltimore): **James W. Poultney,** P. O. Box 31, Garrison, Md. 21055 (phone 363-0795).

MASSACHUSETTS (Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Arthur D. Marcotti,** 215 Laurel St., Melrose, Mass. 02176 (phone 665-5057).

MICHIGAN (Detroit, Kalamazoo, Lansing, Marquette, Mount Clemens, Oscoda, Sault Ste. Marie): **Dorothy Whitney,** 3494 Orchard Lake Rd., Orchard Lake, Mich. 48033 (phone 682-4550).

MINNESOTA (Duluth, Minneapolis, St. Paul): **Joseph J. Sadowski,** 1922 Malvern St., St. Paul, Minn. 55113 (phone 631-2781).

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MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **Robert E. Combs,** 2003 W. 91st St., Leawood, Kan. 66206 (phone 649-1863).

MONTANA (Great Falls): **Jack K. Moore,** P. O. Box 685, Great Falls, Mont. 59403 (phone 761-2555).

NEBRASKA (Lincoln, Omaha): **Lyle O. Remde,** 4911 S. 25th St., Omaha, Neb. 68107 (phone 731-4747).

NEVADA (Las Vegas, Reno): **Cesar J. Martinez,** 4214 Grace St., Las Vegas, Nev. 89121 (phone 451-3037).

NEW HAMPSHIRE (Manchester, Pease AFB): **R. L. Devoucoux,** 270 McKinley Rd., Portsmouth, N. H. 03801 (phone 669-7500).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Fort Monmouth, Jersey City, McGuire AFB, Newark, Trenton, Wallington, West Orange): **Joseph J. Bendetto,** 2164 Kennedy Blvd., Jersey City, N. J. 07305 (phone 420-6154).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Harry L. Gogan,** 2913 Charleston, N. E., Albuquerque, N. M. 87110 (phone 264-2315).

NEW YORK (Albany, Bethpage, Binghamton, Buffalo, Catskill, Chautauqua, Griffiss AFB, Hartsdale, Ithaca, Long Island, New York City, Niagara Falls, Patchogue, Plattsburgh, Riverdale, Rochester, Staten Island, Syracuse): **Kenneth C. Thayer,** R.D. #1, Ava, N. Y. 13303 (phone 827-4241).

NORTH CAROLINA (Charlotte, Fayetteville, Goldsboro, Greensboro, Raleigh): **Dozier E. Murray, Jr.,** 1600 Starbrook Dr., Charlotte, N. C. 28210 (phone 523-0045).

NORTH DAKOTA (Grand Forks, Minot): **Leo P. Makelky,** 611 16th Ave., S. W., Minot, N. D. 58701 (phone 839-5186).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Toledo, Youngstown): **Robert L. Hunter,** 2811 Locust Dr., Springfield, Ohio 45504 (phone 323-2023).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **David L. Blankenship,** P. O. Box 51308, Tulsa, Okla. 74151 (phone 835-3111, ext. 2207).

OREGON (Corvallis, Eugene, Portland): **Philip G. Saxton,** 15909 N. E. Morris, Portland, Ore. 97230 (phone 254-0145).

PENNSYLVANIA (Aliquippa, Allentown, Chester, Erie, Homestead, Horsham, King of Prussia, Lewistown, New Cumberland, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **Lamar R. Schwartz,** 390 Broad St., Emmaus, Pa. 18049 (phone 967-3387).

RHODE ISLAND (Warwick): **Matthew Puchalski,** 143 SOG RIANG, Warwick, R. I. 02886 (phone 737-2100, ext. 27).

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TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tullahoma): **James W. Carter,** 314 Williamsburg Rd., Brentwood, Tenn. 37027 (phone 373-9339).

TEXAS (Abilene, Austin, Big Spring, Corpus Christi, Dallas, Del Rio, El Paso, Fort Worth, Houston, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Vic Kregel,** P. O. Box 9495, San Antonio, Tex. 78204 (phone AC214 266-2242).

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VERMONT (Burlington): **R. F. Wissinger,** P. O. Box 2182, S. Burlington, Vt. 05401 (phone 863-4494).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Lester J. Rose,** 177 Corinthia Dr., Denbigh, Va. 23602 (phone 877-4372).

WASHINGTON (Port Angeles, Seattle, Spokane, Tacoma): **Theodore O. Wright,** P. O. Box 88850, Seattle, Wash. 98188 (phone 237-9865).

WEST VIRGINIA (Huntington): **Evelyn E. Richards,** 10 Berkley Place, Huntington, W. Va. 25705 (phone 529-4901).

WISCONSIN (Madison, Milwaukee): **Charles W. Marotske,** 7945 S. Verdev Dr., Oak Creek, Wis. 53154 (phone 762-4383).

WYOMING (Cheyenne): **Edwin J. Witzenburger,** Capitol Bldg., Rm. 116, Cheyenne, Wyo. 82001 (phone 632-7132).

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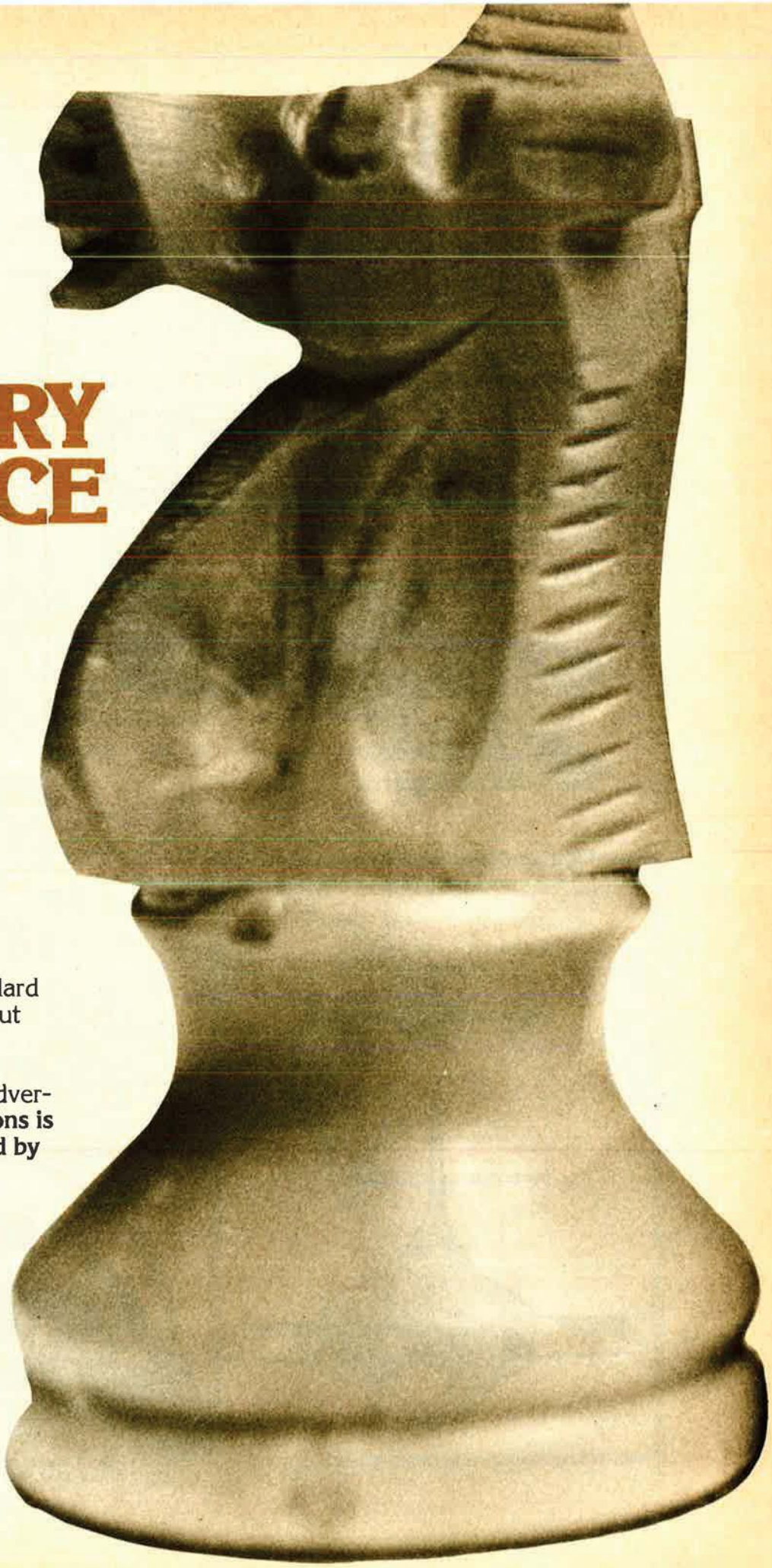

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"There I was..."

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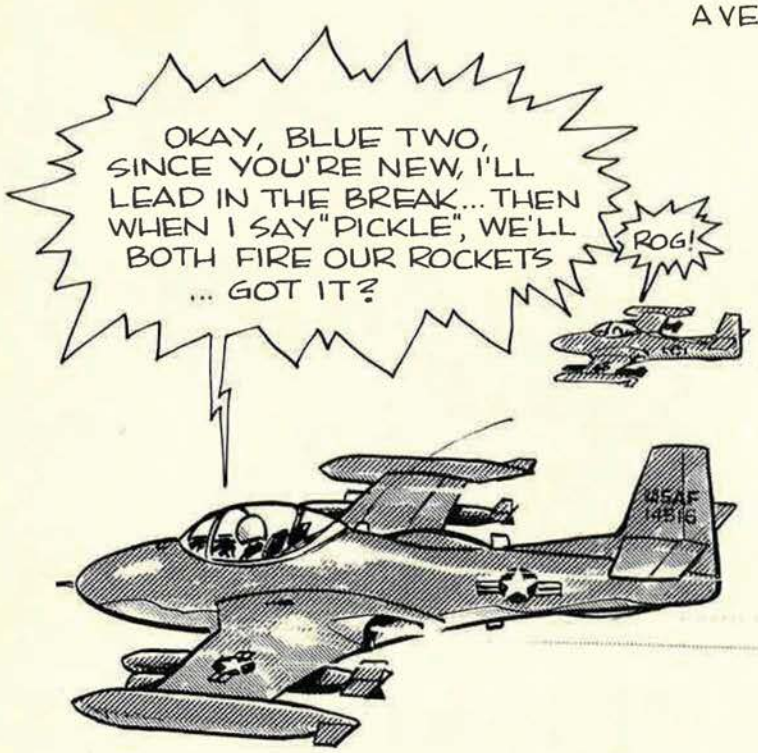

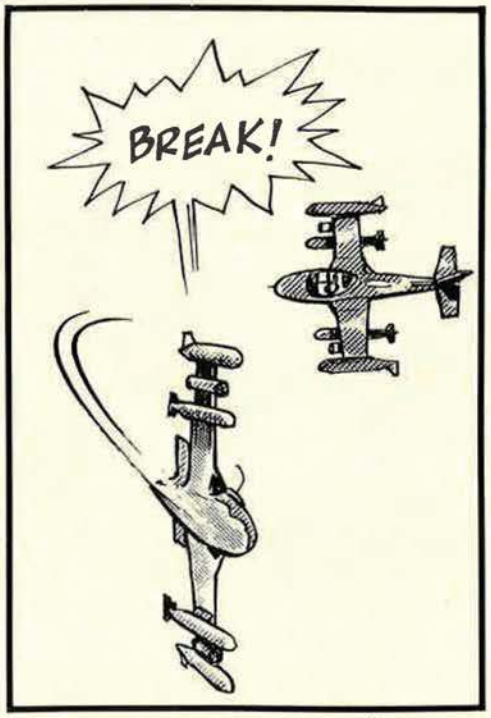

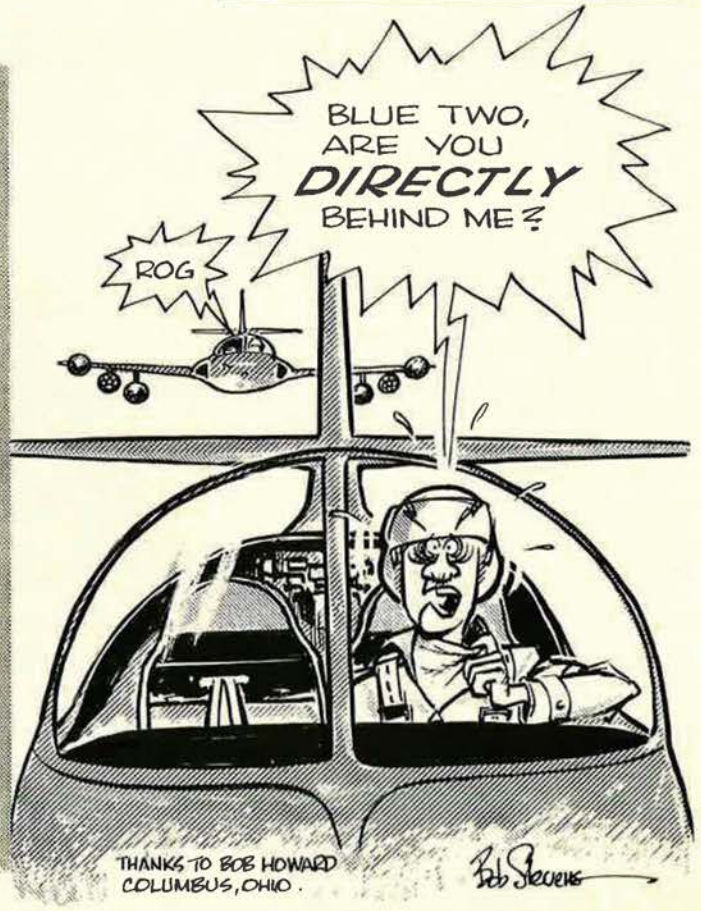

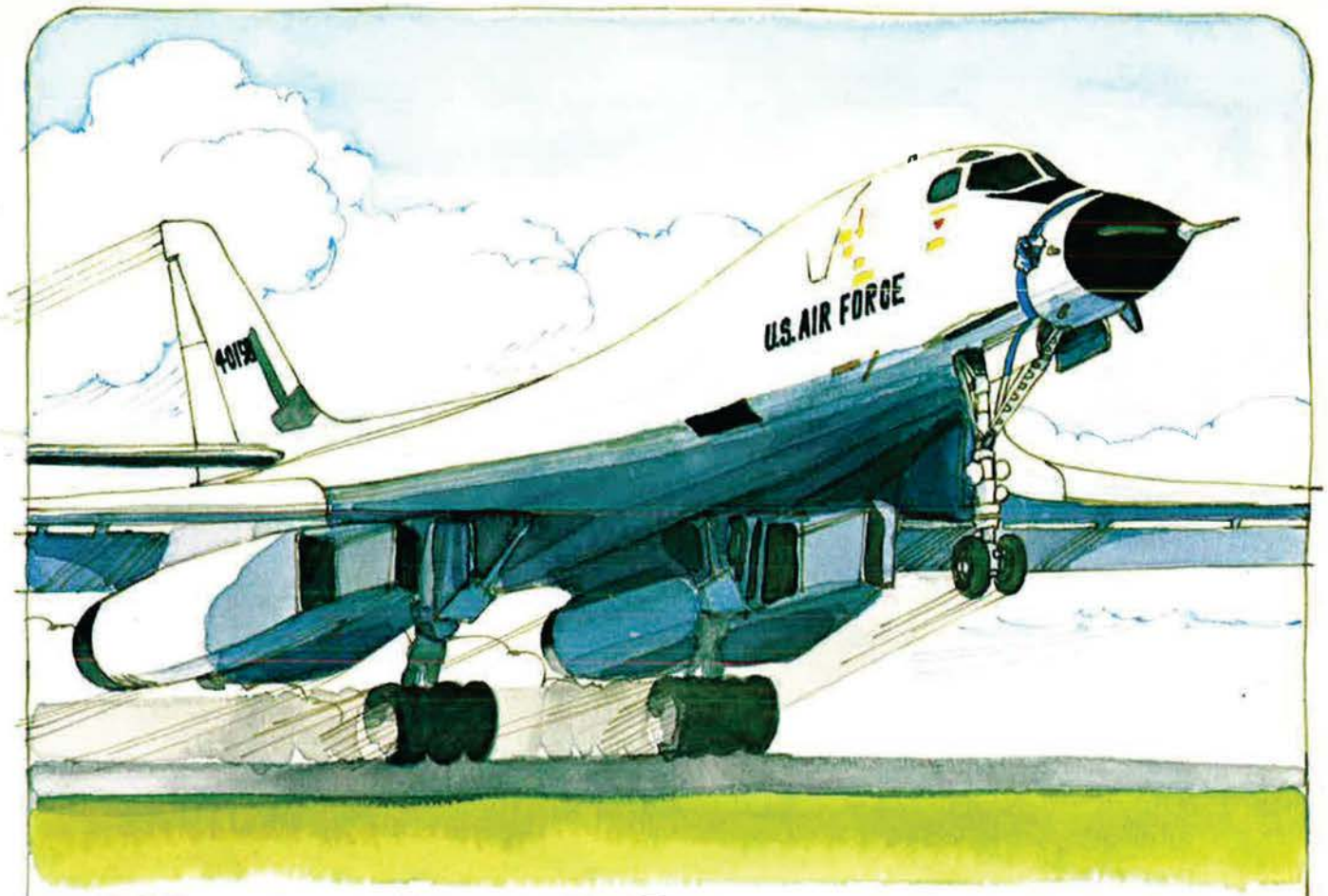

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F-15 pilots have been praising our Vertical Situation Display, commenting on its "sharp, bright symbols" and the ability to read the display even when the cockpit is bathed in sunlight.

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B-1 VSD

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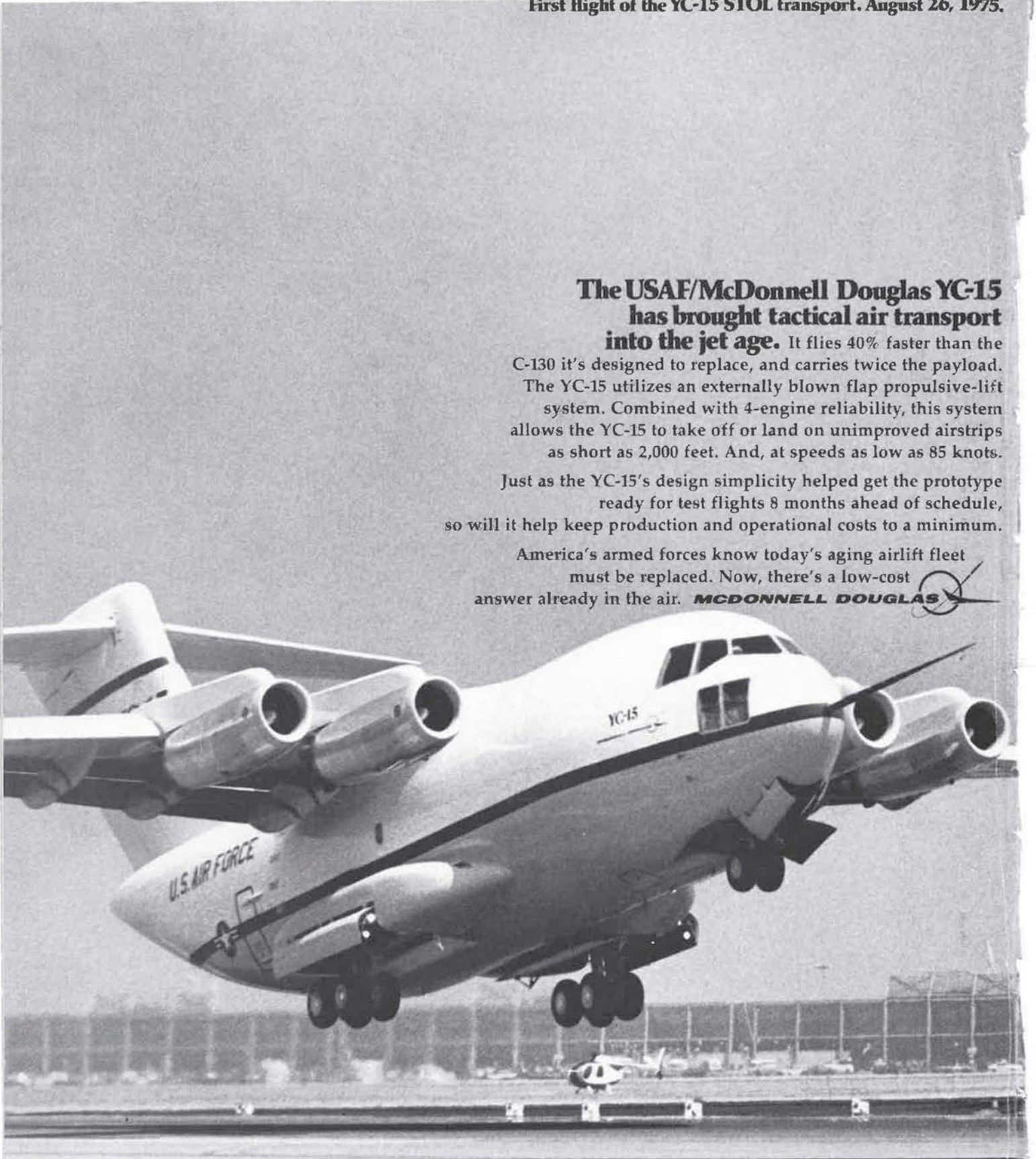

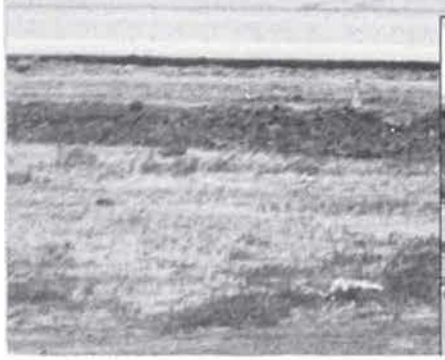

McDonnell Douglas YC-15 Off the ground