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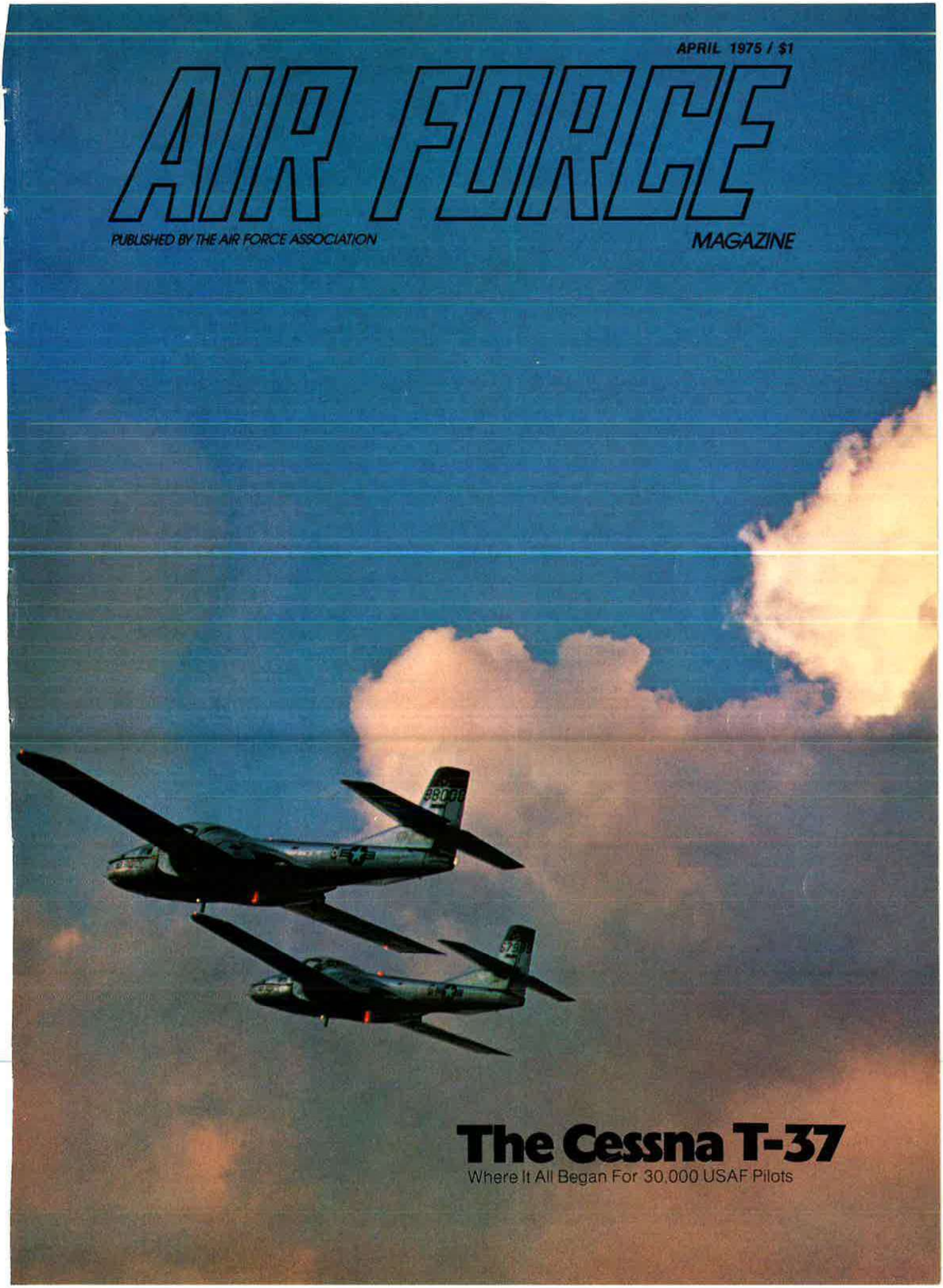
AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE



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The Advanced System/4 Pi Model ML-1 evolved from the 4 Pi technology base, in place since 1965. The result of this technology has been System/4 Pi computers for a variety of military and space programs such as A-7, F-111, EA6B, A-6, F-15 and Shuttle. It's IBM's solution – here today – for the next generation of avionic processing requirements. Using a typical avionic instruction mix, the Model ML-1 can perform more than 400,000 operations/sec.

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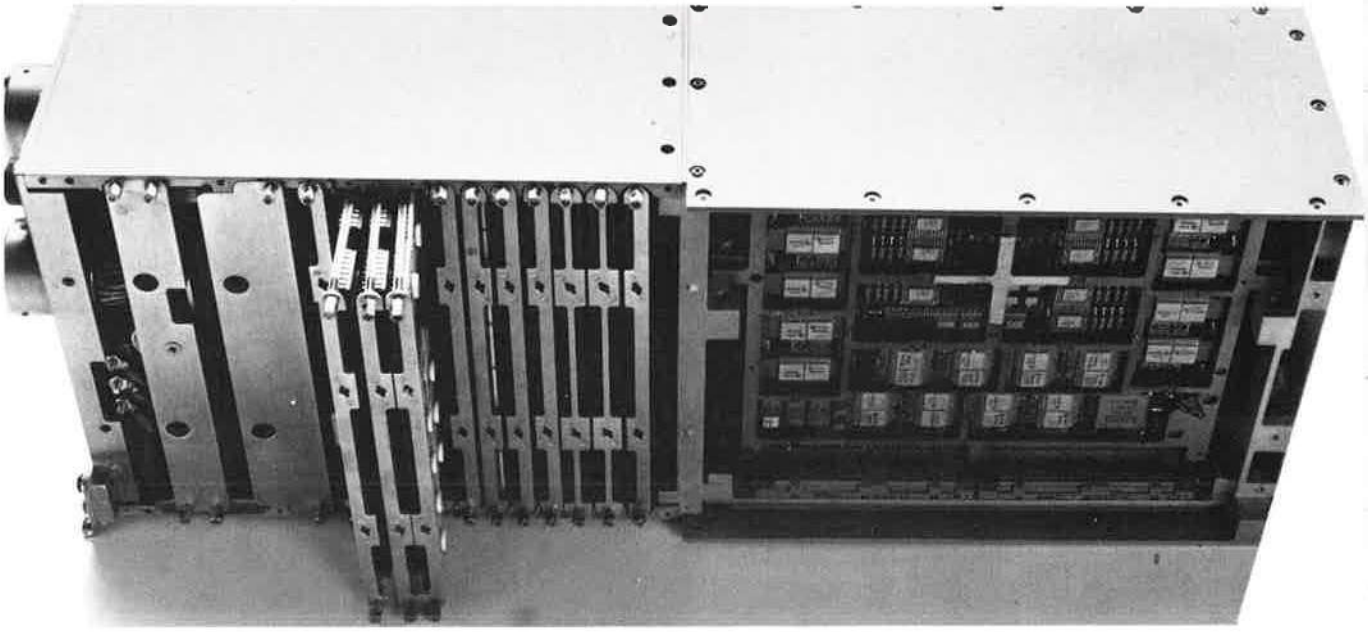

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APRIL 1975
VOLUME 58, NUMBER 4

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ABOUT THE COVER

What's a picture of T-37s doing on our cover? True, the "Tweet" isn't one of USAF's hottest birds. But for eighteen years, it's served as the basic jet trainer for 30,000 Air Force pilots. Two instructor pilots give their report on flying the venerable, seemingly ageless T-37, beginning on p. 65.

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Our Crumbling Industrial Base

By John L. Frisbee
EXECUTIVE EDITOR, AIR FORCE MAGAZINE

WE TAKE nothing from American generalship or the quality of the US fighting man when we say that this country could not have won its major wars of the twentieth century without the miracles of production that overwhelmed opponents who were less materially affluent or lacked our management and mass-production capacity. Now, the United States is close to becoming a victim of its own past achievements.

It has become an article of American faith that all we need do in an emergency is prime the pump with dollars, turn on the faucet, and an unremitting stream of hardware and supplies will gush forth. America—the Arsenal of Democracy.

Well, when the chips are down, no amount of priming will do the job if the pipes have been allowed to rust away. And that is precisely what is happening to our defense-related industrial base, a fact largely obscured by debate on less mundane defense subjects.

In his recent Posture Statement, Chairman of the Joint Chiefs of Staff Gen. George S. Brown had this to say:

"... nuclear war remains the least likely course of action for our potential enemies. The capability of industry is critical to the United States successfully developing a stalwart conventional deterrent.... We are experiencing a creeping erosion of the US industrial base that promises to grow progressively more severe in the foreseeable future. . . . The industrial base must be capable of sustaining all mobilized US forces (Active and Reserve) in a long war against either the Warsaw Pact or the People's Republic of China."

The US industrial base also must be *perceived* by potential opponents as adequate to maintain our deterrent forces, and at the same time be capable of providing friends and allies with the materiel to defend themselves.

A few examples of industrial base shrinkage serve to illustrate General Brown's point:

In the past three years, 1,000 US foundries have been driven out of business by the cost of meeting new environmental standards. We are unable to produce enough heavy castings to support tank production at the minimum essential level of eighty-three tanks a month, while the USSR produces thousands each year.

Some US strategic industries have virtually disappeared because of high labor and materials costs. An example is watchmaking, a primary source of precision components for military equipment and ordnance. And with the disappearance of such industries goes a skilled and irreplaceable labor force.

Many producers who are able to make military products refuse to do so because of budgetary uncertainties and what they call a "lack of growth potential." When one of the two large producers of ether, used in single-base propellants, stopped production, sixteen potential producers declined to fill the gap.

In contrast, General Brown reported a significant expansion of the Soviet production base that supports its general-purpose forces. The Yom Kippur War apparently taught the Soviets, who always have been advocates of military mass, a few things about the tremendous cost of modern conventional war in terms of equipment losses and ordnance expenditures. We apparently have not taken that lesson to heart.

Fortunately, we haven't passed the point of no return. Environmental standards *can* be relaxed when the national interest is at stake. Stockpiles of critical materials *can* be increased if necessary.

Perhaps the most important is a recent amendment to the Defense Production Act of 1950. As originally passed, the DPA set up a revolving fund of $2 billion to support a defense production base that would meet wartime needs. The funds were made available to the Office of Emergency Preparedness through a borrowing arrangement with the Treasury. By 1970, interest payments had reduced the revolving fund to insolvency.

The amendment to the DPA, passed by Congress last fall, has breathed life—or at least the chance of it—into the program through new funding procedures. The General Services Administration's Office of Preparedness (a successor to OEP) now can go directly to Congress for support of critical industries that could not otherwise operate in the black. Studies to determine where added production capabilities will be needed are again under way.

All of these remedies, of course, require congressional support.

There is much the Defense Department can do—and is doing—to check the erosion of our production base. But ultimately, the viability of that base depends on the Congress. Adequate congressional support is not likely to be forthcoming unless there is wider understanding of two related points:

First, the USSR is reaching for *both* nuclear and conventional superiority. Second, our production base is an essential element of the overall US deterrent. As Soviet general-purpose forces grow in size and improve in quality, deterring the Soviet conventional threat becomes as important as deterring nuclear war.

Supporting conventional, general-purpose forces is the primary function of our industrial base. That base must not be allowed to crumble. ■

TWO WORDS BACK UP THE A-7. COMBAT PROVEN.

Its survival instinct has been proven in combat.
Only 58 A-7's have been lost in 109,500 sorties—a combat loss rate of .053%.

Advanced avionics make it the most versatile attack aircraft in use.
A Doppler-Inertial-Gyrocompassing System with 4 backup modes directs navigation while radar provides ground map, terrain following, terrain avoidance, beacon mode and target ranging. The pilot is free to concentrate on the action.

The A-7 guarantees 10 mil accuracy.
That's a 2-to-1 improvement over first generation automatic toss delivery systems. A Head-Up Display and 5 computed attack modes permit weapons delivery from any direction, dive angle or airspeed.

Loiter and load capabilities make it the most versatile support aircraft available.
Originally intended for close support and interdiction, the A-7 has also flown escort plus search and rescue missions with distinction. And it's effective in both day and night operations.

Single point servicing minimizes turnaround time.
Waist-high access and built-in self-test eliminate the need for complex ground equipment.

The A-7 neutralizes targets in 1/3 the usual number of sorties.
It makes the A-7 the most accurate and cost-effective tactical air weapon system in the world.

VOUGHT
SYSTEMS DIVISION
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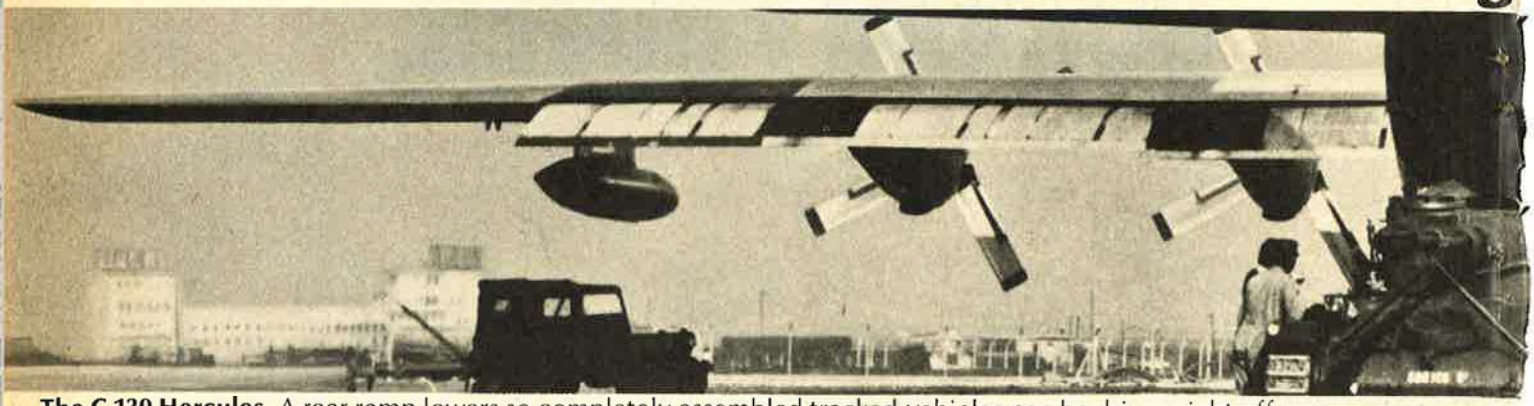
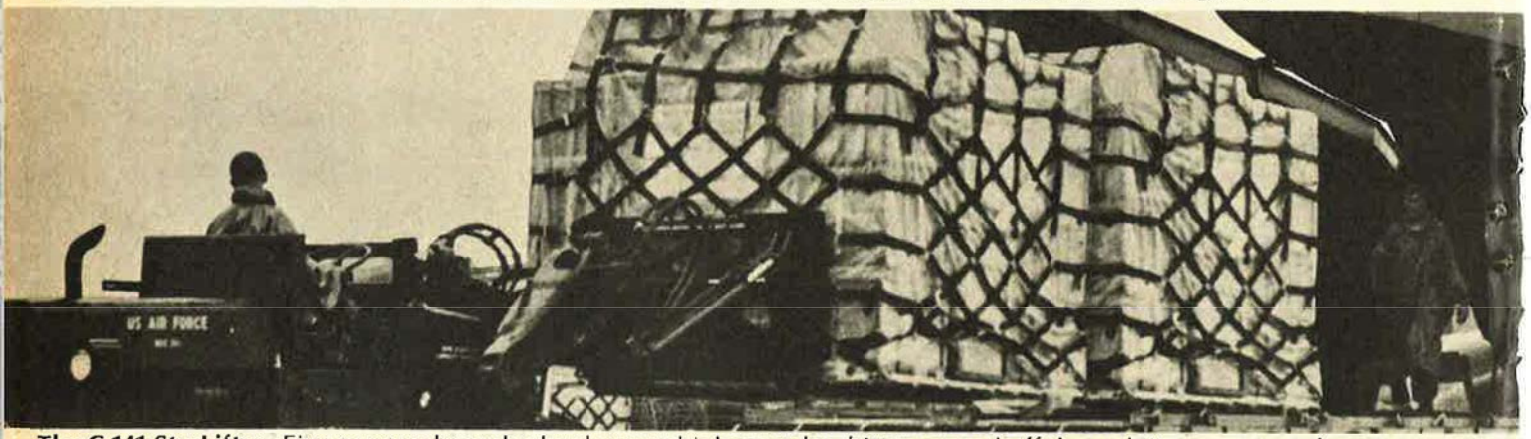
How's this

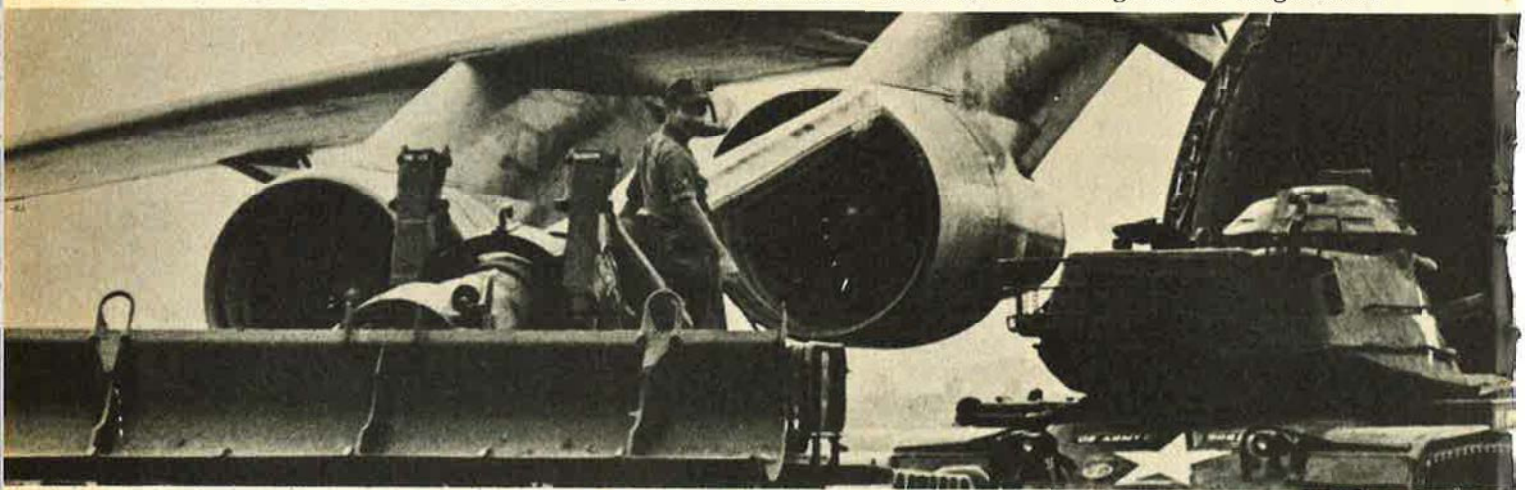
Lockheed knows more about building



The C-130 Hercules. A rear ramp lowers so completely assembled tracked vehicles can be driven right off.



The C-141 StarLifter. Five-ton trucks and other large vehicles can be driven on and off through its rear cargo doors.



The C-5A Galaxy. The landing gear kneels, then shoulder-high ramps lower so vehicles like 50-ton M-60 tanks can be driven on

At Lockheed-Georgia, we have the only airlift production line in the U.S. There we build airlifters like they should be built: to load and unload fast.

Take the C-130 Hercules. This rugged airlifter doesn't need ground-handling equipment to unload trucks and bulldozers through its large rear doors. It can carry 45,000 lbs. of cargo. It can land on short unimproved runways of sand, dirt and even snow. And even airdrop.

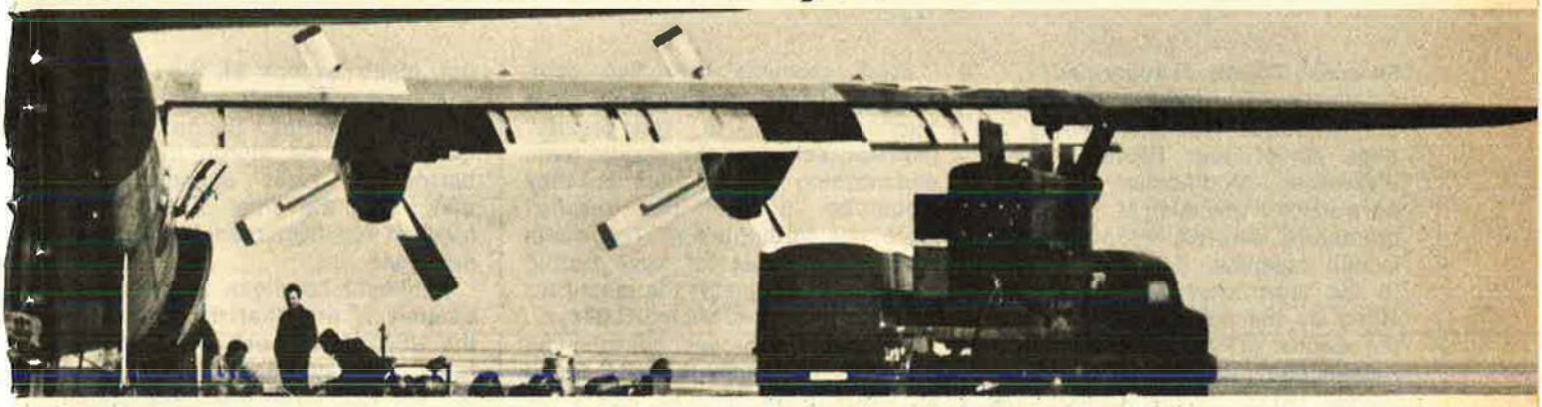
To date, 37 nations have chosen this timeless airlifter.

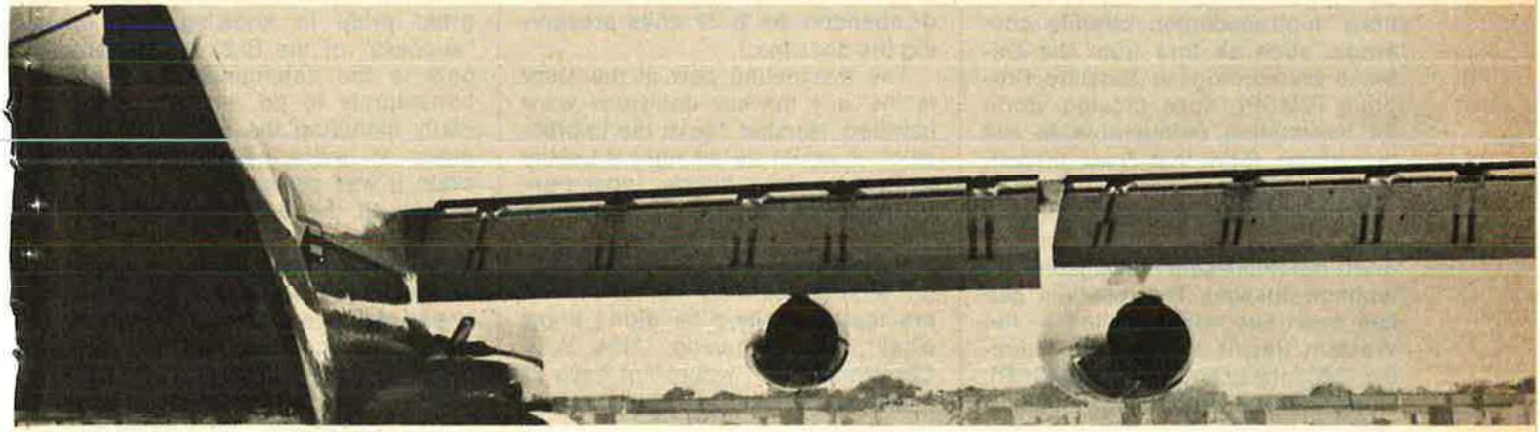
Take the C-141 StarLifter. This strategic airlifter can carry 72,000 lbs. of cargo across oceans. Its low cargo deck enables plane loads of palletized cargo to be unloaded in 10 minutes. The C-141 can airdrop when you have to. And to give it even more capability, the U.S. Air Force is planning to stretch the fuselage and add in-flight refueling.

Take the C-5A Galaxy. No other plane being developed or redesigned can match it, in capability or mission flexibility. The C-5A is the most advanced airlifter in the world. It has even made a successful live-drop and launch of a Minuteman intercontinental missile.

for openers?

drive-in airlifters than anyone.





and off through two huge cargo openings, front and rear.

The C-5A can carry 220,000 lbs. of outsized cargo impossible for other planes. From 50-ton tanks to giant Chinook helicopters.

It's also the only plane able to be loaded and unloaded, simultaneously through two huge cargo openings, front and rear.

As a result, the C-5A can unload typical infantry vehicles and air mobile loads twice as fast as other planes. And with palletized loads, it's three and one-half times faster.

The C-5A saves precious time in the air too. It can be refueled in flight. Airdrop cargo when it has to. Find its way in the worst weather with one of the world's most advanced navigational systems. Land on unimproved runways as short as 1,200 feet. Take off in less than 3,000.

The Lockheed drive-in airlifters. They're the backbone of the Military Airlift Command. They're built by the company who knows more about building airlifters than anyone.

Lockheed

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Airmail

Forecast Greatly Exaggerated

Gentlemen: The forecast demise of the Air Force typhoon chasers on page 40 of your February issue ["Weather Modification—A Pandora's Box?", by Alan M. Horton] is premature. Aircraft reconnaissance is still essential. It is a vital input to the storm-warning service provided by the Joint Typhoon Warning Center (JTWC) in the Western Pacific and the National Hurricane Center (NHC) in the Atlantic and Caribbean. Under certain conditions, high-resolution satellite coverage, such as that from the Defense Meteorological Satellite Program (DMSP), does provide storm fix information comparable to but not better than that from aircraft reconnaissance.

Austerity and mission priorities have reduced the amount of aircraft reconnaissance available for typhoon chasing. The resultant gap has been successfully filled in the Western Pacific through the Selective Reconnaissance Program (SRP). Under SRP, the Director, JTWC, determines which reconnaissance platform (aircraft, satellite, or radar) will be used to provide center fix information. Last year, JTWC tasked aircraft reconnaissance sixty-six percent of the time, satellite 32.5 percent, and radar 1.5 percent.

Advances in satellite technology may someday occasion the eulogy of aircraft reconnaissance. Until that time, the current mix of aircraft, satellite, and radar provides the optimum means of storm reconnaissance.

Brig. Gen. John W. Collins
Commander
Hq. Air Weather Service (MAC)
Scott AFB, Ill.

The B-29 and Doctrine

Gentlemen: There is no reason to quarrel with Herman Wolk's central thesis in "The B-29, the A-Bomb, and the Japanese Surrender." . . . But there is a sobering insight to be gained from Wolk's article, even if he gives little evidence of noticing it. I refer to the behavior patterns caused by all the bureaucratic organizations with and within which we live.

Wolk recounts how two commanders (Wolfe and Hansell) were sacrificed . . . to "get results" (Norstad acting as the middle man, and warning new commanders they would be "fired" if the "results" were not forthcoming). The name of the game was to prove Arnold a genius and to justify the resources he secured for producing B-29s. . . .

Since the approved doctrine did not work in Japan, the AAF faced an ugly choice: It could justify the B-29 by abandoning its doctrine, or abandon the B-29 while preserving the doctrine.

The fascinating part of the story is the way the key decisions were handled. Norstad "gave the impression" it would be all right if LeMay shifted to low-altitude incendiary bombing, but Arnold simply wasn't informed at all (if he was in the hospital, who was in charge?). In an almost startling sentence, we are told that since he didn't know what was happening, "the AAF Commander . . . would not have to share responsibility should things go wrong."

A half-baked substitute doctrine was hastily devised, even if Wolk mentions it only in passing; we emphasized a "profusion of home factories" to explain our abandonment of precision bombing. Had the operation turned into a disaster (a horrendous number of aircrews could have been lost), LeMay presumably would have been publicly condemned, and Arnold would have pleaded ignorance. If Arnold didn't know what was going on, then the JCS, the Secretary of War, and the President didn't either. . . .

This behavior pattern [of survival] is familiar in most organizations; subordinates are expected to accomplish the chief's stated objective *by any means necessary,* even if those means are drastically different than the ones included in approved policy and the ones discussed at the time of the original decision. Subordinates must, by definition, keep the chief (and those above him) in the dark as to how the objective is being met.

Why? First, the chief must not be faced with a decision he cannot make except at the cost of either admitted failure or violation of other policies. Second, everything must be done (no holds barred) to avoid acknowledging that either the chief or the organization has ever made a mistaken decision. . . .

It should be clear, but it unfortunately is not, that the stature of the USAF is not enhanced by this fuller understanding of what went on. We who have been associated with the organization can take no great pride in knowing that the "success" of the B-29 is traceable only to the determination of AAF bureaucrats to do *anything,* especially including the use of the airplane in ways never considered when it was designed.

After all, the B-29 would not have been built *at all* if our acknowledged mission had been fire bombing between 5,000 and 9,000 feet; a cheap airframe would have sufficed very well. The Wolk article, then, is an absolute classic as to what middle managers must do if they are to "get ahead"; with some sorrow, I will use it in classes for years to come.

Col. Frederick C. Thayer, USAF (Ret.)
University of Pittsburgh
Pittsburgh, Pa.

The author replies: I'm sure the name of the game was to win the war. This is clear from historical records of the Army Air Forces in World War II. And the way to win wars is to change doctrine and tactics when they are not working. This is crucial to successful command. The B-29 campaign against Japan was not succeeding from high altitude in daylight, the tremendous winds and cloud cover proving difficult. So General LeMay devised a way to become "independent of weather." It worked.

This change in tactics and doctrine made a substantial contribution to victory over Japan. And I want to emphasize that during 1945, General Marshall constantly made the case for invasion. President Truman gave more weight to Marshall's view than anyone else's.

I do not agree with Professor Thayer that the USAF's stature is diminished by using aircraft "in ways never considered when it was designed." To the contrary, I believe great credit is due airmen when they change doctrine and tactics. This is the essence of leadership and command.

I am unaware of evidence proving the AAF's choice was to "justify the B-29 by abandoning its doctrine, or abandon the B-29 while preserving the doctrine," and have seen nothing to even indicate consideration was given to abandoning the B-29.

As to the reason for General LeMay's not informing General Arnold, that is in the historical records, in LeMay's own words. And rather than the "profusion of home factories" being a hastily devised and "half-baked substitute doctrine," it was emphasized, in November 1943, by the landmark "Report of the Committee of Operations Analysts on Economic Objectives in the Far East," forwarded to General Arnold. This report established the foundation for B-29 targeting.

Surely Professor Thayer knows that in World War II the President was rarely, if ever, informed of changes in tactics.

As for "the determination of AAF bureaucrats," General LeMay was foremost a tactician and commander. He was the antithesis of a bureaucrat.

Though my article was not about "organizational survival," I believe the history of the B-29 campaign reflects great credit on the Army Air Forces—no matter how one looks at it.

Herman Wolk

Bucking Colts

Gentlemen: I have read with concern "The Bucking Colts Take Over," in the February "Airpower in the News." In particular, I am concerned over your comment on Rep. M. Robert Carr and his "affiliations with . . . the American Civil Liberties Union. Rate him as anti-defense."

In 1942, when I took my oath as an officer in the Army of the United States, I swore to " . . support and defend the Constitution of the United States against all enemies, foreign and domestic."

I remain loyal to that oath.

My support for defense against foreign enemies is evidenced, in part, by my membership in the Air Force Association.

My support for defense against domestic enemies is evidenced, in part, by my membership in the American Civil Liberties Union.

If defense is, indeed, the defense of the Constitution, and, thereby, the defense of the freedom of each American citizen against all enemies, foreign and domestic, in what way do you see the ACLU as a threat to defense?

Lt. Col. Robert A. Harris, USAF (Ret.)
Lexington, Mass.

Gentlemen: Your item entitled "The Bucking Colts Take Over" was timely and informative—in particular your "political warning" concerning Rep. Philip Burton. You point out, with obvious horror, that the constituency he cares about most is "the poor, the elderly, the black, and the disabled." Clearly, he is a very dangerous person, at least to those of us who do not belong to that constituency.

You also warned us about Rep. James F. Lloyd, who says he has become "more humanistic" since leaving the Navy. This is clearly a disturbing trend, and no doubt shows a deficiency in Navy indoctrination.

However, it is comforting to know that we still have Rep. Lawrence P. McDonald on the Armed Services Committee. As a member of the John Birch Society and the National Rifle Association, he clearly has the right instincts (although I seem to recall that the Birch Society has lately turned against the Vietnam War—of all things). No foolishness about the poor and disabled, etc.

As you recommend, I shall continue to read my daily newspaper—and AIR FORCE Magazine—with plenty of salt.

Lt. Col. E. H. Robinson, USAF (Ret.)
San Diego, Calif.

Inflation Fallacy

Gentlemen: Reference is made to the letter of Capt. Warren S. Kirkland in your February 1975 issue regarding your views on government spending. The thoughts expressed by Captain Kirkland are based, I feel, on misconceptions.

First, he says, "reduction of spending by government is the *only* action which will slow or stop inflation." The emphasis is his. Later he says, "The only agency that can control the amount of money in circulation is the federal government." It is a fact that the size of the money stock (currency and demand deposits) in this country, since 1914, has been the prime concern of the Federal Reserve System.

The Federal Reserve System is not part of the federal government, but is a central bank independent for practical purposes of the Executive, Congress, and the courts. Our central bank is responsible for developing and executing monetary policy—the quantity of money which circulates and the terms of credit. Aside from a few very limited measures, there is nothing the federal government can do about the amount of money in circulation.

The notion that lowered levels of spending is the sole weapon we have against inflation is totally specious. In the first place, restrictive monetary policy is the *most* effective means of combating inflation we have in the short run. Secondly, in the long run, increases in worker productivity (through the stimulation of business investment and other measures) is most effective. Again, in the short run, increasing taxes relative to government spending is effective from an economic standpoint, though probably not from the political standpoint. Finally, in the short run, an effective program of price, wage, rent, and profit control *can* be effective against inflation.

Other misconceptions are those embodied in the statements, "The economic policies of John Maynard Keynes . . . have proven disastrous wherever they have been implemented . . . these neosocialist economics. . . ." It had escaped me that Keynes, dead since 1946, had economic policies for contemporary times. I do know he offered one for the 1930s—one which was not implemented to the extent he insisted was necessary, but one which, in retrospect, seems to have been, short of World War II, most logical.

For anyone, even a Keynesian economist, to apply Keynes' prescription for recovery from the Great Depression to today's stagflation is as absurd as those Marxian economists who live in a dead man's skull. Keynes himself surely would agree: In the first place, "Keynesian economics" has given way to a more comprehensive and logical neo-Keynesian analysis, thanks mainly to John Hicks and Alvin Hansen; and secondly, Captain Kirkland's world is vastly different from that of the "hard times."

In the phrase ". . . these neosocialist economics," Captain Kirkland is manifestly misinformed, as-

Airmail

suming, of course, that his definition of neosocialist is the one generally understood. To my knowledge, Keynes never suggested seriously social ownership of the means of production. In fact, he iterated a reluctance to give up one vestige of the laissez-faire world, disparate incomes: "For my own part, I believe that there is social and psychological justification for significant inequalities of incomes and wealth, but not such large disparities as exist today. There are valuable human activities which require the motive of money-making and the environment of private wealth-ownership for their full fruitation."

What Keynes has given us for the present and the future is not a dogma, but the basis of an analytical system built on a set of well-defined macroeconomic relationships known to exist in an essentially free-enterprise economy.

Theodore R. Snyder, Jr.
Assoc. Professor of Economics
Leicester Junior College
Leicester, Mass.

Gentlemen: I write to add my approval to the thoughts expressed by Captain Kirkland in "Airmail" regarding the fallacy that a reduction in government spending can do nothing to slow inflation.

The current condition of recession *with* inflation is a whole new ball game, and I see no solution with the ever-expanding approval of government spending by politicians "with vested interests." Heaven help us if the present trend of governmental countermeasures continues.

As to where it could possibly lead us, I would suggest those interested read with *deliberation—Panics and Crashes* (Shultz, Pinnacle Books) and *You Can Profit from the Monetary Crisis* (Brown, Macmillan Publishing Co.).

Lt. Col. Charles W. Ruffner, USAFR (Ret.)
Tucson, Ariz.

North Sea Oil Survey

Gentlemen: Thanks very much for that detailed summary of oil and natural gas activities in the February issue ("North Sea Oil: NATO's Refuge or Ruin?", by Lawrence Griswold), which reviewed the current status and dilemmas at length. I would like to add to it, for reasons both historical and obvious.

Almost no one in today's recountings of meanings of this tremendous exploit to finger this energy resource goes back to how it began. The Air Force even gets left out of it. The first North Sea survey (by Aero Service Div., Litton Industries) used as its workhorse a WW II surplus B-26, with a tail extension housing a magnetometer, and a B-17 (N-7227-C), similarly equipped to act as backup for this adventure. The resulting chart was 24.5 feet wide and 27.5 feet long, and in the original recording tape form it was nine inches in width, two miles long.

Geologists converted the tracings and tape perforations into soil structures, with special emphasis given those which normally attracted oil and natural gas deposits. It was from all this that dozens of companies arranged concession outlines with governments whose spheres of influence coincided, and drilling began in 1965. Another Litton division, Western Geophysical, which does seismic work, did important work in specific fixing of promising drill locations.

The Aero Service unit has worked for more than fifty nations, and dozens of oil companies, and is still at it and doing quite well. That old B-17 worked in such varied areas as the Alaskan North Slope, did satellite tracking of polar orbit launches out of Vandenberg, sun eclipse recording in the Canadian north, high-altitude mapping of Chile and Venezuela; and then, when her days were about done, the United States Air Force asked for N-7227-C for a special job, with instructions to report early enough so she could be repainted the austere olive drab in which she had made her debut.

The order of the day said she would be in the "fly-past" on February 1, 1965, at Bolling AFB, D. C. She lumbered along on that "retirement review," as retiring Gen. Curtis LeMay gave her a grand salute, a significant part of his last day. It was her last day, too, and she was sold to that band of memory-laners, the Confederate Air Force.

So, as Britain contemplates being rich in something besides history, and the Norwegians squirm under the awfulness of affluence, they should always appreciate that it's better to have choices than being at someone else's mercy and having none at all, and that it is advancing technology in the hands of industry which is always in at the beginning—as well as at the end.

Col. Barney Oldfield, USAF (Ret.)
Corporate Dir., Special Missions and Projects
Litton Industries
Beverly Hills, Calif.

UNIT REUNIONS

Eagle Squadron Association

The Eagle Squadron Association, comprised of those persons who were active in #71, #121, and #133 Squadrons of the RAF during WW II, will hold its annual reunion at the Imperial House Motel in Dayton, Ohio, June 20–22. For further information write

R. L. Alexander, Pres.
105 E. Market St.
Piper City, Ill. 60959
Phone: (815) 686-9032

Spookfest

All personnel ever assigned to an AC-47 unit are invited to attend a Spookfest reunion in Washington, D. C., April 19, at Andrews AFB, Md. Contact

Col. D. O. Sandfort
Inter-American Defense College
Fort Lesley J. McNair
Washington, D. C. 20319

WASPs

The Women's Air Force Service Pilots, who flew with the USAAF in WW II, are holding a reunion at the Kings Inn in Reno, Nev., June 19–21. All ex-WASPs and other personnel, please get in touch with

Mrs. Hazel Hohn
605 Jeanell Dr.
Carson City, Nev. 89701

70th Service Squadron

The 70th Service Squadron, WW II, is holding a reunion at San Angelo, Tex. (place of activation), June 12–15. For details, write or phone

L. C. (Clark) Titus
12001 Oakwood Dr.
Austin, Tex. 78753
Phone: (512) 836-0291

366th Tac Fighter Wing

The 366th TFW Gunfighters Association will hold its annual reunion on May 16–18 at the El Tropicano Hotel, San Antonio, Tex. All past and present members of the 366th since the Wing's activation in 1943 are invited to join the Association and attend the reunion. Contact

Capt. Dave Poli
Box 4038
Mountain Home AFB, Idaho 83648
Phone: (1-208) 832-7987 or
(1-208) 828-2172

SCIENCE/SCOPE

Now undergoing sea trials aboard a U.S. Navy destroyer escort is a fully automatic air defense system built by Hughes. Designated the Improved Point Defense/Target Acquisition System, it is the first to integrate infrared sensors with conventional radar and correlate the returns. IPD/TAS will give single ships the reaction speed they need to defend against low-flying aircraft that "pop up" over the horizon.

The U.S. Navy will add 200 data display consoles to ships of the fleet under terms of a contract awarded to Hughes recently by the Navy Sea Systems Command. The equipment -- officially called AN/UYA-4 display consoles -- is part of the Naval Tactical Data Systems (NTDS). Within seconds NTDS can evaluate a potential threat, assign and control countering weapons, and perform other command functions for a single ship or an entire fleet.

The first ocean dynamics satellite, NASA's SEASAT-A, will gather a wide range of ocean data on a global scale -- such as the location and direction of winds and currents and the height and shape of waves. Applications will include predicting sea state and ocean wind fields for ship routing; warning of coastal disaster; mapping ocean pollution; aiding in the design of ships, deepwater ports, and offshore facilities; and making long-term weather forecasts. Under a 12-month NASA-Wallops Flight Center contract, Hughes is developing a breadboard model of the radar altimeter system that will aid in selecting parameters for NASA's SEASAT-A altimeter. The breadboard will be installed on a NASA C-54 aircraft for use in a four-month test and evaluation program this summer.

Combat Grande, Spain's modern air defense system, is on schedule. Significant progress on the $30-million, 44-month program was reported at the recent meeting of the board of directors of COMCO Electronics Corp. COMCO, with offices in Torrejon, Spain, and Fullerton, Calif., is jointly owned by Compania de Electronica y Comunicaciones, S.A. (CECSA) and Hughes. As subcontractors to COMCO, CECSA is manufacturing the communications subsystems and managing the civil engineering and construction, and Hughes is producing the computers and radar video extractors, designing the communications, and providing the technical manpower.

A way of conserving U.S. R&D dollars by adapting an already designed European air defense system was made possible recently when the Hughes-Boeing proposal to build a short-range, all-weather air defense system was selected over three competitive proposals. The SHORADS system is equally suited for installation on tracked or wheeled vehicles or fixed installations to defend against low-flying aircraft.

Two new portable "pop-up" radar antennas designed for rapid deployment by truck or rail have been delivered to West Germany by Hughes. They will be part of a new tri-service computerized radar system being manufactured by AEG-Telefunken for the German Ministry of Defense. Designed for use against aircraft, the lightweight antennas can be erected and put into operation in less than 30 minutes. Their mobility will make it difficult for an enemy to pinpoint their location.

How to weather heavy weather.

Navigate with a Northrop floating ball system. Unlike conventional systems, it provides accurate navigational data even in wild, stormy weather.

The unique Northrop floating ball is basic to the new USAF Airborne Weather Reconnaissance System (AWRS). In this system, the gimbal-less inertial platform is combined with an Omega navigation receiver. Another Northrop design.

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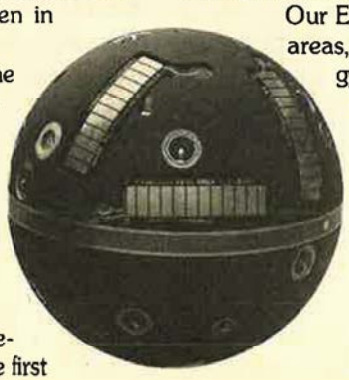
Northrop is well-known for its leadership in integrated navigation/guidance systems. We also built the first Omega receivers for U.S. Navy subs... Navy and USAF aircraft.



Our Electronics Division is active in a number of other areas, too. Northrop is a major producer of precision gyros... used in some 200 defense and space applications. We are a key producer of electronic countermeasures. Airborne computers. Data link systems. And micropackaged electronics.

For information contact: Northrop, Electronics Division, 1 Research Park, Palos Verdes Peninsula, California 90274. (213) 377-4811.

NORTHROP

Airpower in the News

By Claude Witze
SENIOR EDITOR, AIR FORCE MAGAZINE

USAF Faces the Budget Squeeze

Washington, D.C., March 11

"The Russians have given every indication, in the SALT talks and otherwise, that they would like nothing better than to have the B-1 bomber discontinued. I think that is a correct statement."

It is a statement made by Rep. F. Edward Hébert, recently deposed chairman of the House Armed Services Committee, on February 24, as USAF opened its appeal for authorization to spend $30,195.6 million in Fiscal 1976. The witnesses were Air Force Secretary John L. McLucas and Gen. David C. Jones, USAF Chief of Staff.

Mr. Hébert's comment that afternoon is of more than passing importance because, in the opinion of many sophisticated observers, the fate of USAF's new bomber project rides on the results of the SALT negotiations. The apprehension is that Russia will succeed in knocking loose one leg from the Triad deterrent concept.

The Louisiana congressman, and senior expert on the committee, has ample reason to sense the danger in the House of Representatives:

"There are some on this committee and unfortunately more in the House [who] as far as the B-1 is concerned, you could put it up for $10 and they would be against it. All the fine explanation given here goes for naught. As you notice, those who are most opposed to the B-1 weren't here to hear the discussion this morning. It will be the same way when we get to the floor of the House. Nobody will be on the floor, and they will come in and vote against it."

The "fine explanation" cited by Mr. Hébert did not make any headlines in the press, but it was front and center in the McLucas-Jones presentations both to the House and to the Senate Armed Services Committee a few days earlier. It was at the first meeting that Chairman John C. Stennis demanded that the witnesses outline what is good and what is bad about possible alternatives to the B-1.

It was the prestige of Senator Stennis that added weight to his request. On top of this, there are new budget committees in both the House and Senate. They are taking a hard look at the nation's priorities, and it is no secret that the price tag on the B-1 project imperils its position on the shopping list. In addition, there are defectors in Congress, most notably Sen. Henry M. Jackson. Now more eager than ever as a White House aspirant, he is quoted these days as having reservations about the B-1. A number of other influential Senate members also are quoted as viewing the B-1 as a prime chunk of fat in the defense budget.

None of these critics is known to be looking for fat anywhere else in the federal budget. The Department of Agriculture has made a study indicating that in six months of 1974 a broad sample of food-stamp recipients got 23.2 percent more aid than they were legally entitled to. This caper cost the taxpayers $160 million in those six months, almost enough to buy two B-1s. Congress is showing some interest in what appears to be a scandal involving nursing homes in New York. And in Connecticut, a state investigation has found nursing homes that show a profit as high as 286 percent, while paying their proprietors salaries of $80,000 a year. A substantial part of this money comes from the federal government. Meanwhile, the search for budget fat is confined, for the most part, to defense procurement.

It is an old story that the management of defense programs gets closer scrutiny than any other aspect of government. Food-stamp allocations and Medicare payments are not subject to renegotiation. The truth is that the Defense Department probably is the best managed agency of the government. In his testimony, General Jones said USAF has known for years that

USAF Budget
Total Obligational Authority
(In Millions of Dollars)

	Fiscal '75	Fiscal '76	Fiscal '76T
RDT&E	$3,298.9	$3,903.2	$1,034.0
Procurement			
Aircraft	3,060.0	4,575.5	1,087.1
Missiles	1,542.7	1,791.4	277.4
Other	1,656.0	2,342.8	383.6
Military Construction	444.9	703.6	14.0
Military Personnel	7,500.0	7,400.6	1,816.3
Operations and Maint.	7,327.7	7,956.3	2,020.3
Reserve and Guard	1,371.2	1,522.2	391.1
Total TOA	**$26,201.4**	**$30,195.6**	**$7,023.8**

Fiscal '76T is the request for three months beginning July 1, 1976, and ending September 30, 1976. This will provide for the transition to the new fiscal year, set by Congress to start October 1, 1976.

Only "military personnel" costs are down in USAF's FY '76 budget submitted to Congress. Further manpower cuts, Secretary McLucas warned, would "compound . . . our personnel planning and can impinge upon combat readiness."

some belts had to be tightened and it has been tightening them. Yet the fact remains that inflation, and its impact on buying power, in the General's words, "represents a greater and more immediate threat to our military capability than any other single factor." He continued:

"The proposed Air Force budget for Fiscal 1976 is $5.9 billion larger than the one for Fiscal 1967, yet this larger budget represents thirty-eight percent less purchasing power than we had ten years ago."

The ten years chosen by General Jones is an interesting choice. William S. Banowsky wrote about the same decade in *Newsweek* magazine:

". . . power is not just the Pentagon, with its missiles, planes, and tanks. Power is the Department of Health, Education and Welfare. HEW occupies fifty-seven buildings in Washington. If power is where the money is, we should take notice that HEW's proposed 1976 budget is $118 billion, one-third of the total federal budget. In the past ten years, the Pentagon's power has dropped from forty-one percent to twenty-six percent of the budget. HEW has gone from twenty-five percent to thirty-four percent."

The most significant savings in the Air Force during that period, while HEW was growing so rapidly, came from reductions in manpower. General Jones said there has been a decline of thirty-two percent in military and civilian personnel since the peak in 1968. And that is not the full story. Overhead has been slashed even more deeply. Headquarters strength has been cut in half, "partly by direct cuts and partly by eliminating some headquarters altogether and absorbing their functions in other organizations."

The total number of air units in Europe has remained level, but manpower in headquarters and support slots has been cut by more than half. The Tactical Air Command has been broadened to take responsibility for TAC units in the Western Pacific. This will permit the shutdown of the Pacific headquarters in Hawaii (PACAF) and save about $32 million a year. The Military Airlift Command is being reorganized and streamlined, achieving huge savings in manpower and fuel consumption. For all of USAF, the manpower requirement has been cut in one year by more than 31,000.

So far as hardware is concerned, the USAF presentation for Fiscal 1976 seeks $4,575.5 million for 175 new aircraft. Another $1,087.1 million is requested for the transition period; it would buy sixty-three aircraft. The bulk of the fifteen-month purchase would be accounted for by McDonnell Douglas F-15 air-superiority fighters (135) and the Fairchild A-10 close-support fighter (ninety-four). There is provision for six more AWACS planes and three more Airborne Command Posts, both produced by Boeing.

For missile procurement, the proposed expenditure is $1,791.4 million in Fiscal 1976 and $277.4 million in the transition period. Production of Minuteman III would be continued for a purchase of fifty weapons. Another $387.7 million is sought to continue improvement of Minuteman's survivability and flexibility.

The rest of the missiles sought in the fifteen months are the Maverick (7,200), Shrike (1,618), the Sparrow (620), and Sidewinder (1,510).

The figures proposed for personnel costs are, of course, critical; they will consume from more than thirty-eight percent to more than forty percent of the USAF budget. The total for Fiscal 1976 is $11,580 million; for the transition period it is another $2,866 million. The Air Force figure does not include $3,000 million for family housing and retired pay that is funded by the Secretary of Defense.

In this connection, Secretary McLucas issued a warning to both the Senate and House hearings:

"We recognize the necessity to fit manpower levels to new equipment and mission requirements. However, continued reductions in Air Force manpower of the magnitude annually being sustained reduce our surge capability and impair our short-term flexibility to realign available personnel with adjusted requirements.

"As the force shrinks, our ability to assimilate cuts is hampered; a force of 900,000 active-duty military personnel can absorb cuts more readily than can our projected FY 1976 end strength of about 590,000.

"Moreover, the ramifications are proportionate to the rate of drawdown. The impact of reductions is felt over several years; thus, annual cuts compound the turbulence in our personnel planning and can impinge upon our combat readiness."

This approach did not stimulate any important interest, leading to questions from committeemen. What Mr. McLucas was saying was that in Fiscal 1976 USAF will have the smallest personnel structure it has had since 1950, before the war in Korea. Considering the possible missions, it is at rock bottom. The "surge capability" is something the Air Force is called upon to provide, sometimes amid cheers from Congress and its constituents. One example was in late 1973, and another outbreak of war between the Israelis and the Arab states could strain USAF again. Further personnel cuts can jeopardize our capability.

It was the sense of the hearings in both Senate and House committee meetings that the B-1 issue is paramount. General Jones did most of the talking on this subject, putting emphasis on the B-1's cost effectiveness. He said the impact of the bomber threat on our potential opponent is also highly significant:

"Over the past decade Soviet air defense expenditures have exceeded those of the US many times over, and the current disparity, on the order of $5 billion annually, is likely to continue. No one can maintain with absolute assurance that, if the US reduced or eliminated the manned bomber leg of the Triad, the Soviets would divert these resources to other capabilities or to the civilian sector of their economy, as the US has done.

"But the essential points are two, as I see them. First, a continued credible US bomber capability, together with a strong Soviet predilection for massive air defenses, freezes significant resources in an area of no direct threat to US national security, either militarily or economically. Therefore, second, a sophisticated assessment of the utility of the bomber in our strategic arsenal must include not only the capabilities and costs of the system, but also the costs to a potential enemy for defending against it—and the additive capabilities he is thereby denied."

The question about alternatives to the B-1, raised initially by Senator Stennis, was pursued by members of both Senate and House committees. In the latter, the case for production of the General Dynamics FB-111 was pressed by Rep. Samuel Stratton of New York. The other alternative is an expensive program to rebuild the Boeing B-52s now in inventory to make them marginally acceptable.

At the House Armed Services Committee hearing, the question was put bluntly by Rep. Abraham Kazen of Texas, a new member of the committee, but an experienced member of Congress. In effect, Mr. Kazen asked, is it possible to fall back on the FB-111 and the B-52 as alternatives to the B-1?

The General replied that "each has advantages and disadvantages from a pure cost-effectiveness standpoint. In the near-term, the updated B-52 has some margin. However, there are advantages other than pure cost effectiveness for the FB-111 stretch version. We considered them as alternatives, but we don't believe either one meets the requirements."

At another point, General Jones told the House committee the recent strategic bomber study brings out the cost effectiveness of the B-1 over the FB-111 stretch version. His complaint is that, no matter how much the aircraft is stretched, it has good range only with a small payload.

Again, House Chairman Melvin Price pressed for comparative figures, asking about a rebuilt B-52 "to meet the objectives of the B-1 system."

Mr. McLucas said we cannot make a B-52 with the same capability as the B-1.

If you could, what would the cost be?

It would be around a $40 million airplane.

General Jones added that a "total B-52 program," with inflated dollars, would cost $30 billion. The resulting force would be bigger than the projected B-1 force, but would have a lesser capability. He argued for the cost effectiveness of the B-1:

"The B-1 exploits the practical advantages of the manned bomber with much improved speed, range, payload, accuracy, pre- and post-launch survivability, and modern technology, which will sustain a credible manned bomber capability beyond the end of the century. . . . My personal involvement in this program has strengthened my conviction that the B-1 will provide a return appropriate to the investment."

The Chief of Staff then tied the cost effectiveness to the implications of SALT. Much of the US nuclear megatonnage is carried by bombers, and our bomber superiority compensates for Russian superiority in the missile area. Each B-52 phased out of the inventory "represents a disproportionate reduction in numbers of effective weapons and in megatonnage unless replaced by a carrier of equivalent or greater capacity."

Which explains why, as Mr. Hébert said, the Russians would like nothing better than to have the B-1 discontinued. The irony is that so many members of the Ninety-fourth Congress look upon it as fat in the budget. ■

The Wayward Press

On February 10, Gen. David C. Jones, Air Force Chief of Staff, and John L. McLucas, USAF Secretary, testified in support of their proposed Fiscal 1976 budget before the Senate Armed Services Committee. There were questions about the B-1 bomber project. Chairman John C. Stennis asked for a list of alternatives. Mr. McLucas, in reply, discussed both a beefed-up B-52 and the possibility of buying more FB-111 medium bombers.

The next morning, the Washington *Post* attributed to Mr. McLucas a statement that, in the *Post's* words, "the B-1 is now expected to cost $84 million each, compared with $15 to $18 million for its predecessor, the General Dynamics FB-111."

Mr. McLucas did not mention the FB-111 in this sense, and one of the reasons is he knows the FB-111 is not the predecessor of the B-1. The B-52 is the predecessor of the B-1.

The Washington *Post* story was inaccurate.

On the same day, February 11, the Chicago *Tribune,* covering the same Senate hearing, ran a two-column headline that said: "General admits S. Viet pilots 'afraid to fly.' "

The label was on a UPI story, datelined Washington, with this lead:

"Air Force Chief of Staff David Jones testified Monday the North Vietnamese had installed so many antiaircraft weapons in South Vietnam that Saigon's pilots were afraid to fly over their own territory."

This distortion grew out of a question put to General Jones by Sen. Strom Thurmond. The Senator wanted to know whether it is true there are areas in South Vietnam where the defenders do not fly, or are reluctant to fly, because of heavy defenses installed by North Vietnam, including missiles.

General Jones said, "Yes, Sir."

And he added:

"They are concerned about [aircraft] attrition.

"I was impressed with the spirit of their [South Vietnamese] pilots *and the desire of their pilots to get into those areas.*

"And the top leadership is concerned about the loss of aircraft."

Both the UPI lead and the *Tribune* headline were incorrect. What they said was exactly the opposite of what General Jones said.

* * *

In the Anchorage, Alaska, *Daily Times* of last December 1 there appeared a full-page layout on the role and problems of the Joint Chiefs of Staff. Pictured as Army Chief of Staff, with his biography, was Gen. Creighton W. Abrams, Jr. As any copyreader should have known, General Abrams passed away on September 4, about three months before the article appeared.

* * *

When the military services find they have a friend in the Fourth Estate, the fact is worth noting. In the Boston *Post* of January 15, columnist Donald Morris exposes one of the cheap shots fired by Sen. William Proxmire. The Wisconsin Democrat derogated the Air Force for using a facility on Matagorda Island as a hunting and fishing resort. Mr. Proxmire said it was for general officers and, of course, "plush."

Columnist Morris pointed out that the facility is not plush and was used in three years by fifty general officers, 500 other officers, 350 enlisted men, thirty dependents, and fifty-five civilians. Further, these people, on duty, are available at every hour, day and night, as opposed to the forty-hour week, with holidays, enjoyed by most voters in Wisconsin. The *Post* writer also took the opportunity to suggest another target for Mr. Proxmire: "Congressional junketeering is an overripe one."

* * *

Public Broadcast Service, the so-called educational network, currently is showing a film called *Nova: The War from the Air.* The producers claim it is the story of the development of airpower. That is a misrepresentation, best illustrated by the fact that the film takes the viewer to Vietnam but ignores Linebacker II, the operation that forced the North Vietnamese to the conference table and proved the efficacy of airpower in Vietnam. The job took thirteen days, in December of 1972.

By William P. Schlitz

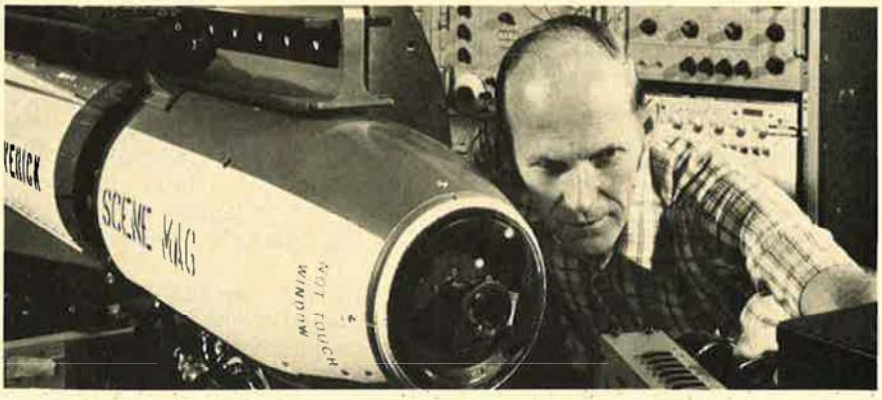
ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

Washington, D. C., March 6

In mid-February, Secretary of Defense James R. Schlesinger asked Congress for a go-ahead for full acquisition of AWACS (Airborne Warning and Control System). This is a milestone in the procurement of equipment that DoD has long deemed essential to US general-purpose forces.

In its evaluation of the need for AWACS, DoD listed the following unique capabilities:

- Low-altitude radar surveillance over an area at least twenty times greater than that of any surface-based system.
- Resistance to ECM substantially greater than any existing deployed radar system.
- The ability to deploy to regions where the US has no forces and to begin operations more quickly than any existing surveillance system.
- Reduced vulnerability because of mobility.
- The flexibility to integrate with existing air defense command control systems or to operate autonomously if that is necessary.



Unique sight allows this new AGM-65B Scene Magnification Maverick missile to spot, lock on to, and be launched against a target at longer range than the standard Maverick, produced since 1972 for USAF by Hughes Aircraft Co.

In its request to the Congress, DoD said, "Our rationale for AWACS employment continues to evolve as we recognize its great potential: from the original CONUS air defense mission, to battle management and control in a NATO war, to ocean surveillance, and to mobile air defense deployment. It is becoming increasingly clear that this system offers advantages . . . in a class above . . . any existing systems for discrete airspace control."

DoD's report to Congress disputed earlier claims by a critical General Accounting Office that AWACS would not be viable in the environment of a NATO war because of Warsaw Pact ECM capabilities. Ground-based ECM equipment probably available to the War-

The first of three preproduction Air Force AWACS aircraft takes off from Renton, Wash., on its first flight. DoD officials recently presented their case for a large-scale buy of AWACS to the Congress (see above).

saw Pact, the report said, should not degrade AWACS performance in support of *defensive* operations over friendly airspace. AWACS could use a tactic of descending in orbit so that it would be below the radar line of sight of the jammers.

On the other hand, the report noted, the same ground-based ECM gear on the enemy side of the FEBA (forward edge of the battle area) could hamper AWACS efforts in support of *offensive* operations by denying surveillance of low-flying enemy aircraft over enemy-held territory, although IFF (Identification Friend or Foe) performance in tracking friendly aircraft on strike and recovery missions would remain effective. But, the report stated, "adjacent AWACS orbits may not be obscured by jammers, and could cross-tell low-level radar tracks."

DoD's request to Congress for AWACS came to grips with the cost-effectiveness issue (flyaway cost per aircraft is an estimated $65 million plus or minus, while program cost for a thirty-four-plane buy could reach $111 million each, DoD officials say) by listing many of the battlefield advantages the systems would provide. Among them:

- Advance warning of a pending enemy attack.
- Cutting friendly SAM vulnerability by providing them with target-acquisition data while the surface-to-air missile force remains "silent."
- Greater efficiency of air combat fighters under AWACS control.
- An increase in kill rate of between thirty-five and 150 percent for friendly interceptors operating against penetrating enemy aircraft.

DoD told the Congress that AWACS would increase "NATO air defense effectiveness by a factor equivalent to more than doubling the entire interceptor force. This incremental increase in effectiveness alone is worth about $3 billion, while over a ten-year period fielding AWACS rather than a larger interceptor force would save another billion dollars," DoD officials estimated.

While DoD officials are hoping for an eventual AWACS buy of some thirty aircraft, the acquisition of fifteen is currently in the works: six funded in FY '75, congressional approval for six in FY '76, and the renovation to operational status of three EDT&E aircraft.

Also, there is the possibility that the NATO countries might pool resources for the purchase of perhaps twenty to thirty-two of the AWACS aircraft.

☆

In a related matter, the first of three preproduction AWACS made its first flight from Renton, Wash., to Boeing Field at Seattle, Wash., late in February.

The aircraft—designated E-3A—is scheduled to undergo an extensive series of test flights, as will two others expected later this year and early in 1976.

On retirement, Col. Benjamin S. Catlin III, former chief, ARPC, is presented an AFA Citation by Brig. Gen. George Douglas, right.

USAF civilian personnel specialist James Abernethy received retirement certificate from Lt. Gen. John Roberts upon serving thirty-three years.

Forward-looking infrared viewing device for the B-1 is undergoing tests at Boeing's Wichita Division. Built by Hughes, it will provide terrain image in any weather, day or night.

TSgt. Fred E. Neal, left, and Mrs. Mary B. Fouraker were named USAF's top administrative specialist and officer, respectively, for 1974. The two were presented plaques by ADC Commander Gen. Lucius D. Clay, Jr.

Eventually, all three aircraft will be overhauled and added to the operational AWACS fleet.

☆

The currently most sophisticated tool for pilot training has gone operational at Williams AFB, Ariz.

Called Advanced Simulator for Undergraduate Pilot Training, or ASUPT, the system is designed—"tailored," according to USAF—to duplicate as closely as possible the sights, sounds, and feel of a T-37 (*see article, p. 65*). It can simulate aerobatic and formation flights, emergency situations, and post stall and spin conditions. The cockpit is mounted on six legs that can create realistic buffet, vibrations, and other flight sensations. "Engine noise, tire squeals, and even fog can be duplicated," officials said.

ASUPT actually consists of two simulators incorporating visual displays, and includes a multichannel visual computer image generator (CIG).

The ASUPT system will be used initially in UPT programs experimenting with new techniques in pilot training, USAF said. Data thus acquired will help in the design of future simulators.

☆

An Air Force Reserve squadron has become the first USAF unit to put a woman on operational aircrew status.

TSgt. Doreen Burgess has been certified by ADC as a qualified search radar operator aboard an EC-121. She's currently serving with the 79th Airborne Early Warning and Control Squadron, Homestead AFB, Fla.

EC-121s require a minimum crew of seventeen, including several highly trained avionics specialists. Sergeant Burgess will report air traffic detected on her equipment to ground sites for specific identification.

Said Lt. Col. C. W. Kirkland, VC of the 79th, "We have eight more women training to become radar and radio operators aboard the EC-121. Operational crew positions in the Air Force have traditionally been held by men, but we are selecting our aircrew recruits strictly on the basis of ability."

Under way for the first time, the Navy's new Patrol Hydrofoil Missile Ship Pegasus *is the subject of a hullborne trial on Seattle's Lake Washington. The ship, built by a Boeing division, can hit better than forty knots.*

CMSgt. Larry Garrett, USAFA Cadet Wing sergeant major for 6½ years, at recent retirement ceremonies. He served twenty-seven years.

☆

The Army has begun engineering development of a new type of artillery shell that will "revolutionize" the role of battlefield ordnance, officials said.

The shell is laser-guided and can be made to change direction in midflight, thus for the first time in history giving artillery great accuracy against such moving targets as tanks, APCs, and self-propelled guns and missile launchers.

The Army recently completed a highly successful series of test firings at White Sands Missile Range, N. M., and expects production versions of the shell in perhaps two years. Texas Instruments, Inc., and Martin Marietta Aerospace are competitively developing the new shell.

Unlike the standard artillery shell, whose trajectory is set as it leaves the barrel, the new shell homes in on a laser beam trained on a target by a forward artillery observer either on the ground or airborne. Fins that deploy in flight are manipulated by the laser-seeker's guidance system and steer the shell to its target.

☆

In another Army ordnance move, DoD has agreed to purchase 20,000 of the Franco-German-designed Roland missiles in the next decade.

Backup to SAC's underground command post, the Airborne Command Post in February completed fourteen years of around-the-clock operations.

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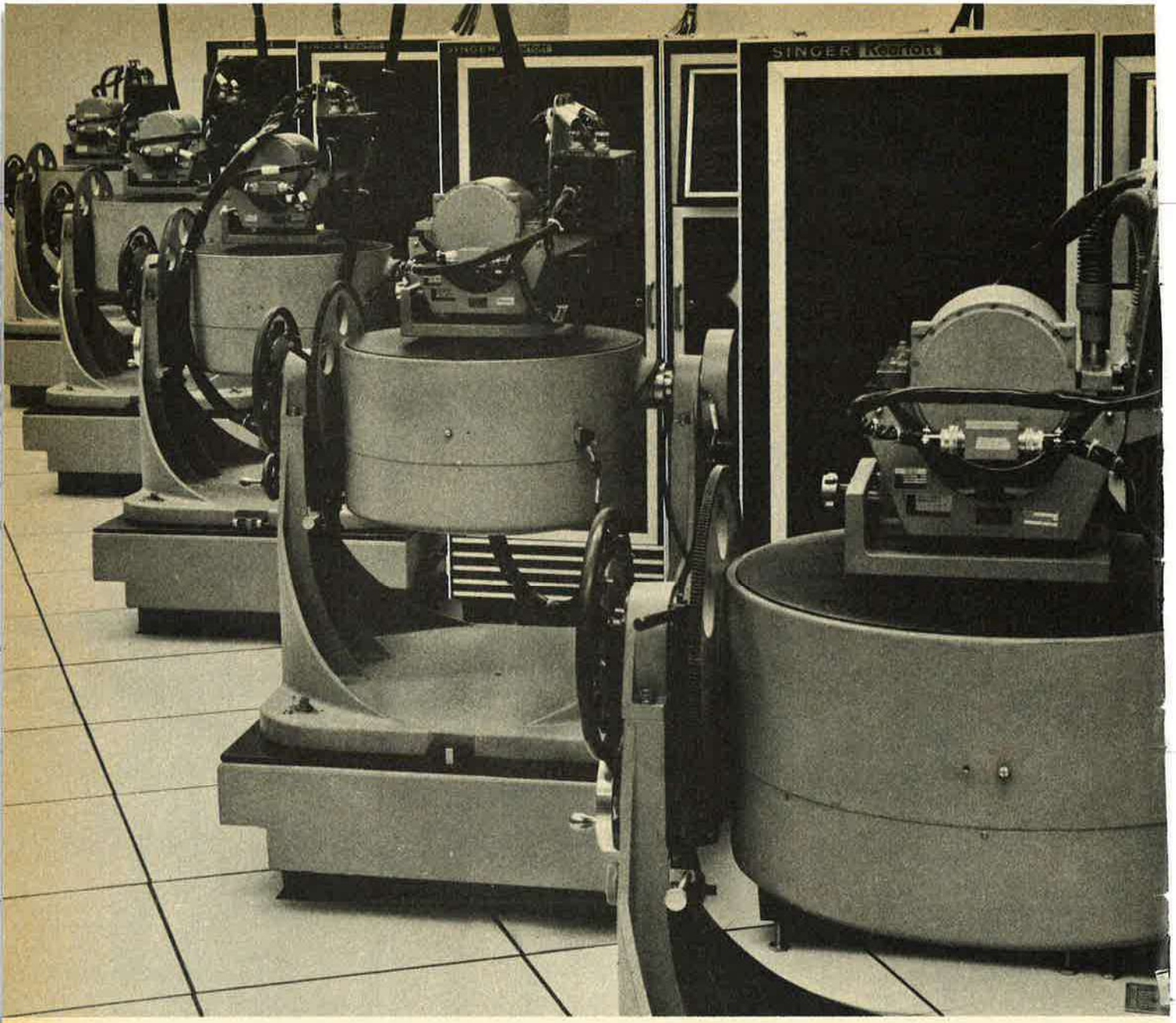

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And recently our inertial measurement units were selected for NASA's Space Shuttle Orbiter and for an Army advanced radar correlator terminal guidance system. There are even some very advanced new applications we can't talk about.

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AEROSPACE & MARINE SYSTEMS

Roland was tested successfully in the US early in 1973.

The Roland SAM, an all-weather, short-range weapon, will be built under license in the US by Hughes Aircraft Co. and Boeing Co. It can be guided to its target either by radar or an optical device. Roland has a range of 6,000 yards and the entire missile/launch system can be installed on a single vehicle. Besides mobility, other characteristics of Roland are its resistance to ECM, and its low maintenance costs. A key feature is the system's ability to provide antiaircraft defense while units are on the move. The missile was designed jointly by Aérospatiale and Messerschmitt-Bölkow-Blohm.

The Roland is a Franco-German-designed all-weather, short-range, vehicle-mounted SAM that US Army plans to buy in large quantities over the next decade. The weapon is to be built in the US under license (see adjacent item).

☆

Recent static tests to destruction of a full-scale aircraft wing made of advanced composite materials were deemed a success by Air Force engineers. Constructed to F-15 specifications, the wing was the largest ever built of the unique materials.

The tests are viewed as important because the wing component weighed in at eighteen percent less than an all-metal wing, weight savings that in the future could be translated "into increased range, speed, maneuverability, or reduced fuel requirements in whichever fighter aircraft uses a composite wing," officials said.

Moreover, studies of production costs show that the composite wing could cost considerably less to build than a metal wing, primarily because of fewer man-hours required.

In short, according to officials, "Composites can compete with traditional metals in weight, performance, and fabrication costs." Also, they said, "costs per pound for advanced composites will decrease rapidly with increased use."

☆

NASA is investigating the failure late in February of an Atlas-Centaur to put its payload—an Intelsat IV commercial communications satellite—in orbit. Since the last failure in 1971, there had been ten successful Atlas-Centaur launches in a row.

All seemed to be going as planned about two minutes into the flight as the launch team at Cape Canaveral was nearing booster engine cutoff.

Then electrical problems occurred simultaneously with the vehicle's loss of altitude. Following a destruct command, the spacecraft impacted in the Atlantic about 500 miles down range, NASA said.

The launch had been intended to put a second communications satellite over the Indian Ocean region. Current satellite communications in that area remain unhindered.

☆

One of the world's most famous —and useless—aircraft will soon meet its end. The singular *Spruce Goose,* the eight-engine flying boat built by Howard Hughes during World War II, is to be dismantled. Nine museums—including the Air Force Museum and the Smithson-

—Wide World Photos

On its first and last flight, back in 1947, is Howard Hughes's Spruce Goose, *an all-wood plane that has remained in storage ever since. It will be dismantled, with sections going to various museums* (see item above).

Aerospace World

ian's Air and Space Museum—have been invited to acquire at their expense sections of the aircraft.

The plane is currently in the possession of the General Services Administration, which acquired it in 1957 after a legal and financial hassle dating back to the '40s.

The *Goose*, with a wingspan greater than those of modern commercial giant transports, was conceived as a way of transporting a large number of troops (520) long distances (up to 3,500 miles).

The aeronautical curiosity has remained in a hangar at Long Beach, Calif., since its first—and last—flight in 1947, with maintenance expenses shouldered by Hughes's Summa Corp.

A recent retiree: Brig. Gen. Charles "Chuck" Yeager (see item below).

Bell's YAH-63, ground test vehicle for Army's new Advanced Attack Helicopter, under development.

☆

Indonesia, one of the so-called emerging nations, has taken a giant step in national communications with its decision to link the country's 5,000 inhabited islands via a domestic communications satellite system.

The synchronous satellite system, to be built by Hughes Aircraft Co. and become operational in mid-1976, will be the first in the Eastern Hemisphere. It will provide a communications net of telephone, telegraph, TV, and teletype for the 125,000,000 Indonesians living on islands that stretch from Sumatra to West Irian.

Hughes officials predict that within the next decade as many as twenty countries will have such satellite systems for national or regional communications. The satellites may earn a place in history as "the single most significant technological development of the space age," Hughes said.

☆

Retirement ceremonies were conducted on February 28 at Norton AFB, Calif., for one of the Air Force's most famous and honored flyers.

During his thirty-four-year career, Brig. Gen. Charles E. "Chuck" Yeager flew more than 10,000 hours in 155 different types of military aircraft. An ace with thirteen kills to his credit in World War II (five on one mission), Chuck Yeager made history in 1947 as the first man to fly faster than sound. As the leading US test pilot, he topped that mark in 1953 by piloting the Bell X-1A to twice the speed of sound.

General Yeager's exploits earned him numerous military decorations and the nation's highest aviation awards, including the Mackay, Collier, and Harmon International Trophies. In 1954, he was presented AFA's David C. Schilling Award for distinguished service in the field of flight. In 1973, at age fifty, he became the first active-duty military person, and the youngest ever, to be named to the Aviation Hall of Fame.

A veteran of 127 missions in Southeast Asia, General Yeager's last post was as Director of Aerospace Safety.

☆

The Department of Transportation estimates that in excess of $100 million of cargo is lost annually in this country alone due to truck hijackings.

Now, New York City police are experimenting with a small transponder that responds to an electronic interrogator unit carried in a helicopter or other aircraft. The book-size device, once signaled, allows the aircraft to home in on it. The interrogators can also be carried aboard autos, so that airborne and ground units working together can quickly pinpoint a hijacked truck's position.

Stashed with a truck's cargo, the transponder remains silent until activated and therefore is not detectable by electronic monitoring. It will respond from anywhere—

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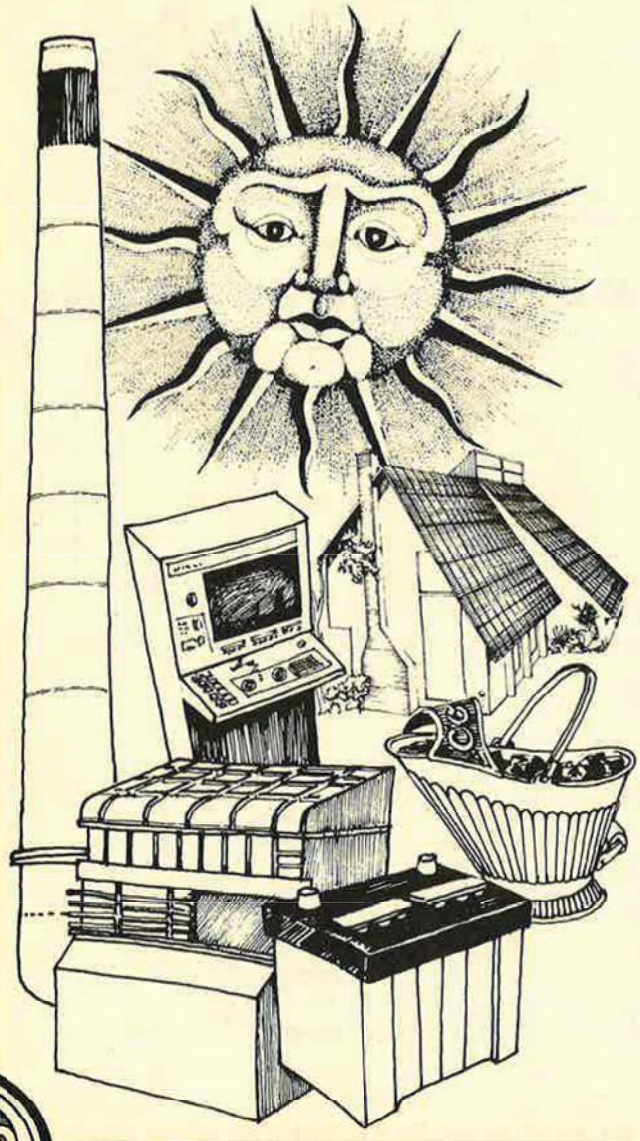
Conversation Pieces

FUELING THE FUTURE

Only yesterday, space flight challenged the world of technology to new heights of achievement. Now, the twin problems of energy and environment challenge the growth, even the survival of society. But quick solutions can create more problems than they solve. That's why so many different options are being so carefully examined.

TRW, for example, has multidisciplinary teams working with government, labor, and industry on conservation studies and pollution control as well as on specific energy development projects.

We're working on advanced electric batteries for load leveling in power plants and for vehicle propulsion... designing solar energy systems for heating and cooling buildings and dehydrating fruits and vegetables... and developing geothermal and shale oil technology as well as investigating the use of ocean thermal gradients to produce power.



Our new smokestack scrubber uses charged water droplets to remove more than 90% of the particles from flue gases. Smaller and less costly than conventional scrubbers, it has no moving parts, so it's silent and vibrationless. It's a direct offshoot from our spacecraft attitude control technology.

Another group has developed a special burner for oil or gas-fired furnaces. It reduces emissions of nitrogen oxides and costs no more than conventional burners.

Yet another team is now ready for pilot-plant tests of a simple, low-cost system for removing pyritic sulphur from coal. It is expected to make some 30% of the Appalachian reserves clean enough to meet EPA standards.

The total energy problem, however, is the most challenging of all. It requires objective trade-offs between supply, conversion, and distribution capabilities and the varying parameters of demand. Of real value here is the fact that our people are not directly involved in the production of fuels. This frees them to ask the kind of basic questions that are essential to objective analysis.

Our work in space technology, which may seem irrelevant to energy problems, also turns out to be useful. Among other things, it has given us a lot of experience in using very little energy with maximum efficiency.

Our most recent interplanetary probe, for example, has just enough power to light an ordinary desk lamp; yet it warms components in temperatures far below zero... energizes a whole complex of sensing, recording, and computing systems... and transmits streams of pictures and other data over distances as great as half a billion miles.

Admittedly, that's not the same as powering a city but it does induce a miserly attitude. That helps in a practical way: What we've learned about handling milliwatts efficiently is surprisingly useful when you're trying to get more megawatts out of increasingly precious fuel supplies.

If you are interested in using TRW's capabilities in any of these areas, we invite you to write and tell us about your specific needs.

TRW

SYSTEMS AND ENERGY

Attention: Marketing Communications, E2/9043

One Space Park, Redondo Beach, California 90278

truck, warehouse, or whatever thereby aiding police in locating stolen cargo.

The system was designed under DOT's supervision by Hoffman Electronics Corp., El Monte, Calif., and its subcontractor, Information Identification Inc., Fort Worth, Tex.

☆

Several long-time AFAers were recently cited for "their contributions and humanitarian good will" by being named winners of the 1975 Bishop Wright Air Industry Awards.

The awards are named for the father of the Wright brothers, a Dayton, Ohio, clergyman who encouraged his sons' experiments in aviation.

- **James H. Doolittle,** AFA's first President, "an eternal beacon" to those who would preserve America's "heritage of freedom and peace."
- Aviation pioneer **Grover Loening,** who has devoted a lifetime to aviation progress.
- **Herbert O. Fisher,** for a half century of contributions to all facets of aviation.
- **Fred Feldman,** for "his total personal commitment" to educational and patriotic causes.

☆

NEWS NOTES—The **dog tag,** a fact of military life for decades, will now be issued only to USAF aircrews and other Air Force personnel participating in **actual or simulated combat.** Other casualties to progress: the Army and Marine Corps **two-year enlistment** and the Navy's **three-year hitch;** the minimum beginning July 1 will be three and four years, respectively.

Some 15,000 people are expected to attend a NASA-sponsored **Earth Resources Symposium** at the Lyndon B. Johnson Space Center, Houston, Tex., June 8–13.

An old NASA information hand—**John W. (Jack) King**—has been named **Director of Public Affairs** for the newly created Energy Research and Development Administration (ERDA).

DoD's fourth annual **Procurement Research Symposium** will take place at the Air Force Academy October 15–17. Industry is being encouraged to attend.

A new **Transportation Museum facility** is under construction at Fort Eustis, Va. The building will house an extensive collection of transport memorabilia ranging from snowshoes to aircraft.

MSgt. William J. Gilbert, of the 36th Tactical Wing, Bitburg AB, Germany, has been named **Air Force Wing Historian** of the Year for 1974.

Capt. Micki King, Olympic diving gold-medalist, will leave USAF this summer to become the first **Director of Intercollegiate Athletics for Women** at the University of California, Los Angeles. She's been Varsity Diving Coach at the Air Force Academy since February '73.

Died: Long-time AFA member and supporter, retired **Maj. Gen. Tom E. Marchbanks, Jr.,** of a heart attack on March 2. The former chief of the Air Force Reserve was fifty-two. ■

Today, great nations exercise power through alliances and military aid programs. The apparent durability of these programs will affect the decisions of foreign governments in . . .

Assessing US Reliability as an Ally

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

In December 1972, when the bombing of North Vietnam had resumed with B-52s adding to the tactical air strikes, I received a caller in my NATO office. He was a general, the Danish Military Committee Representative, and he was instructed by his government to register a protest against the air attacks. He did so, perfunctorily but correctly, and then went off the record, so to speak.

It seems that he had been a prisoner of the Germans in 1944. And because he had been captured for underground activities, he was a political prisoner, rather than a military one. Hence, he was in Hamburg in 1944, on a work gang, when the RAF and the Eighth Air Force staged their great Hamburg raids. His point, to be brief, was that even accepting North Vietnamese casualty figures, the US raids on Hanoi were obviously very precise and designed to cause minimum civilian casualties. And that while the tonnage dropped on Hanoi was many times greater than that dropped on Hamburg, the casualties in Hamburg had been many times greater. He wondered why more was not made of the fact that these bombing attacks were, on the evidence, for a military objective—not for terror. Somewhat belatedly, the point has been made.

A more recent commentary on our Vietnam involvement comes from Sir Robert Thompson, who has spent a good part of his life in the counterinsurgency business. He was a principal figure in the successful British Malayan campaign, and following that period he led, from 1961 to 1965, the British Advisory Mission in Vietnam.

In a recent article *(International Defense Review,* December 1974), Sir Robert reflects on the failure of US strategy in Vietnam. He faults the United States in a number of areas and concludes that the underlying reason for our failure was political irresoluteness. In Sir Robert's judgment, the resumption of the air attacks of December 1972—or even the threat of resuming them—could have won the war and established the basis for a real peace. And he emphasizes that US air support (without US ground troops) was all that was needed. The accuracy and intensity of the attacks were well on the way to reducing to a shambles the entire rear base of the insurgency. However, the whole Western propaganda apparatus seemed to be in the service of the North Vietnamese and, in the end, that proved as effective as the bombing.

We got out of Vietnam just short, in Sir Robert's opinion, of a real victory and hence a real peace. And now, with the Vietnam aid request before Congress, the emotions again surface.

It is a curious state that we have come to, and one that must cause our friends enormous worry. The merits of the Vietnam case are lost in the emotional backwash that comes from any mention of that long-suffering country. And so, apparently, we will let the South Vietnamese go, even though they have confounded the South Vietnam-haters by proving they can and will defend themselves, given the sort of support the Soviets are providing the North Vietnamese. Or, for that matter, a fraction of that support, for that is what the current request amounts to.

We have a few other allies in that part of the world who must be reassessing things at this moment.

And not just in that part of the world. The Turks are wonderful friends and implacable enemies. They are, in short, much better with you than against you. The overriding reason for Turkish participation in NATO has always been its desire for alliance with the United States. Now, regardless of anyone's views on the Cyprus matter—and there are, as is usually the case, two *sides to* that complicated question—Turkey is an important factor in NATO's southern flank and in the Eastern Mediterranean.

A casual look at a map suggests that neutrality might be the expedient thing for a nation whose neighbors are, among others, Russia, Bulgaria, Syria, and Iraq. But, as the Turkish Brigade in Korea demonstrated, courage ranks well above expediency in regulating Turkish behavior. The Soviets would be immensely pleased to see the Turks out of NATO and the US out of Turkey. Soviet threats will never do it. United States ambivalence might. And while friendly relations with Greece are important, being nasty to the Turks is no way to earn back that friendship.

The simple fact is that military alliances, and military aid programs judiciously applied, are the ways a great power these days exercises its power. The other great military power, recently at any rate, seems to understand that. If South Vietnam and Turkey are good examples, we do not.

Sir Robert Thompson takes a gloomy view of things down the road if our Congress denies further aid to South Vietnam.

"There could be," he says, "only one real lesson to be learnt from the Vietnam War—do not rely on the United States as an ally." ■

An important part of America's future is off and flying.

The B-1 strategic aircraft for the U.S. Air Force has passed its first flight tests with flying colors. Pilots report that the aircraft is performing extremely well . . . and is meeting expectations.

With each flight, the B-1 is moving closer to providing undeniable proof that it will be the versatile arm of U.S. deterrent forces into the 21st century. Adding new flexibility to the nation's triad of land-based missiles, sea-based missiles and manned aircraft.

Costs? In terms of real dollars the B-1 is holding close to budget. Eighty-eight per cent of all increases are due strictly to inflation.

A senior Air Force spokesman recently told a Congressional Committee that the B-1 development program has "one of the best records" in U.S. weapon systems history.

The success of the B-1 means an important step has been taken toward fulfilling a vital role in our nation's future security.

From all-weather, modular, standoff weapons to a large new, mobile-based ICBM and maneuvering warheads, the Air Force Systems Command is exploring new technological ground to provide USAF the weapons that will assure tomorrow's "essential equivalence" . . .

USAF'S NEW FLE

BY EDGAR ULSAMER
SENIOR EDITOR, AIR FORCE MAGAZINE

TECHNOLOGICALLY and managerially, USAF's weapons development and procurement programs, despite double-digit inflation, are "in better shape than ever before," in the view of Gen. Samuel C. Phillips, Commander of the Air Force Systems Command.

But present budgetary realities demand that "we achieve even higher productivity with fewer people." Those realities also provide the stimulus for a major reorganization of AFSC.

Promising Major Lab Programs

Among the potentially far-reaching programs in progress at the Air Force's laboratories—traditionally catalysts of major new weapons technology—are modular guided weapons, an Air Force pioneered technology that "is really coming into its own," according to AFSC's Director of Science and Technology, Brig. Gen. G. K. Hendricks. Aimed at versatile, flexible standoff capabilities, AFSC's modular guided weapons concept provides for quick interchange of the principal components of guided standoff weapons, permitting field commanders to tailor them to specific missions. Three components, or modules, are elementary in all requirements: a seeker that guides the weapon to its target, a basic airframe, and a warhead. Field commanders will have three guidance and control options that may be combined with a choice of two airframe wings and two warheads.

The three seeker choices are laser-designated target identification, imaging IR (infrared), and electro-optical target lock-on. Warhead options are the 2,000-pound MK 84 bomb; and the 2,000-pound submunition carrier, SU-54, which can accommodate a range of submunitions from special runway penetrators and bomblets to Gator antitank or antipersonnel mines. The two airframe choices are a direct attack/cruciform wing module that glides to the target with good low-altitude maneuverability; and a guided glide-bomb design with highly refined lift/drag ratio "planar" wings to extend range to more than fifty miles.

A common, crucial element of standoff weapons is a compact, economical guidance package to provide mid-course or terminal guidance, and a reliable autopilot. In the case of the latter, General Hendricks said, it will at first be necessary to use different autopilots to accommodate different combinations of modules. But work at the Armament Laboratory at Eglin AFB, Fla., and elsewhere on digital autopilots has proved the feasibility of a programmable system that could be used by the entire family of proposed standoff weapons. Good progress is also being made in developing data links between the launching aircraft and the standoff weapon, including on-board TV links. These systems are being designed for use by USAF and the US Navy, according to General Hendricks.

As Commander of Air Force Systems Command, Gen. Samuel C. Phillips, above left, heads Air Force weapons development and procurement. Brig. Gen. G. K. Hendricks, right, AFSC's Director of Science and Technology, supervises the Command's labs that develop new technology.

The Air Force labs, while developing modular standoff weapons, are also streamlining their operational use, especially in the critical areas of flight-line support and tech orders for assembling the various modular configurations. The Human Resources Laboratory at Brooks AFB, Tex., is analyzing workloads in terms of human factors and simplifying ground-crew procedures "so that we have assured and standardized ground support by Air Force and Navy crews," he said.

AIR FORCE
APRIL 1975 MAGAZINE

IBLE CAPABILITIES

SECRETARY SCHLESINGER ON ICBM IMPROVEMENT PROGRAM

Defense Secretary James R. Schlesinger's FY '76 *Annual Defense Department Report* states that the principal means for improving the Minuteman III force "are the refinement of the existing guidance system and the new higher yield warhead, the MK 12A reentry vehicle."

In a change from the Department's previously announced position, Dr. Schlesinger reported that MARV, the ultraprecise, terminally guided, maneuvering reentry vehicle, will continue to be developed as a potential payload for the M-X or the Trident II, "the most advanced SLBM of the new Trident nuclear submarines. The time required to develop MARV places this reentry vehicle in the time frame of the M-X and Trident II, rather than Minuteman III," Dr. Schlesinger said.

In order to retain the option to deploy improved versions of Minuteman, DoD requested $270 million to buy another fifty Minuteman IIIs for "follow-on flight-testing and also preserve the option to deploy more Minuteman IIIs, if that should be deemed necessary."

Dr. Schlesinger also announced plans to "complete the engineering development of the new higher yield warhead for the Minuteman III, the MK 12A. The AEC [since changed to ERDA] test program for this weapon has been accelerated so that it can be completed before the end of March 1976, the proposed effective date of the Threshold Test Ban Treaty." The warhead's new arming and fuzing mechanism and the reentry vehicle as a whole will be flight-tested on Minuteman III vehicles "already procured for the operational test program, as well as on the boosters to be procured specifically for the flight-testing of the guidance refinements."

The new warhead, along with the advanced, miniaturized arming and fuzing mechanism, according to Dr. Schlesinger, can be retrofitted into the existing MK 12 RV "without any changes in weight, balance, or other flight characteristics," thus sharply reducing flight-test requirements.

The new MK 12A RV is to complete flight-test in the summer of 1977 and could be put into production in FY '77, he disclosed. Total development costs for the MK 12A system, not counting ERDA's warhead costs, Secretary Schlesinger said, will come to about $107 million. Procurement costs for MK 12As to retrofit 550 Minuteman IIIs would come to about $335 million, again not counting ERDA's warhead procurement costs, Dr. Schlesinger said.

The third element in the new Minuteman III improvement program involves further "refinement in the existing Minuteman guidance system and the incorporation of these refinements in all of the Minuteman III missiles in FY '78." Once the new "guidance programs have been developed, incorporation of the refinements in the missiles simply involves the insertion of ground and flight software changes," according to the Secretary. Ten boosters are to be used to flight-test the new guidance system, with some of the boosters testing two different guidance systems as well as the MK 12A warhead at the same time, Defense Secretary Schlesinger said.

One of the most promising of the lab technology efforts is high-energy laser development, with an airborne laser laboratory program now under way. The Air Force Weapons Laboratory acts as the program integrator of high-energy laser development work carried out by industrial contractors and within various other elements of the Defense Department. A large number of scientists and technicians of the lab are assigned to this work, AIR FORCE Magazine learned. While even general information about US laser research is classified, General Hendricks acknowledged that the program has "high national interest and priority."

Boosting Productivity

As is the case throughout the Department of Defense, reducing the impact of inflation has become AFSC's top priority. General Phillips told this reporter that production and manufacturing, more than any other areas, offer the best chance for cost reductions. The Command recently created a special Directorate of Production/Man-

ufacturing to improve AFSC's capabilities and to seek ways to alleviate the shortage of Air Force experts in this field. The Materials Lab spearheads AFSC's pioneering work in cost-cutting manufacturing techniques. This work covers a range of activities from machine-tool design to new materials, streamlined industrial processes, wider use of computer-aided production, and closer mating of development and production to reduce life-cycle costs.

Advanced composite materials technology is among the primary means for simplifying and accelerating manufacturing processes and, correspondingly, for cutting costs. Experience has shown that it is possible to "cut the number of man-hours and individual processing steps to a fraction of what they are today" by using advanced composites in manufacturing major aircraft components, according to General Phillips.

These high-strength, low-weight combinations of materials function like steel-reinforced concrete, with the qualities of one element augmenting those of the other. Composites can now be used in jet engines, including rotating components exposed to high temperatures. General Hendricks predicted that within two years the perti-

DoD ANNOUNCES PAVE PEPPER SCHEDULE

In his *Annual Defense Department Report*, Defense Secretary James R. Schlesinger disclosed plans to "complete the flight-testing of two Minuteman III missiles, each with several smaller RVs. This payload [known as Project Pave Pepper], if successfully demonstrated, would give us the option to expand the target coverage of the Minuteman force without any increase in the number of missiles deployed.

"The additional capacity would be useful as a hedge against large losses in the Minuteman force, as a means of increasing our coverage of relatively soft-point targets of value that are not collocated with population, for suppression of expanded Soviet defenses, and as a hedge against unexpected failures in the SLBM force. Even if only fifty Minuteman so equipped were to survive an enemy first strike, they could deploy a large number of RVs on such targets.

"The $18 million provided [previously] plus the $2 million requested in FY '76 will be enough to complete this program. The first flight is scheduled in May, and the second in August 1975. No significant problems have been encountered in this project so far, and the tests are expected to be completed successfully."

AFSC'S TENTATIVE PLANS FOR

The purpose of the proposed realignment of the Air Force Systems Command's test centers and laboratories is to sharpen the focus on AFSC's three main product groups —the Aeronautical Systems Division, SAMSO, and the Electronic Systems Division—and their specific functions.

The principal changes, tentatively planned to go into effect by mid-1975, include creating two centers of technology, one grouped around the Aeronautical Systems Division at Wright-Patterson AFB, Ohio, and the other around the Electronic Systems Division at Hanscom AFB, Mass. General Hendricks told this reporter that the grouping at Wright-Patterson AFB, tentatively identified as the Wright Aeronautical Laboratories, will absorb the Flight Dynamics, Avionics, Aero Propulsion, and Materials Laboratories. This proposed complex will also incorporate most of the functions now assigned to the Aerospace Research Laboratories (ARL). It has been proposed that the latter organization be disestablished in line with USAF's policy of reducing in-house research in favor of increased "extramural" contract and grant efforts. The Air Force Office of Scientific Research (AFOSR, located in Arlington, Va.) will become the single manager of the total research program, according to General Hendricks.

AFOSR will be responsible for formulating basic research programs with emphasis on "extramural" work by academic and industrial research facilities. Some specialized in-house basic research still will be allocated to USAF laboratories, so that these facilities continue to maintain rapport with their civilian counterparts, General Hendricks explained. AFOSR, he added, will also absorb the Frank J. Seiler Research Laboratory located at the Air Force Academy in Colorado Springs, Colo., and the European Office of Aerospace Research and Development in London, England. The enlarged AFOSR will coordinate its work with the basic research offices of the other military services to avoid undesirable duplication.

The Wright-Patterson Complex

The Wright-Patterson lab complex will be managed by a central director, but will retain the identity of the individual labs as distinct components, according to General Hendricks. The Air Force expects significant improvements from the proposed lab consolidation, primarily better support of the product organizations through joint programs that involve the technological disciplines of all the formerly independent labs. While most of the work of the Wright-Patterson lab complex presumably will be done for the Aeronautical Systems Division, other work will support ESD and SAMSO.

AFSC's Director of Science and Technology will continue to supervise the labs, but individual advanced development and engineering development programs will require approval by a product organization. In a practical sense, "the labs won't be able to ask for funding approvals from Washington by themselves; instead they will have to advocate a given project jointly with a product division. This procedure should assure that all work contributes to the mission of one of the product groups," General Hendricks explained.

The Hanscom Complex

Initial impetus for the pending reshuffle of the Air Force research and development structure was provided by USAF's laboratory utilization study (LUS), initiated early last year at the behest of DDR&E (Director, Defense Research and Engineering). One conclusion was that command control and communications, already vital to all aspects of the Air Force mission, will become even more important, and requires intensified and coordinated technological support. Hence, the creation of a command control and communications (C^3)

nent Air Force labs, working with the aerospace industry, will demonstrate that such key engine components as fan and compressor blades that meet all requisite reliability and endurance standards can be made from advanced composites. An estimated twenty-five percent weight reduction and the ability to use fewer but larger parts would cut costs sharply.

Major AFSC Programs

Flight-testing and performance evaluation of the B-1 strategic bomber ranks as "one of this command's most important, if not *the* most important, job," according to General Phillips. While all available evidence indicates that the B-1 design "is soundly conceived and technically well executed, we still have a great deal of work to complete before we can reach the critical production decision late in 1976," he added. (In his first appearance before the new Congress, Gen. George S. Brown, Chairman, Joint Chiefs of Staff, termed the capabilities of the B-1 a "virtually indispensible element of our deterrent force.")

Another high-priority area for AFSC in FY '76 is continued improvement of the ICBM force. That includes completing conversion of Minuteman II sites to the authorized total of 550 Minuteman IIIs, while retaining 450 single-warhead Minuteman IIs. (The decision in January 1975 to freeze deployment of Minuteman III at 500 was rescinded by DoD shortly after it became known. Departmental spokesmen declined to say whether the halt was related to the MIRVed systems' ceiling of 1,320 agreed to at Vladivostok, or to the agreement's so-called "geographic purity" stipulation. The latter is meant to facilitate the two sides' verification task by not mixing ICBMs of different types at the same location. The just-released DoD budget request for FY '76 includes fifty Minuteman III missiles for test and training purposes, in addition to the 550 funded previously. By keeping the Minuteman production line open, DoD also preserves "the option to deploy more [than 550] Minuteman IIIs, if that should become necessary.")

AFSC will continue developing "Pave Pepper," a modification of the "front-end" of Minuteman III to accommodate more but smaller warheads than the three now used. Two flight tests are scheduled. General Phillips pointed out that this program is confined to developing "an interesting and useful option and includes

REALIGNING LABS AND CENTERS

laboratory, collocated with ESD at Hanscom AFB and near the concentration of electronic industries along Route 128 near Boston. According to present, tentative plans, which are still under intense review at high levels within both the Air Force and DoD, both the Cambridge Research Laboratories (CRL) at Hanscom AFB, Mass., and the Rome Air Development Center (RADC) at Griffiss AFB, N. Y., will be reorganized.

According to these still tentative plans, some 550 military and civilian members of RADC whose jobs are related to command control and communications, and support thereof, are to be moved—without change in function—to Hanscom and incorporated into the C^3 laboratory. The avionics-related efforts of the present RADC structure are scheduled for transfer to Wright-Patterson AFB and incorporation into the lab complex, ASD, and AFSC's Foreign Technology Division.

The present CRL structure is to be divided into two groups. The smaller, with about 250 staff members engaged in work related to command control and communications, is slated to remain at Hanscom AFB to form, along with the transferees from the Rome Air Development Center, the new C^3 laboratory complex. The balance of CRL's staff—about two-thirds of its manpower doing environmental research—is to be transferred to Kirtland AFB, N. M., where it will become a new Air Force Geophysics Laboratory.

What This Move Means

Several factors underlie this move: First, it will reduce the non-C^3 (geophysics) activities at Hanscom; second, it will take advantage of the availability of office and lab space at Kirtland as a result of closing the Air Force Special Weapons Center; third, it will improve the geographic proximity of the Geophysics Lab with its major customers and related activities; and fourth, it will improve the interrelationship between the geophysical research and the activities of the Air Force Weapons Laboratory at Kirtland. The latter's primary functions—high-energy laser technology and nuclear effects simulation—presuppose close support in the earth sciences, from energy propagation to fracture mechanics, and make collocation of the two labs mutually attractive. The two organizations also require similar, massive computer resources that can be shared, according to General Hendricks.

Finally, the principal "customer" of the new Geophysics Lab, which is SAMSO at Los Angeles AFS, Calif., is a great deal closer to Kirtland AFB than it is to Hanscom.

No significant changes in the size and scope of the Weapons Laboratory are planned, except for the nominal transfer of its C-135 laser research aircraft to Wright-Patterson AFB. (AFSC's test aircraft operations are being consolidated at three sites, with all large aircraft assigned to ASD, and all fighters and other smaller types home-based at either the Flight Test Center at Edwards AFB, Calif., or the Armament Development and Test Center at Eglin AFB, Fla. According to Air Force Chief of Staff Gen. David C. Jones, this centralization will reduce the number of required test aircraft and cut overhead because "we do not need quite as much total supervision at three locations as you do at [the previously used] six" sites, which included Patrick AFB, Fla.; Kirtland; and Griffiss AFB, N. Y.)

Future test requirements at the Holloman AFB/White Sands missile ranges will be carried out by either the Flight Test Center or the Armament Development and Test Center, rather than by the soon-to-be-dissolved Special Weapons Center, according to General Hendricks. He added that no comparable changes are contemplated for the remaining centers and laboratories of the Air Force Systems Command.

no provisions for actual deployment." He termed this option "a logical extension of the Minuteman program."

Pave Pepper warheads would have less hard-target kill capability than the currently used Mark 11 and Mark 12, and still less than the Mark 12A, which is being developed for Minuteman III.

US efforts to improve yield-to-weight ratios of new warheads, General Phillips said, are affected by the 1963 ban on atmospheric testing and will be curtailed even more by the so-called threshold test ban that becomes effective next year and prohibits underground tests of devices with yields of more than 150 kilotons. (These test limitations presumably affect the US more than the Soviet Union. Because of greater ICBM throw weight, the Soviets can afford to build relatively crude warheads of large weight that require less testing than do US weapons, which must compensate for weight and size constraints by greater sophistication.)

Improving Minuteman's Warhead Yield

The simplest way to improve Minuteman warhead yield, General Phillips explained, is to increase the missile's throw weight so it could accommodate a larger warhead. The missile's first stage has remained essentially unchanged since it was designed in 1959. "There is, of course, the option to incorporate [in the first stage] the more advanced propellant and thrust vector [nozzle] controls available now, which would give us a worthwhile increase. There is less room for improvement of the two upper stages because they already include some of this advanced technology," he said.

The next step "would be to put a new, larger missile with substantially greater throw weight into the Minuteman silos." This development work under AFSC's M-X program has been in progress for about three years and is far enough along "so we could go into prototype production whenever this becomes necessary," General Phillips pointed out. The specifications of a follow-on ICBM won't be frozen until the system is committed to full-scale engineering development but "it would seem almost certain that the next ICBM should be the largest missile we can put into the existing Minuteman silos to capitalize on the hardening possible only with fixed sites. At the same time, the missile must be usable in either a land-mobile or air-launch mode."

Determining the size of a follow-on ICBM involves critical trade offs, since SALT I prohibits increasing silo size by more than fifteen percent. While it is technically possible to use a missile that occupies almost all available silo space in order to achieve maximum throw weight, such a "silo stuffer" would be vulnerable to ground shock and related nuclear effects of an opponent's warheads.

It is prudent, General Phillips explained, to reserve some silo space for shockmounting the missile and "to give it room to move. The amount of space required is not significant because we have found ways to get more protection from less space than previously thought possible."

USAF's next ICBM could weigh "well above 150,000 pounds and still retain full silo hardening as well as air launchability," according to General Phillips. A common missile design could be used for both silo- and air-launch, but the missile would have about ten percent more throw weight when launched from an aircraft than from the ground, because of the altitude advantage and the carrier's forward motion.

Even though SALT limits the size of M-X, the AFSC Commander believes that "these constraints pose no burdens in the context of purely military requirements. We can get all the throw weight we need within the permissible silo dimensions. Also, increasing the number of MIRVs per missile beyond a certain point—probably not appreciably more than ten—does not make good military sense and produces diminishing returns. Too

USAF AIRCRAFT PROCUREMENT

(Number of aircraft in parentheses; millions of current dollars)

	FY '75		FY '76		FY '76T[a]	
F-15	(72)	$756.9	(108)	$1,437.8	(27)	$319.5
A-10	(22)	166.9	(61)	360.7	(33)	87.0
AWACS	(6)	370.7	(6)	430.5		30.0
AABNCP					(3)	175.0
B-1				77.0		31.0
C-12[b]			(16)	11.8		
A-7[c]		70.5				
F-111[d]		82.6				
F-5	(71)	69.2				
Modifications		525.8		660.7		126.3
Spares		726.2		1,101.7		190.1
Other		291.2		495.3		128.2
TOA		$3,060.0		$4,575.5		$1,087.1

[a] Covers Transition Period from July 1, 1976, to September 30, 1976.
[b] For Defense Attaché/MAAG use.
[c] $29.6 million impounded.
[d] $122.9 million impounded.

Flight testing and evaluation of the new B-1 bomber is one of AFSC's most important jobs, if not the most important, officials said.

USAF MISSILE PROCUREMENT

(Number of missiles in parentheses; millions of current dollars)

	FY '75		FY '76		FY '76T	
Minuteman III	(61)	$298.4	(50)	$265.8		
Minuteman Force Modernization		298.9		387.7		$70.5
Maverick	(5,600)	72.7	(6,000)	144.0	(1,200)	25.0
Shrike	(270)	11.1	(1,318)	45.9	(300)	9.6
Sparrow	(300)	43.3	(620)	80.1		
Sidewinder (AIM 9L)			(710)	39.5		
Sidewinder (AIM 9H)			(800)	22.7		
Modifications		40.9		49.1		0.3
Spares		43.3		86.6		6.2
Other		734.1		670.0		165.8
TOA		$1,542.7		$1,791.4		$277.4

much of the payload is used up for fuel," he explained.

Future MIRV systems could be made highly accurate through midcourse and/or terminal maneuvering (MARV). As part of ABRES (the Advanced Ballistic Reentry Systems Program, managed by the Air Force in behalf of the Department of Defense) "we have flown experimental MARV configurations and I would say that from the point of view of technological expertise and actual experience we are pretty well along in this field," General Phillips told AIR FORCE Magazine.

The MIRVs now in use fly unguided trajectories; inertial guidance is provided only during launch and while the "bus" that releases the individual reentry vehicles toward their separate targets is maneuvering. MARV technology provides the RVs with independent maneuver capabilities after they have left the "bus." This means that each RV can be equipped with inertial or other guidance to adjust its trajectory between release from the "bus" and its target, according to General Phillips. US guidance technology could give such a system nearly 100 percent accuracy, or a CEP approaching zero. For nuclear weapons, a "zero CEP" means that the target will be within a warhead's lethal radius.

Space Gaining in Military Importance

Recent achievements and the potential for further advances "accentuate the military importance of space in the areas of strategic warning and command control and communications." The infrared sensing capabilities of USAF satellites "that have turned out to be so enormously competent in detecting and tracking ballistic missile launches are being improved at a high rate with advances occurring on a month-to-month basis," General Phillips said.

In the field of C^3 (command control and communications), the results obtained with the first two DSCS II satellites (pronounced "discus" but standing for Defense Satellite Communications System, a Defense Communication Agency program managed by AFSC) "proved an essentially 100 percent reliability. Last year, we put up one satellite over the Atlantic and another over the Pacific. This year we will put up two more that will give us worldwide equatorial communications coverage," he said.

USAF RESEARCH AND DEVELOPMENT

(Millions of Current Dollars)

By Category	FY '75	FY '76	FY '76T
Aircraft	$1,097.5	$1,430.2	$ 362.5
Missiles	370.5	358.3	107.9
Astronautics	453.7	560.5	133.7
Ordnance and Combat Vehicles	149.4	188.7	57.6
Other Equipment	633.7	719.9	204.7
Military Sciences	132.2	143.6	38.3
Management and Support	462.0	502.0	129.3
Totals	**$3,298.9**	**$3,903.2**	**$1,034.0**

For Selected Systems	FY '75	FY '76	FY '76T
B-1	$445.0	$672.2	$168.3
YF-16	32.0	273.0	82.5
A-10	81.4	51.9	1.0
AMST Prototype	55.8	85.0	11.4
F-15	182.6	39.9	0.0
Advanced Tanker/Cargo	2.0	5.2	1.4
Minuteman III	123.9	122.7	34.0
ALCM	66.5	51.0	13.0
ABRES	111.6	101.0	29.2
Advanced ICBM Technology	37.3	41.2	15.3
NAVSTAR Global Positioning System (GPS)	23.9	74.6	13.2
Space Shuttle	10.0	22.7	8.2
AWACS	202.0	199.2	54.5
AABNCP	62.7	42.2	7.8

Starting this year, AFSC also will begin development testing of the Navy's Fleet Satellite Communications System, and the Air Force Satellite Communications System, two command control and communications networks that share the same satellites and will give the US real-time control over its land, sea, and air forces worldwide, General Phillips disclosed.

All-Weather Standoff Weapons

Among the wide range of tactical systems under development by AFSC and its contractors is an integrated program to provide tac air with all-weather standoff capabilities. "We have an all-weather bombing capability in the F-111. LORAN [Long Range Navigation] proved during the Southeast Asian war that reliable and accurate all-weather bombing is possible. Over the past year and a half we have tested the new Advanced Location Strike System (ALSS) at Holloman AFB, N. M. This system can fix the location of various emitting targets, including radar, with extreme accuracy through the use of ground stations and airborne relays. Once an emittor is located, ALSS can direct a standoff weapon against it. Another AFSC program, of which ALSS is a part, is PLSS, or Precision Location Strike System, which permits all-weather attack on nonemitting targets whose location is known," according to the AFSC Commander.

Overall, General Phillips stressed, the state of Air Force R&D "is good, with strong progress evident across the board, due mainly to the high professionalism and dedication of the men and women who serve in AFSC and its components. While we can't prevent the inroads that inflation is making on our programs, our proposed reorganization should compensate for some of its impact by giving us greater productivity with fewer people." ■

Obsolete equipment limits efficiency of TAC's command control and communications network—the Tactical Air Control System (TACS). Six individual improvement measures are under way to give commanders real-time tactical information that would be essential in large-scale operations, either in Europe or elsewhere. Piece by piece, TAC is . . .

BUILDING A BETTER BUBBLE

BY MAJ. FRED MEURER, USAF
CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

IMAGINE you're playing in the Super Bowl. Man for man, your team is as strong as your opponent's. You have all the weapons—a superb aerial attack and an excellent ground game. Your defense is tops. You've been building for years, replacing trusty but time-worn veterans with speedy and hard-hitting—albeit expensive—new players. You have an elaborate scouting system. You have trained and practiced well. You're all set for the big confrontation—the do-or-die battle.

Then they impose some restrictions on you:

You can't coach from the sidelines; you have to sit in the stands.

You may have no spotters in the press box to relay vital information instantaneously to the bench as The Game progresses.

Your quarterback may not call audibles.

Your defense will be blindfolded.

Such restrictions would leave you with a total lack of command and control. Your chances of winning The Game, and the world title, would be nil.

Tactical Air Command (TAC) experts at Langley AFB, Va., say that the US and its NATO allies fighting a war in Europe—or anywhere, for that matter—would be in pretty much the same hopeless situation without an adequate Tactical Air Control System, or TACS (*see box, p. 36*).

TACS, they explain, is a command control and communications network that has as its core a Tactical Air Control Center (TACC). The TACC is the "head bone" in this "knee bone connected to the thigh bone" series of ordinate and subordinate communications elements that comprise the command control operation.

It is from within the TACC that the air commander directs tactical operations and manages his responsibilities of airspace control, air defense, and tactical mission control, including immediate close air support missions. In short, tactical battle plans are formulated in this deployed tactical air force headquarters.

Plans are made on the basis of information fed directly or indirectly into the TACC from three groups of sources: (1) deployed, radar-equipped tactical control elements that conduct surveillance and help control aircraft on combat missions; (2) tactical air support elements, deployed with ground units, that identify, process, and fulfill air support requirements of the ground forces; and (3) Tactical Ground Sensor System (TGSS) elements that use unattended ground sensors to detect enemy movement and assist the Air Force Forces (AFFOR) commanders to more effectively apply strike sorties.

Among the first group of elements are radar-equipped Control and Reporting Centers (CRC) and Posts (CRP), Forward Air Control Posts (FACP), and Air Support Radar Teams (ASRT).

The second group of elements, all working alongside US Army units, include Direct Air Support Centers, (DASC), Tactical Air Control Parties (TACP), Combat Control Teams (CCT), and Airlift Control Centers and Elements. Close air support missions to assist ground units are originated by DASC or TACP elements (*see box*).

The final element, the TGSS, includes sensor buildup and delivery, sensor relay, sensor assessment, and sensor management.

All the elements add up to the TACS, the command control system that is so vital to successfully fighting a war.

The fact is, three such systems are in active operation today—one headquartered at Shaw AFB, S. C.; one headquartered at Bergstrom AFB, Tex.; and one in Europe. The Air National Guard has equipment for two more, packaged for deployment.

A second fact, however, is that equipment used in the existing TACS is not sophisticated enough to allow effective management of modern tactical warfare, TAC officials point out. The process is too slow, they say.

Precise Control

According to Lt. Col. Robert E. Armbrust, of TAC Operations' Di-

rectorate of Command and Control, a combination of AWACS and something called the 485L Program will afford "a precise method of control" and will "tilt the balance in favor of NATO allies," if war ever breaks out in Europe.

Maj. Melvyn E. Farber, of TAC's Directorate of Command and Control Requirements, added: "It's a question of money, but the fact is, we need these things. We are not living in a world of make-believe."

While everyone is familiar with AWACS, the Airborne Warning and Control System due to become operational in late 1976, the 485L Program is largely unknown outside TAC circles. It is the planned follow-on to the present TACS, known as 407L. The 485L Program involves a series of six individual tasks now under way to further automate and otherwise modernize the TACS so that tactical air operations can be managed on a near real-time basis.

Historically, according to Colonel Armbrust, the US has never had an adequate command control system in operation when it first entered combat. Early in World War II, tactical aircraft were attached to specific ground units, and there was no central authority to concentrate the air effort where it was most needed. As a result, the enemy was able "to strike without the threat of a concentrated air effort being massed against them."

Allied planners learned through experience and reorganized tactical air forces to provide for an air commander coequal to the ground commander, and responsible to the theater commander for all air operations. This enabled the air commander to mass his aircraft where and when needed to best serve the battle plan. Electronic communications, however, were sadly inadequate.

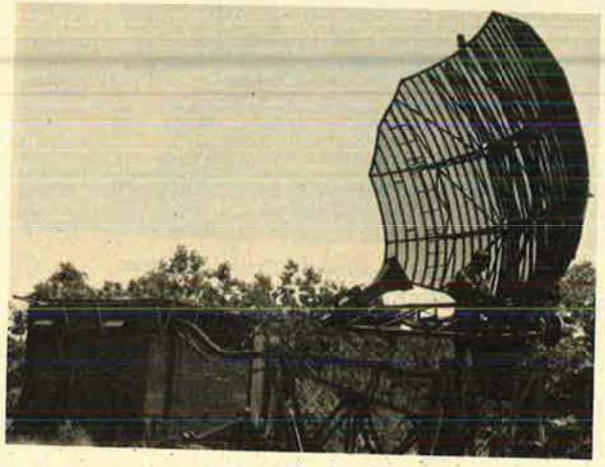
When the Korean War broke out, US forces had somewhat improved equipment and procedures, but, without the benefit of mobile radar and a dedicated communications network, they used the same basic battle plan as in World War II. "It was essentially the same system doing the same job," Colonel Armbrust said.

Then came US involvement in Vietnam, and with the realization that "we gotta get something over there," assorted radar components, communications gear, and other off-the-shelf items were packed and shipped. These were used to fashion the command control system, almost totally manually operated, that saw the US and its allies through the war until the early 1970s.

Command control development did not stand still all that time. By 1970, the Air Force was phasing in a new computer software package in Vietnam, called Seek Data II, which was described as "the most ambitious plan ever for using computers as the primary tool of military command." Utilizing existing IBM computers, software developed for Seek Data II introduced three major computer programs:

- Frag Prep, which automated most of the steps in preparing daily fragmentary, or "frag," orders. It had been taking Seventh Air Force planners about two days to plan one day of tactical air operations in Southeast Asia.
- Airlift Management System, or ALMS, that controlled the in-country movement of supplies and personnel in Vietnam by automatically producing frag orders for transport aircraft.
- Consolidated Reporting and Evaluation Subsystem, Tactical, or CREST, that automated a portion of Seventh Air Force's ability to report to higher headquarters.

While Seek Data II was a major innovation, it did not allow as much real-time control over strike units and other types of tactical operations as it did over airlift. The system did make possible totally automated reporting of information, or dissemination of frag orders to tactical units, but it did not include a monitoring function. Time-consuming, manual double-checking was still required in preparing frag orders to monitor assigned airspace, and to ascertain the availability of runways and aircraft for various missions.



Easily transportable foldaway radars are used for airspace surveillance and aircraft control. Microwave radar relays in development will increase their range.

Also introduced in the late 1960s was the 407L Program, which, in part, was designed to bring computers to Control and Reporting Centers and Control and Reporting Posts. Procurement and installation of 407L components, however, was not completed in time to establish a 407L-equipped TACS in Southeast Asia.

According to Major Farber, TACS today—now linked electronically by that 407L equipment—again has serious deficiencies, most of which center around what he terms "the slow manual operation of TACS elements and the inherent limitations of present communications." These deficiencies, he said, led to the 485L Improvements Program.

The 407L deficiencies add up to the fact that tactical air commanders still do not have immediate, real-time information available to guide

Weapons controllers monitor consoles in Tactical Air Control Centers (TACCs) and direct actions against enemy air and ground forces. The TACCs are being fully automated under the 485L Improvements Program.

The author, Maj. Fred Meurer, is spending a year on the AIR FORCE Magazine staff under AFIT's Education With Industry (EWI) program. He is a career information officer.

them in making their next move. The six 485L measures that are needed to overcome these deficiencies are:

- Total automation of Tactical Air Control Centers (TACC);
- The ability to exchange radar track digital information with the command control systems of the other services;
- CRC/P improvements;
- Improving radar and communication range and siting capability;
- Development of a smaller, more powerful manpack radio;
- Development of a new portable maintenance shelter.

As described below, equipment to fully automate and modernize four complete TACS will cost in the neighborhood of $205 million at today's price tags, Major Farber said. All 485L innovations are being developed under the "fly-before-buy" concept, allowing the Air Force to test and evaluate the products to determine if they meet Air Force needs before ordering production.

If all goes well, he added, the four fully automated TACS will be operational in the FY '77–78 period. Even then, he said, TAC would continue its constant evaluation to see how the system can be further improved.

Major Farber gave a graphic example of what an automated system would do for mission planning. While 900 tactical sorties a day would be high by Southeast Asia standards, operations in Europe could well dictate that many daily missions.

TACC Automation

The computerized TACC would be able to produce and distribute the 900-sortie frag order for the succeeding day in five hours or less, whereas producing a frag order of that size with the present semiautomated capability requires up to twenty-four hours. Time saved would greatly enhance weapons loading and aircraft maintenance performance, in addition to allowing better mission planning and mission monitoring, and time to make adjustments.

Lessons learned in programming Seek Data II will be valuable in developing the automation, Major Farber believes.

The TACC automation program would replace present manually operated communications links and plotting boards with automated display and data processing equipment, and new communications gear that will interface with existing equipment. A remoted input-output data source terminal for which hardware and software are now being developed will accomplish communications, data processing, and display functions at lower TACS echelons. General Dynamics Corp. won the hardware contract in January 1973.

Meanwhile, Computer Sciences Corp. is developing the software at Langley AFB, Va. Twenty-six Air Force people are working with the contractor to ensure that all user needs are met, and to provide a trained cadre of personnel for later Air Force operation of the automated TACC.

Tactical Air Control Party members move with Army units. The "guys with mud on their boots" coordinate efforts with the TACC.

Software being developed now is "very elementary," Major Farber said, and follow-on development will extend over a four-year period.

Testing hardware and software in one automated system is expected to begin at Bergstrom AFB, Tex., in FY '76. A production decision later that fiscal year would be followed by delivery of the first production equipment a year later.

Exchanging Radar Information

The Joint Chiefs of Staff have established a Tactical Air Control System/Tactical Air Defense System interface to overcome shortcomings in exchanging radar track digital information between services. It will assure that the tactical data systems of the various services can exchange information on a secure, real-time basis. The US Navy is executive agent for the program.

Under an Air Force Systems Command contract, Hughes Aircraft Co. has developed a message-processing module (MPM) to interface with existing TACS radar equipment. An Air Force test unit at Camp Pendleton, Calif., has been working with the three other services in conducting tests since July 1973, and they are to continue into FY '76.

If the timetable holds, delivery of the production MPM would begin later that fiscal year.

CRC/P Improvements

The problem with existing CRC/CRP radar operations is that the tracking program requires extensive manual intervention, and the system does not have a realistic radar flight simulation capability. The slow manual process of handling flight plans and correlating them with frag orders and mission schedules decreases the efficiency of the CRC's air traffic regulation function.

TACS are in operation even in peacetime, and—with the current reduction in flying hours and restrictions imposed by the Federal Aviation Administration—high-quality flight simulation for radar tracking is an important requirement for TACS radar proficiency training. A System Trainer and Exercise Module (STEM) program is under study and development and soon should begin to provide a deployable simulator to support operator and controller training. Evaluation of the STEM, however, will not be completed until FY '77.

A Hughes Aircraft Co. automatic radar tracking and en route traffic control device, using improved software programming and minor hardware modifications to the present CRC/CRP computer system, is being tested at the Hughes facility in Fullerton, Calif. It will greatly reduce the manual effort needed to track aircraft. Air Force testing will begin at Bergstrom AFB this year, with a production decision expected in mid-FY '76.

Another proposed feature, the Enroute Air Traffic Regulation (EATR) improvement to be developed later, would provide automated flight plans and frag order handling for controllers.

Microwave Radar Relays

A serious limitation within TACS is that operations, communications, and radar equipment are presently connected by cable. The length of the cable determines the maximum distance by which these units can be separated.

ITT in 1971 began developing a microwave relay system to enable installation of radar and communications on better siting locations ten to fifteen nautical miles from the TACS command operations facilities. Greater flexibility in site selection will improve communication and radar range.

The contractor's testing was completed in December 1974, paving the way for Air Force testing at Shaw AFB, S. C. Initial delivery of the microwave systems is expected sometime in FY '77.

Because its component units are transportable by air—here by C-141—the TACS can be set up anywhere in the world in hours.

Manpack Radios

Essentially the same sixty-pound radios strapped to the backs of soldiers in World War II movies are being lugged today by Air Force TACP members and combat control teams. The heavy radios reduce mobility and flexibility, and do not have adequate range.

TAC later this year will test a new Hughes Aircraft Co. ten- to twelve-pound radio developed for the Marine Corps and fitted with special antennas designed for the Air Force. The first of 625 radios planned for

THE ESSENTIAL ELEMENTS OF TACS

Tactical Air Control Systems can be tailored to meet the needs and scope of particular air operations. At a minimum, key elements of a TACS would include a Tactical Air Control Center, Control and Reporting Centers, Control and Reporting Posts, and Forward Air Control Posts.

All these elements could be included in a TACS:

Tactical Air Control Center (TACC)—The focal point through which the air commander directs operations to meet his responsibilities of airspace control, air defense, and tactical mission control. The TACC prepares daily air operations plans, directs planned operations, and orders air missions in response to tactical situations, such as close air support or rescue missions.

Control and Reporting Center (CRC)—There is normally one CRC in a TACS and it is directly subordinate to the TACC. As the primary control radar of the TACS, the CRC provides radar surveillance and control for the TACC within its assigned area. It directs sector air defense, provides aircraft guidance or monitoring for both offensive and defensive missions, relays mission changes to airborne aircraft as directed, and coordinates control of missions with subordinate TACS elements and other agencies as necessary.

Control and Reporting Post (CRP)—One or more CRPs are deployed well forward of the CRC to extend surveillance and control capability. CRPs are the operational link between the CRC and the Forward Air Control Post.

Forward Air Control Post (FACP)—These highly mobile radar elements are deployed as necessary to provide a forward extension of the radar system into enemy territory, affording low-altitude detection and control capabilities.

Air Support Radar Team (ASRT)—A highly mobile element of TACS with precision control equipment, ASRT directs strike aircraft on high-accuracy, all-weather bombing missions from forward ground locations. Employed in Southeast Asia, the concept was called "Combat Sky Spot."

Tactical Ground Sensor System (TGSS)—Using sensors that detect enemy movement, the TGSS assesses the threat and reports to the All Sources Correlation Area (ASCA) of the Combat Intelligence Center (CIC), where this information is correlated with data on other real- and near real-time targets. CIC recommendations for air strikes go directly to the TACC. The sensors, normally dropped by aircraft, hang in trees or implant themselves in the ground.

Direct Air Support Center (DASC)—Collocated with each Army Tactical Operations Center, the DASC receives, coordinates, and plans immediate close air support, reconnaissance, and tactical airlift missions, and directs the air effort allocated for such missions.

Tactical Air Control Party (TACP)—A mobile group of Air Force personnel assigned to move with Army battalions or larger units, a TACP includes an air liaison officer (ALO), operations officer, forward air controller (FAC), communications technicians, and communications equipment. Airborne FACs visually direct air strikes on targets close to friendly units.

The TACP or the DASC can relay a request for immediate air support from any level of Army command to the TACC for approval. Diverted or scrambled aircraft responding would be controlled by TACS radar until handed off to a FAC for control during the attack phase. It could work this way:

An Army battalion informs the ALO with the TACP that air support is needed to suppress enemy activity that is pinning down friendly ground forces. The TACP calls the DASC located at Corps headquarters, states the request, and describes the target. The Army, which monitors requests at all levels through a TACP, approves the request for close air support if it cannot support the request with its own organic firepower.

In coordination with the TACC, the DASC determines the availability of aircraft, and weapons configurations. Deciding that two A-37s with 500-pound bombs are needed, and finding that no similarly configured airborne aircraft can be diverted, the DASC or the TACC scrambles an alert flight. The flight takes off and passes through CRC radar control, CRP radar control, and FACP radar control. The FACP hands the flight off to a ground or airborne FAC, who controls the mission. After the A-37s deliver their ordnance, the flight reverts to FACP control for the return through CRP and CRC to its home base.

Airlift Control Center (ALCC)—Part of the TACC, the ALCC provides detailed management and mission control of tactical airlift resources.

Airlift Control Element (ALCE)—A team of Air Force personnel that controls and coordinates airlift operations in a forward area where airlift facilities do not exist.

Combat Control Teams (CCT)—Emplaced near the combat zone by the most expeditious means, the CCT relays information to incoming airlift aircraft and guides them to their objective.

The entire TACS must be ready to move during the course of a ground battle since the depth of radar coverage is reduced as the forward edge of the battle moves. This requires relocation of the CRPs and CRCs, as well as the interlocking communications, depending largely on the range of electronic equipment used.

Air Force production should be available in FY '77.

Maintenance Shelters

Maintenance personnel travel with deployed communications teams, doing their repair work today in old, heavy, and now largely unavailable portable shelters. Goodyear developed four prototype models of a new lightweight, folding shelter, and Air Force testing was done at Bergstrom AFB, Tex., late last year.

The new mobile S 530 maintenance shelter will provide work and storage space for spare parts and serviceable units, and may be procured late this year.

TACS in Europe

Although many improvements are necessary for the TACS, the equipment the Air Force now has represents the free world's most sophisticated mobile command control capability. Elements of this system are currently deployed in Europe, training daily with NATO forces. Other NATO nations, Colonel Armbrust said, also have TACS systems.

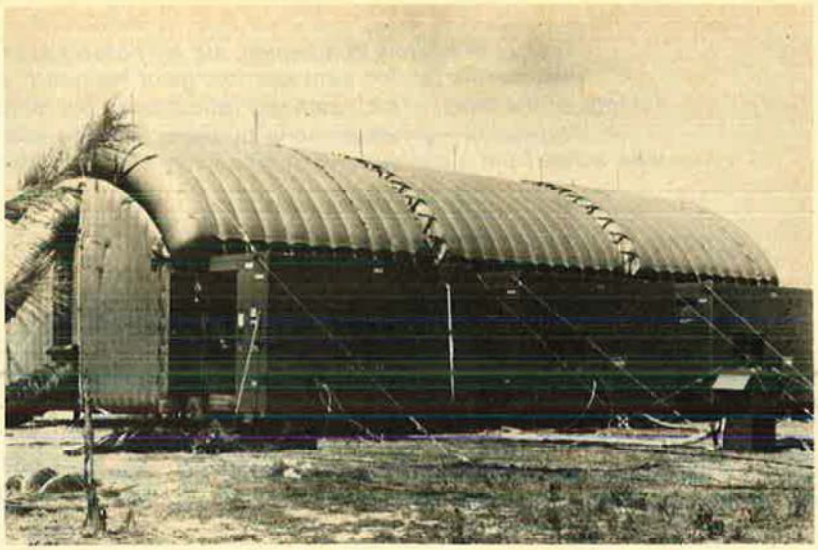
"Plans are being formulated and modified all the time to tie together and harmonize the systems of all NATO nations into one integrated system in Europe," he said, adding that all of them interface with each other under those plans.

USAF's TACS in Europe, managed by USAFE, is operationally dedicated to Hq. Allied Air Forces, Central Europe (AAFCE), which was established on June 28, 1974. USAF Gen. John W. Vogt, Jr., CINCUSAFE, is the AAFCE Commander.

Secretary of the Air Force John L. McLucas said in a recent speech to the German-American Press Club in Germany that refinement of the command control system in Europe has high priority in NATO. Resulting centralized command control allows committed NATO air forces to "fully exploit the speed, range, and flexibility of today's modern aircraft," he said.

"We [the USAF] would provide any forces requested" for the command control mission, Colonel Armbrust declared, "and we're prepared to provide tactical air control for any NATO forces."

Liaison personnel from all NATO nations would be expected to help man the integrated TACS.



Air-inflatable shelters, transported by cargo aircraft or helicopter, form the Tactical Air Control Center. Communications equipment inside is used to collect data from the field and to transmit operations orders.

The AWACS Tie-in

AWACS, the E-3A airborne warning and control system aircraft due to become operational in 1976, is not an airborne TACS, it was emphasized, but rather an extension of the ground TACS. It will allow the total system to look farther over the horizon and fill in ground-based radar gaps caused by ground clutter (the intrinsic electronic noise on the earth's surface).

Col. Stan G. Lockley, chief of TAC's AWACS Division, simplified the AWACS tie-in: "AWACS will extend the range of operational control even deeper into enemy territory, and will facilitate command control until ground TACS elements can be brought in and made operational."

AWACS' lookdown radar, developed by Westinghouse, is designed to cut through ground clutter to detect, track, and control low-flying aircraft. It could also assume some of the basic ground control radar functions should ground radar become inoperative through enemy action or otherwise.

(The Air Force announced in August that Tinker AFB, Okla., will be the main operating base for AWACS. Oklahoma City Air Logistics Center at Tinker has been designated to support AWACS. The aircraft will be assigned to TAC and be available for rapid worldwide response to contingencies.)

While AWACS will be unarmed, Colonel Lockley is not concerned about its survivability in a battle situation. "Tactics," he said without being able to go into detail, will keep it flying.

Colonel Lockley got away from his immediate area of expertise to praise another element of TACS—"the guys with mud on their boots"—the Air Force people who man the TACS components.

He estimated that for each standard TACS, more than 2,000 people are involved in working a twelve-hour shift. Many of those, he said, are "out in the bush, every day for long periods of time, working hard without getting a lot of credit." The ongoing operation of TACS is necessary even in peacetime, he explained, because everyone involved—those on the ground as well as the aircrews—must maintain proficiency with the system.

"Those kids really scratch the earth to make a living," he remarked.

AWACS, the 485L Improvements Program, the people who man the equipment. "Behind it all is a big bubble called TACC," Colonel Lockley said. "We can hardly conduct tactical warfare without it." ■

Typical of military academies, the Air Force Academy included, is tension between "things of the heart" and "things of the mind." This "gap"—a reflection of the military profession—serves a useful purpose, says the author, who writes from a background of nine years at the Academy.

In Defense of the Terrazzo Gap

BY LT. COL. MONTE D. WRIGHT, USAF (RET.)

IT IS scarcely original to note that a military academy is an institution with a split personality. Some critics go so far as to say that a military academy is a contradiction in terms. Having taught nine years at the USAF Academy, I believe that, while the split personality is real, it is also peculiarly appropriate in officer education.

A casual glance at the Academy organization chart shows three mission elements: the Dean of Faculty, the Commandant of Cadets, and the Director of Athletics. While there is thus a potential three-way split, Athletics does not really compete with the other two. Although cadets spend much more time and effort on athletics than do civilian college students, even the colleges long ago accepted the need for physical education. The professors train the mind, the coaches train the body; and the professors are clearly the senior partners.

The real tension at the Academy exists between the organizations headed by the Dean and the Commandant, and it is commonly referred to as "the terrazzo gap," an allusion to the physical location of their offices on opposite sides of Fairchild Hall's terrazzo-surfaced court. The tension has nothing to do with personalities. It exists in spite of good will and command concern, has always existed, and always will. It exists because the Dean and the Commandant are engaged in two different aspects of a common undertaking.

The Faculty, like faculties at civilian colleges, is organized into departments approximately along the lines of the traditional academic disciplines. Within the departments there is a high regard for factual data; for precise method in gathering, testing, and arranging data; for formulating, testing, and modifying hypotheses. The student is encouraged to be critical, to challenge written and oral statements from whatever source, to seek the truth, to achieve understanding. These activities are rational.

Things of the Heart

The Commandant of Cadets and his staff emphasize values, feelings, and beliefs that are often beyond the realm of, and hence not subject to, pure reason—"things of the heart" as opposed to "things of the mind." For example, the first task in military training is to instill discipline. Obedience does not come automatically to a young American, it seldom comes easily, and for some it never comes. Duty, honor, loyalty—these values, while they may be rationally argued and understood, are almost never acquired as a result of rational inquiry; rather, they are absorbed or rejected in response to family or peer-group pressures, in emulation of an admired individual, or in some other way. Morale and esprit are much-used and imprecise terms, but no matter how they are defined, much about them lies beyond the rational. The words conjure up animal spirits, exuberance, sometimes pure emotion. Indeed, the Commandant and his staff might be said to engage in the propagation of a faith; and like good Jesuits, while they make use of reason, fact, and science whenever they can, many of their actual goals lie in a realm that transcends the rational.

Consider the minutiae of basic military training. Marching has nothing to do with the way today's Air Force fights, and appears to be of no use, save ceremony. The extreme attention to shined shoes, haircuts, and maintenance of the uniform obviously has considerable value in producing neat-looking young men who take pride in themselves. But no cost-efficiency expert would validate the time and effort expended on these matters if personal grooming were the only end. Whether the socks are to the right or left of the underwear in the bureau drawer, whether the doolie breaks into a run on one side of the bridge or the other—such things absorb much time at the Academy and must appear to outsiders as utterly unimportant.

The significance, of course, is not in the deed at all; it is in what happens to the cadet as he goes through the motions. He comes to accept that he will do as he is told. He acquires the habit of an almost automatic obedience to orders. He is acclimated to life in an orderly environment. He takes his place in the structured hierarchy. Going through the motions again and again, living in the group, the cadet changes. He accepts to varying degrees the military values that make up discipline.

Two Different Worlds

No wonder the cadet is confused, as he tries to live in two such different worlds. He is told when to get up, what to wear, how to get to breakfast and to his first period class. Then his English instructor expects him to criticize the ideas expressed in an essay! For the next two hours his math instructor may require him to prove a theorem and then apply it in different ways. But,

at lunch, he must immediately revert to the other world. And so it goes, all day long, throughout four years.

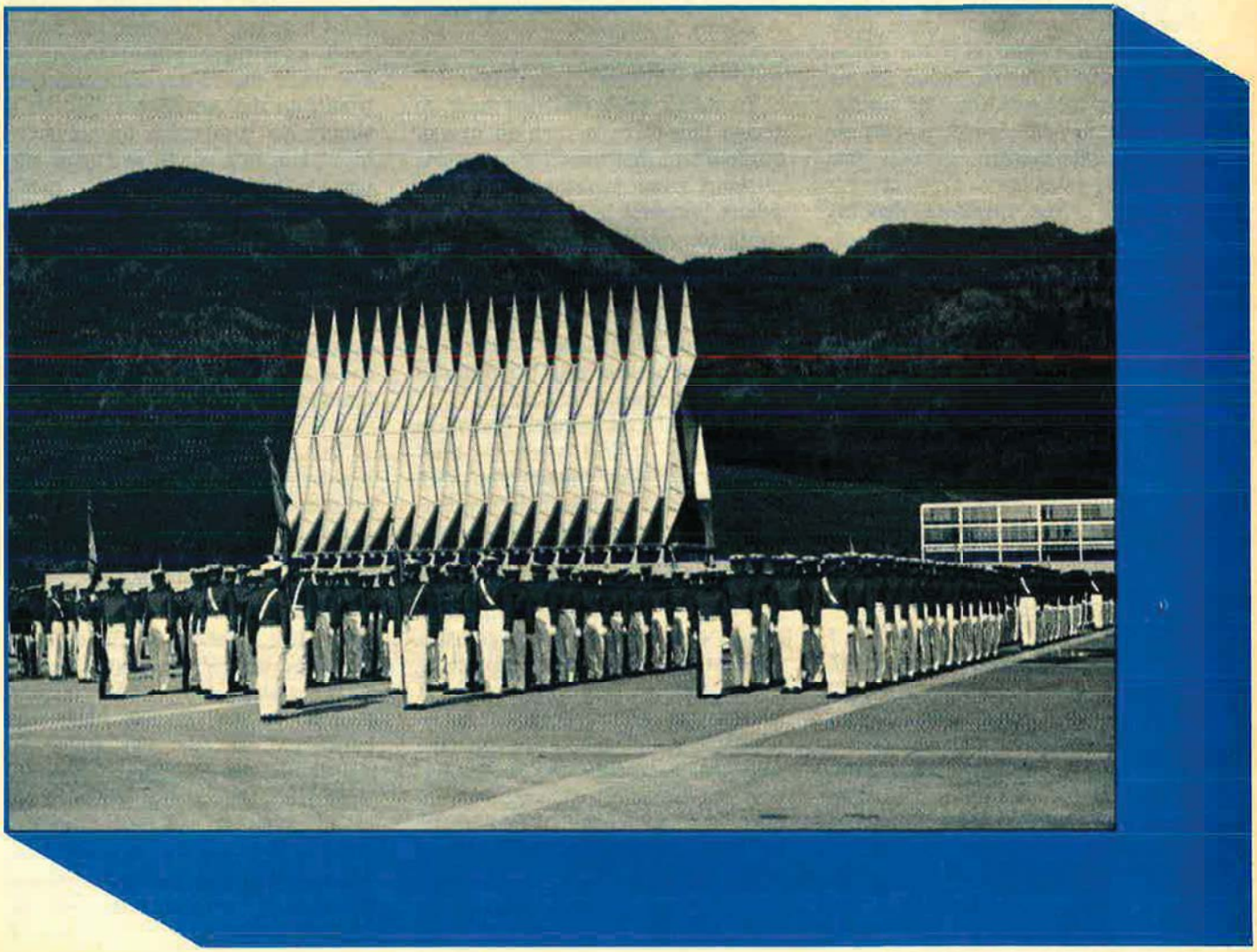
Although every cadet seems to discover the dual world of the Academy anew ("The catalog didn't say anything about this!"), many observers have noted the central contradiction between education and indoctrination. Some have delved deeply into it; a few have concluded that the Academy cannot function, or at best that there must be a more efficient way to go about producing officers. But I have come to believe that the continual tension between the offices of the Dean of Faculty and the Commandant of Cadets, between those who accentuate the rational, the skeptical, the judgmental on the one hand, and those who stress disciplined order, obedience, and unswerving compliance on the other, is peculiarly appropriate in training officers, because military officers must operate in these two realms throughout their careers.

That an undisciplined army is a mob, dangerous to itself and to the society it should defend, has long been a truism. In battle there is simply no time to debate alternatives or seek consensus. Someone must decide, the rest must obey. A large part of the soldier's critical faculties must be masked, disengaged, shifted into neutral as it were. Faith in his weapons, trust in his commander, an unthinking willingness to sacrifice himself—these are matters of the greatest practical value in battle. Without them, the battle may well be lost.

But if these values are the only ones nourished by the officer corps, the war may be lost. The *next* war will almost certainly be lost. Military organizations must change; strategy, tactics, weapons must be modified. Choices between alternatives are often very difficult, and a commander has the right to expect the best possible advice from his staff. This means that at least a few officers must tell the boss what he may not want to hear. Someone must sponsor the minority view. Someone must challenge the establishment. Imagination and intellectual honesty are precious in any organization at any time; if the armed forces do not maintain these qualities also, they cannot in the long run discharge their missions.

Understanding USAFA's Purpose

The crunch comes, of course, in the realization that the individuals who must criticize their superiors



The author, Lt. Col. Monte D. Wright, has been Director of the NASA Historical Office since his retirement from the Air Force in 1973. He holds a doctorate in history from Duke University. Colonel Wright is a navigator and the author of Most Probable Position: A History of Aerial Navigation to 1941, *reviewed in the October '73 issue of this magazine. Most of his Air Force career was spent in ADC and at the Air Force Academy.*

in one set of conditions are the same ones who must automatically obey under other conditions. The conditions may change very quickly, so the officer must be able to change his mode of behavior just as quickly. And, finally, no automatic signal will flash when it is time to change from the one to the other. All of which means that the military profession is considerably more difficult than it would be if the officer could perform in one mode all the time. For the Academy, of course, it would also be simpler to prepare a person to perform in only one mode.

To the extent, therefore, that my understanding of the central contradiction in the officer's profession is correct, it follows that the tension existing within the Academy is necessary. I happen to think that a little tension is good for any organization —it discourages sloth and complacency. But the best possible preparation for the young officer may be learning to live with the tension at the Academy, especially learning how to conduct himself in the two different modes of behavior. I have but one plea—the officers at the Academy should think more about these things.

I must admit that I did not think much about the Academy's overall purpose when I first was assigned there. It seemed obvious. I concentrated on my particular job (teaching navigation for the Commandant the first two years, teaching history for the Dean thereafter). But during my last four years, I was a member of the Third Class Committee, which considered the case of each Third Class (sophomore) cadet who was deficient in studies, decided whether he was worth salvaging, and if so, how best to proceed. The Committee was composed of representatives of the Commandant, Athletics, the Registrar, the Hospital, and each Department that taught Third Class courses. Widely different evaluations of the same cadet had to be resolved. For me, the process was an education.

At the same time, I was teaching military history and grappling with those old questions: What makes an effective military leader? What makes an effective follower? What makes a winning military organization? I came to appreciate how the various elements of the Academy program were supposed to fit together. Few officers assigned to the Academy will be favored with such a long tour or a seat on a Class Committee. In the normal tour of three or four years, can most officers come to a real understanding of the Academy's purpose?

Building a Bridge

To do so, they will first have to accept that there is such an overall purpose and that the various aspects of the program have important subsidiary purposes to perform. Memorizing the mission statement, which is reproduced *ad nauseam* all over the place, won't cut it. Some hard thought is called for—and it should be repeated about twice a year, perhaps in connection with New Semester's Resolutions.

Faculty officers need to find ways to instill a critical sense in their students without interfering with what the Commandant is simultaneously trying to do. Indeed, the Academy employs an all-military faculty in order to show the cadets that officers *can* question, think critically, and argue dispassionately while at the same time exemplifying the highest military virtues. Yet, it is easy for the instructor to get so wrapped up in his academic pursuits that he forgets the larger purpose. In his effort to improve rapport with his students, he may be tempted to disregard the military forms. I am convinced that any teacher who tries to be "one of the boys" makes a mistake; for an Academy instructor to do so is doubly unfortunate.

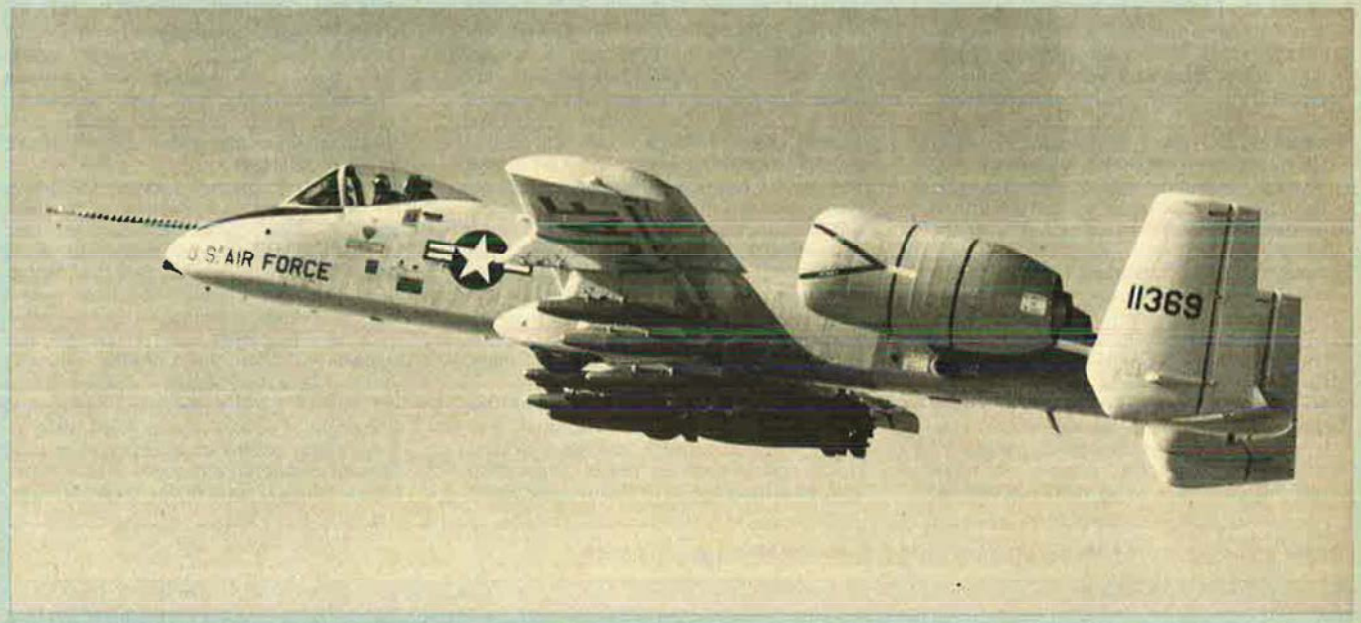
Every instructor should take an active role in military training, athletics, squadron activities—whatever he is qualified for. Some, but not all, department heads already encourage this. For an instructor to disparage the military program, or an individual Air Officer Commanding, in front of cadets is obviously out of order. But more important, the instructor should show by his words and actions that he appreciates the role of the AOCs—the young officers who supervise the activities of the Cadet Wing. Theirs is perhaps the most important, and most thankless, job at the Academy.

Likewise the Commandant's people have been known to slur the faculty. For some months, until the Commandant stopped it, it was "in" to refer to instructors as "faculty pukes." Only seldom did AOCs—let alone more senior members of the Commandant's staff—visit classes. Most important, however, the AOCs need a positive understanding of how their day-to-day activities contribute to the Academy's goal. It is simply not productive for an AOC to explain to a cadet, as I once witnessed, that cadets march to meals because it is the quickest way to move a large number of men from one place to another. The cadet knew better. Cadets do walk to certain meals, and no stopwatch is needed to discover that all the cadets in the Wing can walk to the dining hall more quickly than they can form into ranks and march.

There is a valid reason for marching, but it has to do with the effect on the marcher. The purpose behind the long hours of academic toil is also a desired effect on the toiler. The two forms of activity produce qualities that can easily be in opposition. It is the military officer's challenge to master both and to use them under appropriate circumstances, so that he wins both the battle and the war. The officer assigned to the Academy therefore should not expect the terrazzo gap to disappear. It will be in frequent need of bridging or papering over, but it will always be there, because it reflects a critical aspect of the military profession. ■

JANE'S

ALL THE WORLD'S AIRCRAFT SUPPLEMENT



This photograph shows one of the A-10A prototypes carrying underwing clusters of 500 lb bombs

FAIRCHILD REPUBLIC

FAIRCHILD REPUBLIC COMPANY, DIVISION OF FAIRCHILD INDUSTRIES; Address: Farmingdale, Long Island, New York 11735, USA

FAIRCHILD REPUBLIC A-10A

On 18 December 1970, Fairchild Republic and Northrop were selected as the two companies that were each to build two prototypes for evaluation under the USAF's A-X programme, initiated in 1967, for a close-support aircraft.

The first Fairchild Republic prototype (71-1369), designated YA-10A, flew for the first time on 10 May 1972, followed by the second prototype (71-1370) on 21 July 1972. USAF flight evaluation in competition with Northrop's YA-9A took place between 10 October and 9 December 1972. On 18 January 1973 it was announced that the A-10A had been selected as the winner, and Fairchild Republic later received a contract for ten pre-production aircraft (six for development test and evaluation and four for initial operational test and evaluation). The six DT & E aircraft were later reduced to two, the first of which was delivered in February 1975. Static and fatigue test airframes have also been completed.

An initial order for 22 production A-10As was received in December 1974, and delivery of these is due to begin in 1977. Production of a further 30 from FY 1976 funds has also been approved. The USAF has indicated an eventual requirement for more than 700 A-10 aircraft.

The following description applies to the production A-10A:

TYPE: Close air-support aircraft.

WINGS: Cantilever low-wing monoplane, with wide-chord, deep aerofoil section (NACA 6716) to provide low wing loading. Incidence −1°. Dihedral 7° on outer panels. Aluminium alloy three-spar structure, consisting of one-piece constant-chord centre-section and tapered outer panels with integrally stiffened skins and drooped (cambered) wingtips. Outer panel leading-edges and core of trailing-edges are of honeycomb sandwich. Four-point attachment of wings to fuselage, at front and rear spars. Two-segment, three-position, trailing-edge slotted flaps, interchangeable right with left. Wide-span ailerons, made up of dual upper and lower surfaces that separate to serve as airbrakes. Flaps and ailerons actuated hydraulically. Small leading-edge slat inboard of each main-wheel fairing. Redundant and armour-protected flight control system. Electrically-operated trim tab in each aileron.

FUSELAGE: Semi-monocoque structure of aluminium alloy (chiefly 2024 and 7075), with four main longerons, multiple frames, and lap-jointed and riveted skins. Built in front, centre, and aft portions. Single-curvature components aft of nose portion, interchangeable right with left.

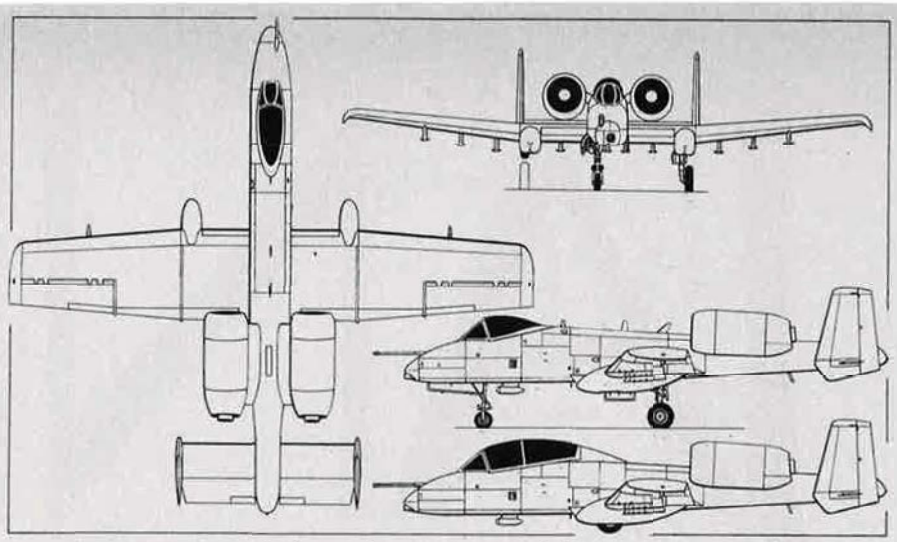
Centre portion incorporates wing box carry-through structure.

TAIL UNIT: Cantilever aluminium alloy structure, with twin fins and interchangeable rudders mounted at the tips of constant-chord tailplane. Interchangeable elevators, each with an electrically-operated trim tab. Rudders and elevators actuated hydraulically. Redundant and armour-protected flight control system.

LANDING GEAR: Retractable tricycle type, with single wheel on each unit. All units retract forward, and have provision for emergency gravity extension. Interchangeable main-wheel units retract into non-structural pod fairings attached to the lower surface of the wings. When fully retracted approximately half of each wheel protrudes from the fairing. Steerable nosewheel is offset to starboard to clear firing barrel of gun.

POWER PLANT: Two General Electric TF34-GE-100 high by-pass ratio turbofan engines, each rated at 9,065 lb (4,112 kg) st, enclosed in armoured pods and pylon-mounted to the upper rear fuselage, at a point immediately aft of the wing trailing-edges and forward of the tailplane leading-edges. Fuel contained in four tear-resistant and self-sealing cells: two main cells in the fuselage, and two smaller, adjacent integral cells in the wing centre-section. Maximum internal fuel capacity 10,650 lb (4,830 kg). All fuel cells are internally filled with, and externally cradled in, reticulated foam, and all fuel systems pipework is contained within the cells except for the feeds to the engines, which have self-sealing covers. Three 600 US gallon (2,271 litre) jettisonable auxiliary tanks can be carried on underwing and fuselage centreline pylons. Provision for mounting a detachable in-flight refuelling probe on the upper starboard side of the nose.

ACCOMMODATION: Single-seat enclosed cockpit, well forward of wings, with large transparent bubble canopy to provide all-round vision. Bulletproof windscreen. Canopy is hinged at rear and opens upward. Pilot's ejection seat operable at speeds from 450 knots (518 mph; 834 km/h) down to zero speed at zero height. Entire cockpit area is protected by an armoured "bathtub" structure of titanium, capable of withstanding projectiles of up to 23 mm calibre.



Fairchild Republic A-10A single-seat close-support aircraft. Lower side view shows the projected two-seat version (Pilot Press)

Basic design work for a dual-control two-seat version has been completed.

SYSTEMS: Redundant control system incorporates two 3,000 lb/sq in (210 kg/cm²) primary hydraulic flight control systems, each powered by an engine-driven pump, and a manual backup. Hydraulic systems actuate flaps, flying control surfaces, landing gear, brakes, and nosewheel steering. Two independent hydraulic motors, either of which is sufficient to sustain half-rate firing, supply drive for 30 mm gun barrel rotation. Electrical system includes two 35/40A 115/200V AC engine-driven generators and a standby battery and inverter. Auxiliary power unit. Environmental control system, using engine bleed air, for cockpit pressurisation and air-conditioning, pressurisation of pilot's *g* suit, windscreen anti-icing and rain clearance, fuel transfer, gun compartment purging, and other services.

ELECTRONICS AND EQUIPMENT: Head-up display giving airspeed, altitude, and dive angle; weapons delivery package with dual reticle optical sight for use in conjunction with underfuselage Pave Penny laser target seeker pod; target penetration aids; associated equipment for Maverick and other missile systems; IFF/SIF (AIMS); UHF/AM; VHF/AM; VHF/FM; HF/SSB; TACAN; UHF/DF; VOR/ILS; LORAN C/D; X-band transponder; all-altitude heading and attitude reference system (HARS); radar homing and warning (RHAW); secure voice communications; active or passive electronic countermeasures (ECM); armament control panel; and gun camera.

ARMAMENT: A General Electric GAU-8/A 30 mm seven-barrel cannon is mounted in the nose, offset slightly to port so that as the barrels rotate the firing barrel is always on the aircraft's centreline. The gun and the handling system for the linkless ammunition are mechanically synchronised and driven by two motors fed from the aircraft's hydraulic system. The single-drum magazine has a capacity of 1,350 rounds, and has a dual firing rate of either 2,100 or 4,200 rds/min. Four stores pylons under each wing (one inboard and three outboard of each main-wheel fairing), and three under fuselage,

Second prototype of the Fairchild Republic A-10A single-seat close-support aircraft

for max external load of 16,000 lb (7,257 kg). The centreline pylon and the two flanking fuselage pylons cannot be occupied simultaneously. The centreline pylon has a capacity of 5,000 lb (2,268 kg); the two fuselage outer pylons and two centre-section underwing pylons 3,500 lb (1,587 kg) each; the two innermost outer-wing pylons 2,500 lb (1,134 kg) each; and the four outermost wing pylons 1,000 lb (453 kg) each. These allow carriage of a wide range of stores, including twenty-four 500 lb Mk-82 LDGP or Mk-82 retarded bombs; six 2,000 lb Mk-84 general-purpose bombs; eight BLU-1 or BLU-27/B incendiary bombs; four SUU-25 flare launchers; twenty Rockeye II cluster bombs, sixteen CBU-52/71, ten CBU-38, or sixteen CBU-70 dispenser weapons; six AGM-65A Maverick missiles; Mk-82 and Mk-84 laser-guided bombs; Mk-84 electro-optically-guided bombs; two SUU-23 gun pods; chaff or other jammer pods; or up to three drop-tanks.

DIMENSIONS, EXTERNAL:
- Wing span 57 ft 6 in (17.53 m)
- Wing chord at root 9 ft 11½ in (3.04 m)
- Wing chord at tip 6 ft 6.4 in (1.99 m)
- Wing aspect ratio 6.54
- Length overall 53 ft 4 in (16.26 m)
- Height overall 14 ft 8 in (4.47 m)
- Tailplane span 18 ft 10 in (5.74 m)
- Wheel track 17 ft 2½ in (5.25 m)
- Wheelbase 17 ft 8¾ in (5.40 m)

AREAS:
- Wings, gross 506.0 sq ft (47.01 m²)
- Ailerons (total, incl tabs) 47.54 sq ft (4.42 m²)
- Trailing-edge flaps (total) 85.99 sq ft (7.99 m²)
- Leading-edge slats (total) 10.56 sq ft (0.98 m²)
- Airbrakes (total) 86.78 sq ft (8.06 m²)
- Fins (total) 83.96 sq ft (7.80 m²)
- Rudders (total) 23.50 sq ft (2.18 m²)
- Tailplane 89.40 sq ft (8.31 m²)
- Elevators (total, incl tabs) 29.00 sq ft (2.69 m²)

WEIGHTS AND LOADINGS:
- Manufacturer's empty weight 18,783 lb (8,520 kg)
- Basic equipped weight, clean 25,740 lb (11,675 kg)
- *Basic design weight, equipped 30,044 lb (13,628 kg)
- **Forward airstrip weight 30,813 lb (13,976 kg)
- Max T-O weight 46,624 lb (21,148 kg)
- Max wing loading 92.14 lb/sq ft (449.88 kg/m²)
- Max power loading 2.57 lb/lb st (2.57 kg/kg st)
- Thrust/weight ratio 0.6

PERFORMANCE (at max T-O weight except where indicated):
- Max never-exceed speed 450 knots (518 mph; 834 km/h)
- Max combat speed at S/L, clean 398 knots (459 mph; 738 km/h)
- Combat speed at 5,000 ft (1,525 m), with six Mk-82 bombs 393 knots (453 mph; 729 km/h)
- Cruising speed at S/L 300 knots (345 mph; 555 km/h)
- Stabilised 45° dive speed below 8,000 ft (2,440 m), AUW of 35,125 lb (15,932 kg) 260 knots (299 mph; 481 km/h)
- Max rate of climb at S/L at basic design weight 6,000 ft (1,828 m)/min
- T-O distance: at max T-O weight 3,780 ft (1,152 m); at forward airstrip weight 1,085 ft (331 m)
- Landing distance: at max T-O weight 2,045 ft (623 m); at forward airstrip weight 1,110 ft (338 m)
- Operational radius: close air support, 2.2 hr loiter, 20 min reserve 250 nm (288 miles; 463 km); escort 261 nm (301 miles; 484 km); reconnaissance 433 nm (499 miles; 803 km); deep strike 540 nm (620 miles; 1,000 km)
- Ferry range 2,507 nm (2,888 miles; 4,647 km)

incl six 500 lb bombs, 750 rds of ammunition, and fuel for 300 nm (345 miles; 555 km) with 20 min reserve

**with four Mk-82 bombs*

Prototype of the Fairchild Republic A-10A approaches the refuelling boom of a Boeing KC-135 tanker aircraft

LOCKHEED

LOCKHEED-CALIFORNIA COMPANY; Head Office and Works: Burbank, California 91520, USA

LOCKHEED S-3A VIKING

Since the 1974–75 edition of *Jane's All the World's Aircraft* closed for press, Lockheed-California has been authorised to release more comprehensive and updated weight and performance data for the current S-3A version of the Viking carrier-based anti-submarine aircraft, as follows:

WEIGHTS:
- Weight empty 26,650 lb (12,088 kg)
- Normal ASW T-O weight 42,500 lb (19,277 kg)
- Max design T-O weight 52,539 lb (23,831 kg)
- Max landing weight 45,914 lb (20,826 kg)
- Max carrier landing weight 37,695 lb (17,098 kg)

PERFORMANCE:
- Max level speed 450 knots (518 mph; 834 km/h); Mach 0.79
- Max cruising speed 370 knots (426 mph; 685 km/h)
- Loiter speed 160 knots (184 mph; 296 km/h)
- Approach speed 100 knots (115 mph; 185 km/h)
- Stalling speed 84 knots (97 mph; 157 km/h)
- Max rate of climb at S/L over 4,200 ft (1,280 m)/min
- Service ceiling above 35,000 ft (10,670 m)
- T-O run at 42,500 lb (19,277 kg) AUW 2,200 ft (671 m)
- Landing run at 36,500 lb (16,556 kg) AUW 1,600 ft (488 m)
- Combat range more than 2,000 nm (2,303 miles; 3,705 km)
- Ferry range more than 3,000 nm (3,454 miles; 5,558 km)

Lockheed S-3A Viking anti-submarine aircraft undergoing carrier suitability tests on the USS Forrestal (US Navy)

Mitsubishi MU-2M seven/nine-seat business aircraft (two 724 ehp Garrett AiResearch TPE 331-6-251M turboprop engines)

MITSUBISHI

MITSUBISHI JUKOGYO KABUSHIKI KAISHA (Mitsubishi Heavy Industries Ltd); Head Office: 5-1, Marunouchi 2-chome, Chiyoda-ku, Tokyo 100, Japan

Specifications are now available for the Mitsubishi MU-2L and MU-2M business aircraft, respectively improved versions of the MU-2J and MU-2K, to which brief reference was made in the Addenda to the 1974–75 *Jane's*. As in the case of earlier MU-2s, the new models are assembled in San Angelo, Texas, for marketing in the western hemisphere. More than 400 MU-2s of all versions have been sold worldwide.

MITSUBISHI MU-2L and MU-2M

Each of these new versions is powered by two Garrett AiResearch TPE 331-6-251M turboprop engines. Those fitted in the MU-2M are each rated at 724 ehp. The engines of the MU-2L are each uprated to 776 ehp to permit operation at an increased take-off weight, with full fuel and full payload.

The MU-2L is equipped normally with eight seats, including one or two pilots, but a 12-seat configuration is available. The MU-2M is normally a seven-seater, with one or two pilots, but is available with nine seats.

DIMENSIONS, EXTERNAL:

Wing span over tanks	39 ft 2 in (11.93 m)
Length overall:	
MU-2L	39 ft 5 in (12.01 m)
MU-2M	33 ft 3 in (10.13 m)
Height overall:	
MU-2L	13 ft 8 in (4.17 m)
MU-2M	12 ft 11 in (3.93 m)

WEIGHTS:

Weight empty, equipped:	
MU-2L	7,570 lb (3,434 kg)
MU-2M	6,864 lb (3,113 kg)
Max T-O weight:	
MU-2L	11,575 lb (5,250 kg)
MU-2M	10,470 lb (4,750 kg)

PERFORMANCE (at max T-O weight):

Max cruising speed:	
MU-2L	296 knots (341 mph; 550 km/h)
MU-2M	315 knots (363 mph; 585 km/h)
Max rate of climb at S/L:	
MU-2L	2,625 ft (800 m)/min
MU-2M	2,840 ft (866 m)/min
Service ceiling:	
MU-2L	29,600 ft (9,020 m)
MU-2M	32,150 ft (9,800 m)
T-O to 50 ft (15 m):	
MU-2L	2,170 ft (661 m)
MU-2M	1,800 ft (548 m)
Landing from 50 ft (15 m):	
MU-2L at AUW of 9,473 lb (4,297 kg)	1,880 ft (573 m)
MU-2M at AUW of 8,338 lb (3,782 kg)	1,600 ft (488 m)
Max range with 30 min reserve:	
MU-2L	1,259 nm (1,450 miles; 2,334 km)
MU-2M	1,457 nm (1,678 miles; 2,700 km)

With engines each uprated to 776 ehp, the MU-2L can carry full fuel with a full payload of eight to twelve persons

WSK-OKECIE

WYTWORNIA SPRZETU KOMUNIKACYJNEGO, OKECIE (Transport Equipment Manufacturing Centre, Okecie); Head Office and Works: 02-256 Warsaw-Okecie, Al Krakowska 110/114, Poland

The Polish aircraft industry's Okecie works is responsible for light aircraft development and production, and for the design and manufacture of associated agricultural equipment for its own aircraft and for those built at other factories in the Aircraft and Engine Industry Union (PZL). In the early 1960s its design team began project studies for an agricultural aircraft

First prototype of the PZL-106 Kruk agricultural aircraft
(A. Prystopski)

to replace the PZL-101 Gawron (Rook), of which WSK-Okecie manufactured more than 330 in the period 1958–73. The initial design, known as the PZL-101M Kruk (Raven), was an extensively redesigned development of the Gawron, with a 260 hp Ivchenko AI-14R radial engine. Progressive refinement led to the current PZL-106 Kruk, with a more powerful engine and the braced low-wing monoplane configuration that has become customary for agricultural aircraft.

PZL-106 KRUK

The PZL-106 agricultural aircraft was designed by a team led by Dipl Ing Andrzej Frydrychewicz as a successor to the PZL-101 Gawron. The first prototype (SP-PAS) was built in seven months and flew for the first time on 17 April 1973. Ten days later, it was demonstrated before senior government officials, and has since been joined by at least two further prototypes. One of these (SP-PBG) is powered, like SP-PAS, with a 400 hp Lycoming engine but embodies a number of aerodynamic refinements, including lengthened overwing fairings where the bracing struts are attached.

The third prototype (SP-VXY) flew for the first time in 1974, with a 323 hp K-5 seven-cylinder geared aircooled radial engine, newly developed by the Polish aircraft industry and driving a two-position two-blade propeller. It was exhibited in September at the Warsaw XXX exhibition, where representatives of WSK-Okecie confirmed that the PZL-106 airframe is able to accept a wide variety of horizontally-opposed or radial piston engines, and turboprops, in the 330–600 hp range.

Initial production aircraft are expected to be similar to the Lycoming-powered second prototype, of which a description follows:

TYPE: Single-engined agricultural aircraft.

WINGS: Braced low-wing monoplane, with upward-cambered tips. All-metal two-spar constant-chord structure. Slotted ailerons. Full-span fixed leading-edge slats. Non-retractable auxiliary aerofoil flap beneath each trailing-edge, inboard of aileron. Streamline-section Vee bracing-struts, with jury struts.

FUSELAGE: Welded steel-tube structure, covered with glassfibre-reinforced plastics.

TAIL UNIT: T-tail of duralumin construction, with single bracing strut each side.

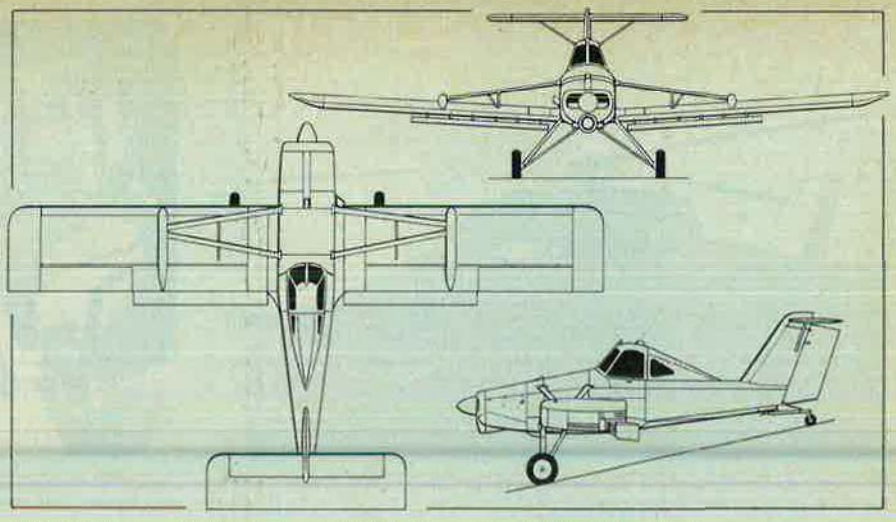
Fixed surfaces metal-covered; rudder and elevator fabric-covered. Large mass balance at each elevator tip. Small ground-adjustable tab on rudder.

LANDING GEAR: Non-retractable tailwheel type. Main wheels, with large-diameter low-pressure tyres, each carried on side Vee and half-axle. Oleo-pneumatic shock-absorbers. Steerable tailwheel.

POWER PLANT: One 400 hp Lycoming IO-720-A1B eight-cylinder horizontally-opposed aircooled engine, driving a three-blade constant-speed metal propeller. Total fuel capacity 79 Imp gallons (360 litres).

ACCOMMODATION: Pilot only, in enclosed, ventilated and air-conditioned cockpit. Second (mechanic's) seat can be fitted aft of pilot. Cockpit area of fuselage is strengthened, with integral steel-tube overturn structure. Combined window and door on each side.

EQUIPMENT: Easily removable non-corrosive hopper/tank, forward of cockpit, can carry 1,763–2,204 lb (800–1,000 kg) of dry or liquid chemicals and has a maximum capacity of 275 Imp gallons (1,250 litres). Venturi distributor for dry chemicals can provide swath widths of 82–150 ft (25–45 m).



PZL-106 Kruk agricultural aircraft (400 hp Lycoming IO-720-A1B engine) (Pilot Press)

DIMENSIONS, EXTERNAL:

Wing span	42 ft 7¾ in (13.00 m)
Length overall	27 ft 6¾ in (8.40 m)
Height overall	9 ft 6¼ in (2.90 m)

AREA:

Wings, gross	317.5 sq ft (29.50 m²)

WEIGHTS:

Weight empty	2,314 lb (1,050 kg)
Max T-O weight	4,960 lb (2,250 kg)

PERFORMANCE:

Max level speed	113 knots (130 mph; 210 km/h)
Econ cruising speed	91 knots (105 mph; 170 km/h)
Operating speed with chemical load	1,763 lb (800 kg) 65–86 knots (75–100 mph; 120–160 km/h)
Operating height	15–50 ft (5–15 m)
Rate of climb at S/L	885 ft (270 m)/min
T-O run	335 ft (102 m)
Landing run	348 ft (106 m)

SIKORSKY

SIKORSKY AIRCRAFT, DIVISION OF UNITED AIRCRAFT CORPORATION; Head Office and Works: Stratford, Connecticut 06602, USA

SIKORSKY S-76

Sikorsky Aircraft announced on 19 January 1975 the company's decision to build a new 12-passenger twin-turbine commercial helicopter, as the first stage of a programme intended to give the company a bigger share of the civil aircraft market.

The go-ahead for prototype construction follows a year of design and market research, with the intention of achieving a first flight in mid-1976. Designated Sikorsky S-76, the design will conform with FAR Part 29 Category A IFR, or appropriate military specifications, the deciding factor being which of these two specifications has the more stringent requirement. By designing and building to this latter standard, Sikorsky plans not only to produce a rugged and reliable civil helicopter, but one which could be taken "off-the-shelf" to satisfy a military role without any major modifications to airframe structure or dynamic system.

The S-76 will benefit from the design, research, and development work carried out on the dynamic system of Sikorsky's YUH-60A UTTAS. The main rotor, for example, is a scaled-down version of that developed for the YUH-60A. The power plant is to consist of two 650 shp Allison 250-C30 turboshaft engines, a growth version of the current production Model 250-C20, which powers a number of important helicopters.

The development schedule set by Sikorsky calls for FAA certification and initial deliveries in late 1977, with quantity production beginning in 1978.

TYPE: Twin-turbine general-purpose all-weather helicopter.

ROTOR SYSTEM: Four-blade main rotor. Blades have titanium spars, glassfibre skins, and swept tips. Blades pressurised and equipped with gauges to provide fail-safe indication of blade structural integrity. Elastomeric rotor hub bearings which need no lubrication. Bifilar vibration absorbers on rotor head. Cross-beam four-blade tail rotor of composite materials.

ROTOR DRIVE: Conventional transmission system, with both turbines driving through freewheeling units to main gearbox. Intermediate and tail rotor gearboxes are grease-packed to reduce maintenance.

FUSELAGE: Conventional semi-monocoque light alloy structure.

TAIL UNIT: Pylon structure with tail rotor on port side. Large fixed tailplane, which serves also to protect passengers or ground crew from contact with the tail rotor.

LANDING GEAR: Hydraulically-retractable tricycle type, with single wheel on each unit. Nosewheel retracts aft, main units inward into rear fuselage; all three units are enclosed by wheel doors when retracted.

POWER PLANT: Two 650 shp Allison 250-C30 turboshaft engines, mounted above the cabin aft of the main rotor shaft. Standard fuel system has a capacity of 276 US gallons (1,045 litres). Extended range fuel tanks optional.

ACCOMMODATION: Pilot and co-pilot plus a maximum of 12 passengers. In this configuration passengers are seated on three four-abreast rows of seats, floor-mounted at a pitch of 31 in (79 cm). A number of executive layouts are available, including a four-passenger "Office-in-the Sky" configuration. Executive versions will have luxurious interior trim, full carpeting, special soundproofing, radio-telephone, and co-ordinated furniture. Two large doors on each side of fuselage, hinged at their forward edges. Baggage hold aft of cabin, with external access door on each side of the fuselage; capacity 42 cu ft (1.19 m³). Optional external cargo hook has a capacity of more than 4,800 lb (2,177 kg).

Mockup of the Sikorsky S-76 twelve-passenger all-weather multi-mission commercial helicopter

Full IFR instrument panel, complete with digital readout area navigation and communications system, installed in S-76 mockup

EQUIPMENT: Optional equipment includes air-conditioning, weather radar, rescue hoist, emergency flotation gear, engine air particle separators, full IFR, and advanced nav/com equipment.

DIMENSIONS, EXTERNAL:
- Diameter of main rotor: 40 ft 0 in (12.19 m)
- Diameter of tail rotor: 8 ft 0 in (2.44 m)
- Length overall: 41 ft 10 in (12.75 m)

DIMENSIONS, INTERNAL:
- Cabin: Length: 8 ft 2 in (2.49 m)
- Max width: 6 ft 4 in (1.93 m)
- Max height: 4 ft 6 in (1.37 m)
- Floor area: 55 sq ft (5.11 m²)
- Volume: 198 cu ft (5.61 m³)

AREAS:
- Main rotor disc: 1,257 sq ft (116.77 m²)
- Tail rotor disc: 50.27 sq ft (4.67 m²)

WEIGHTS AND LOADING:
- Weight empty, standard equipment: 4,804 lb (2,179 kg)
- Max T-O weight: 9,585 lb (4,348 kg)
- Max disc loading: 7.62 lb/sq ft (37.2 kg/m²)

PERFORMANCE (A at gross weight of 9,585 lb; 4,348 kg. B at gross weight of 8,400 lb; 3,810 kg):
- Max cruising speed:
  - A: 145 knots (167 mph; 269 km/h)
  - B: 155 knots (178 mph; 286 km/h)
- Cruising speed for max range:
  - A: 125 knots (144 mph; 232 km/h)
- Hovering ceiling in ground effect:
  - A: 5,100 ft (1,554 m)
  - B: 9,000 ft (2,743 m)
- Range, with 12 passengers, standard fuel, and 30 min reserve: 400 nm (461 miles; 742 km)
- Range, with 8 passengers, auxiliary fuel, and offshore equipment: 600 nm (691 miles; 1,112 km)
- Max ferry range, VFR equipment, and 30 min reserve: 750 nm (864 miles; 1,390 km)

HAWKER SIDDELEY

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

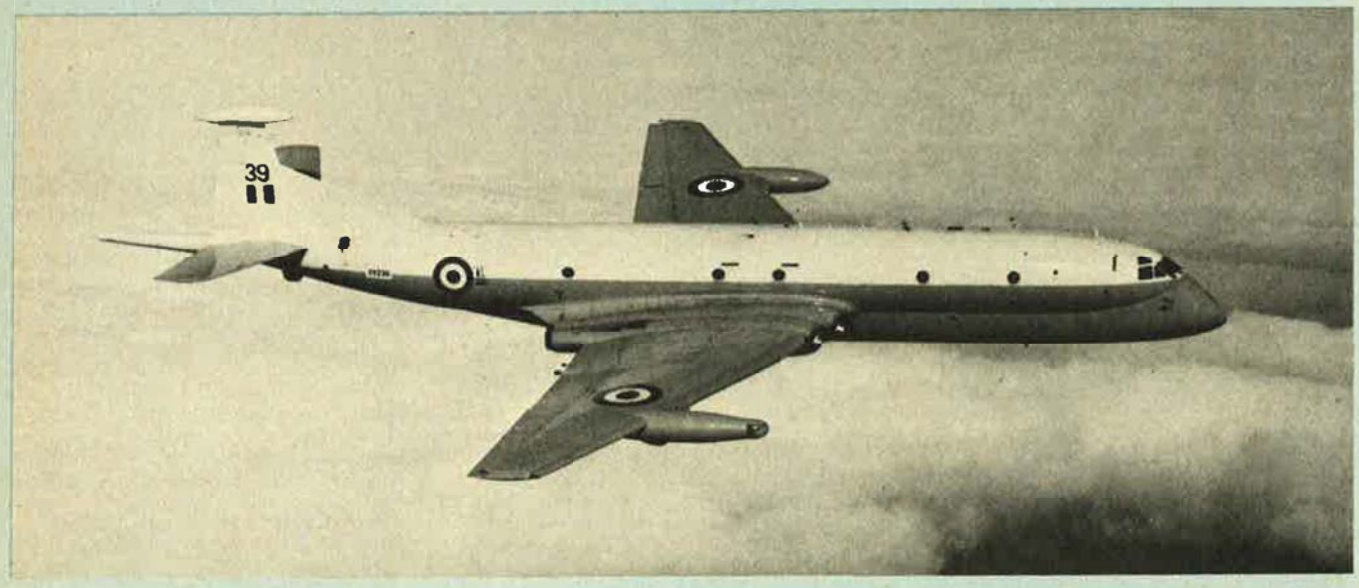
HAWKER SIDDELEY NIMROD

The Nimrod was evolved to replace the Shackleton maritime reconnaissance aircraft of RAF Strike Command, with whom it is scheduled to serve until well into the 1990s. Design of the Nimrod, as the Hawker Siddeley 801, began in June 1964, and government authority to proceed was announced in June 1965.

Based substantially upon the airframe of the Hawker Siddeley (de Havilland) Comet 4C, the Nimrod is a new-production aircraft with a 6 ft 6 in (1.98 m) shorter, modified pressurised fuselage; a new unpressurised, underslung pannier for operational equipment and weapons; and Rolls-Royce Spey turbofan engines (instead of the Avon turbojets of the Comet), with wider air intakes to allow for the greater mass flow. Other external changes include enlarged flight deck main windows and "eyebrow" windows; ESM and MAD equipment, in glassfibre fairings on top of the fin and in the tailboom respectively; and a searchlight in the starboard wing external fuel tank. The search radar is housed in a streamlined glassfibre fairing which forms the nose section of the aircraft's unpressurised lower fuselage.

The Nimrod was designed to combine the advantages of high-altitude, fast transit speed with low wing loading and good low-speed manoeuvring capabilities when operating in its primary roles of anti-submarine warfare, surveillance, and anti-shipping strike. When required, two of the four Spey engines can be shut down to extend endurance, and the aircraft can cruise and climb on only one engine. A wide range of weapons can be carried in the 48 ft 6 in (14.78 m) long bomb bay, and large numbers of sonobuoys and

Hawker Siddeley Nimrod MR. Mk 1 four-turbofan maritime reconnaissance aircraft of RAF Strike Command



RAF Strike Command Nimrod MR. Mk 1 overflying the Soviet anti-submarine helicopter carrier/cruiser Leningrad (Ministry of Defence)

markers can be carried and released from the pressurised rear fuselage area.

In addition to its surveillance and ASW roles, the Nimrod can be used for day and night photography, and has a stand-off surface missile capability. It can carry 16 additional personnel in the self-support role, or 45 persons after removal of some equipment in the aft section of the fuselage.

Two prototypes were built, both utilising existing Comet 4C airframes. The first of these (XV148), fitted with Spey engines, flew for the first time on 23 May 1967 and was used for aerodynamic testing. The second (XV147) retained its original Avon engines, was first flown on 31 July 1967, and was used for development of the nav/tac system and special maritime equipment.

The following production versions have been announced:

Nimrod MR. Mk 1. Initial production version, to which the detailed description in the 1974–75 *Jane's* applies. Thirty-eight ordered initially (XV226-263), the first of which was flown on 28 June 1968. Deliveries began on 2 October 1969 and were completed in August 1972. The MR. Mk 1 was delivered initially to No. 236 OCU, RAF Strike Command, at St Mawgan, Cornwall, and is now in service with No. 42 Squadron, also at St Mawgan; Nos. 120, 201, and 206 Squadrons at Kinloss, Scotland; No. 203 Squadron of the Near East Air Force, based at Luqa, Malta; and a detachment operating from Tengah, Singapore, as a part of the ANZUK force. Nimrod MR. Mk 1s have three times (1971, 1973, and 1974) won the Fincastle Trophy for anti-submarine aircraft, in competition with Neptune, Argus, and Orion aircraft of the Australian, Canadian, and New Zealand air forces.

An order for an additional eight MR. Mk 1 Nimrods was announced in January 1972, and delivery of these is to begin during 1975.

Nimrod R. Mk 1. Designation of three aircraft (additional to the 46 MR. Mk 1s ordered for RAF Strike Command) delivered in 1971 to No. 51 Squadron at Wyton, Huntingdonshire. These aircraft (XW664–666) are replacements for Comet 2s; they are said to be employed for electronic reconnaissance and to monitor hostile radio and radar transmissions, although official statements have referred only to radio/radar calibration duties connected with RAF equipment. They can be identified by the absence of an MAD tail-boom.

Nimrod MR. Mk 2. The RAF's Nimrod MR. Mk 1 fleet is to be refitted with new communications equipment, and advanced tactical sensor and navigation systems, beginning in 1975. Re-delivery of completely refitted aircraft is scheduled to take place during 1978–80, and the aircraft will then be redesignated MR. Mk 2. Equipment in this version will include an advanced search radar, offering greater range and sensitivity coupled with a higher data processing rate; and a new acoustic processing system, being developed by Marconi-Elliott Avionics Systems, which is intended to be compatible with a wide range of existing and projected sonobuoys. An export model of the Nimrod, equipped to MR. Mk 2 standards, is offered with uprated Spey engines, improved APU, and brake cooling.

In addition to the above versions, the RAF has under active consideration an AEW version of the Nimrod, in which the existing navigation equipment would be fully integrated with a detection system able to detect, track, and interrogate several targets simultaneously, and a communications system allowing precise target data to be relayed to surface or other airborne units. Additional tasks of which the AEW version would be capable include fighter vectoring; tactical direction; shadowing of surface forces; emergency civil air traffic control; and co-ordination of emergency relief operations.

Ample space and power is available in the basic Nimrod design to accept additional or alternative sensors such as sideways-looking radar, forward-looking infra-red, infra-red linescan, low light level TV, digital processing of intercepted ESM signals, and other new developments. Other roles for which it is suitable include airborne warning and control (AWACS); oversea or overland long-range search and rescue; sea control and fishery protection; emergency personnel transport; and in-flight refuelling tanker.

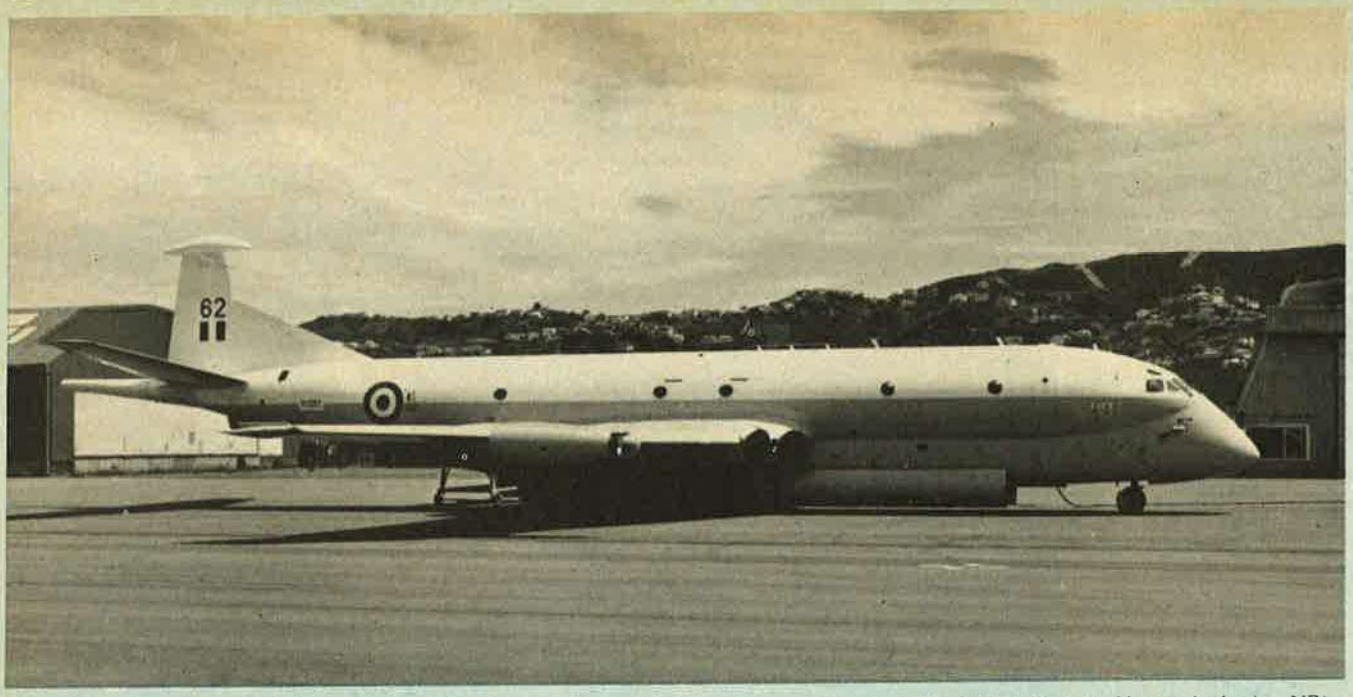
TYPE: Four-turbofan maritime patrol aircraft.

WINGS, FUSELAGE, TAIL UNIT, and LANDING GEAR: As described in 1974–75 *Jane's*.

POWER PLANT: Four Rolls-Royce RB.168-20 Spey Mk 250 turbofan engines, each rated at 12,140 lb (5,506 kg) st. Reverse thrust fitted on two outer engines. Fuel in fuselage keel tanks, integral wing tanks, and permanent external tank on each wing leading-edge, with total capacity of 10,730 Imp gallons (48,780 litres), equivalent to a fuel weight of 85,840 lb (38,940 kg). Provision for up to six removable tanks to be carried in the weapons bay, increasing max fuel weight to 100,940 lb (45,785 kg) and max overload T-O weight of aircraft to 192,000 lb (87,090 kg). Existing Spey engines will be modified to Mk 806 standard in MR. Mk 2, providing 4% greater thrust in high temperature operating conditions.

ACCOMMODATION: Normal crew of 12, comprising pilot, co-pilot, and flight engineer on flight deck; routine navigator, tactical navigator, radio operator, radar operator, two sonics systems operators, ESM/MAD operator, and two observers/stores loaders in main (pressurised) cabin, which is fitted out as a tactical compartment. In this compartment from front to rear are a toilet on the port side; stations for the two navigators (stbd), radio and radar operators (port), and sonics systems operators (stbd) in the forward section; ESM/MAD operator's station, galley, four-seat dining area, rest quarters, and sonobuoy stowage, in the middle section; and buoy and marker launch area in the rear section. Three hemispherical observation windows forward of wings (one port, two stbd), giving 180° field of view. Two normal doors, emergency door, and four overwing emergency exits. Weapons bay can be utilised for additional fuel tanks (*see under "Power Plant"*) or for the carriage of freight. Provision is made for a trooping role, in which configuration 45 passengers can be accommodated if some rear-fuselage equipment is removed.

SYSTEMS: As described in 1974–75 *Jane's*. Upgraded APU in MR. Mk 2.



Nimrod MR. Mk 1 of No. 206 Squadron, RAF Kinloss; winner of 1974 contest for Fincastle Trophy (Wellington Airport Authority, NZ.)

ELECTRONICS AND EQUIPMENT (MR. Mk 1): Routine navigation by Decca Doppler Type 67M/Marconi-Elliott E3 heading reference system, with reversionary heading from a Sperry GM7 duplicated gyro compass system, operating in conjunction with a Ferranti routine dynamic display. Tactical navigation, and stores selection and release, by Marconi-Elliott nav/attack system utilising an 8K Marconi-Elliott 920B digital computer. Tactical display station provides continually-updated information about aircraft position, with present and past track, sonobuoy positions, range circles from sonobuoys, ESM bearings, MAD marks, radar contacts, and visual bearings. Course information can be displayed automatically to the pilots on the flight director system; alternatively, the computer can be coupled to the autopilot to allow the tactical navigator to direct the aircraft to a predicted target interception, weapon release point, or any other point on the tactical display. ASW equipment includes Sonics 1C sonar and a new long-range sonar system; EMI ASV-21D air-to-surface-vessel detection radar in nose; Autolycus ionisation detector; Thomson-CSF ESM (electronic support measures) equipment in pod on top of fin; and Emerson Electronics ASQ-10A MAD (magnetic anomaly detector) in extended tailboom. Strong Electric 70 million candlepower searchlight at front of starboard external wing fuel tank. Aeronautical and General Instruments F.126 and F.135 cameras for day and night photography respectively, the latter having Chicago Aero Industries electronic flash equipment. Smiths SFS.6 automatic flight control system, embodying SEP.6 three-axis autopilot, integrated with the navigation and tactical system. Twin Plessey PTR 175 UHF/VHF, and one Marconi-Elliott AD 470 HF, communications transceivers; twin Marconi-Elliott AD 260 VOR/ILS; Hoffman ARN-72 TACAN; Decca LORAN C/A; Marconi-Elliott AD 360 ADF; Honeywell AN/APN-171(V) radar altimeter. Yaw damper and Mach trim standard.

ELECTRONICS AND EQUIPMENT (MR. Mk 2): New and more flexible operational system, using three separate processors for tactical navigation, radar, and acoustics. Marconi-Elliott central tactical system, based on a 920 ATC computer with a greater storage capacity than that of the MR. Mk 1, to provide improved navigational precision, computing speed, and display capability. EMI Searchwater long-range air-to-surface-vessel radar, with its own data processing subsystem incorporating a Ferranti FM 1600D digital computer. This system presents a clutter-free picture, can detect and classify surface vessels, submarine snorts, and periscopes at extreme ranges, can track several targets simultaneously, and is designed to operate successfully in spite of countermeasures. Acoustics processing and display system, based on twin Marconi-Elliott 920 ATC computers, will be compatible with a wide range of sonobuoys, including the Anglo-Australian Barra, the Canadian Tandem, the US SSQ-41 and SSQ-53, and the new generation of command active buoys being developed in the UK and USA. Starting in 1975, communications will be improved by the installation of twin Marconi-Elliott HF transceivers (instead of the present single AD 470), and a radio teletype and encryption system.

ARMAMENT (MR. Mk 1): 48 ft 6 in (14.78 m) long weapons bay, with two pairs of doors, in unpressurised lower fuselage pannier, able to carry up to six lateral rows of ASW weapons, accommodating up to nine torpedoes as well as depth charges, or varying numbers of different-sized mines or bombs. Alternatively, to give greater range and endurance, up to six auxiliary fuel tanks can be fitted in the weapons bay, or a combination of fuel tanks and weapons can be carried. To ensure weapon serviceability, the weapons bay is heated when the ambient temperature falls below 5°C. Bay approx 30 ft (9.14 m) long in rear pressurised part of fuselage for storing and launching of active and passive sonobuoys and marine markers. Two rotary launchers, each capable of holding six size A sonobuoys, are used when the cabin is unpressurised; two single-barrel launchers are used when the aircraft is pressurised. A hardpoint is provided beneath each wing, just outboard of the main-wheel doors, on which can be carried two pylon-mounted pairs of AS.12 or other air-to-surface missiles, rocket or cannon pods, or mines, according to mission requirements.

DIMENSIONS, EXTERNAL:

Wing span	114 ft 10 in (35.00 m)
Wing chord at root	29 ft 6 in (9.00 m)
Wing chord at tip	6 ft 9 in (2.06 m)
Wing aspect ratio	6.2
Length overall	126 ft 9 in (38.63 m)
Height overall	29 ft 8½ in (9.08 m)
Tailplane span	47 ft 7¼ in (14.51 m)
Wheel track	28 ft 2½ in (8.60 m)
Wheelbase	46 ft 8½ in (14.24 m)

DIMENSIONS, INTERNAL, AND AREAS: As in 1974–75 *Jane's*.

WEIGHTS (MR. Mk 1):

Typical weight empty	86,000 lb (39,000 kg)
Max disposable payload	13,500 lb (6,120 kg)
Normal max T-O weight	177,500 lb (80,510 kg)
Max overload T-O weight	192,000 lb (87,090 kg)
Typical landing weight	120,000 lb (54,430 kg)

PERFORMANCE (MR. Mk 1):

Max operational necessity speed, ISA + 20°C	500 knots (575 mph; 926 km/h)
Max transit speed, ISA + 20°C	475 knots (547 mph; 880 km/h)
Econ transit speed, ISA + 20°C	425 knots (490 mph; 787 km/h)
Typical low-level patrol speed (two engines)	200 knots (230 mph; 370 km/h)
Operating height range	S/L to 42,000 ft (0–12,800 m)
Min ground turning radius	89 ft 0 in (27.1 m)
Runway LCN at T-O weight of 182,000 lb (82,550 kg)	50
T-O run at 177,500 lb (80,510 kg) AUW, ISA at S/L	4,800 ft (1,463 m)
Unfactored landing distance at 120,000 lb (54,430 kg) landing weight, ISA at S/L	5,300 ft (1,615 m)
Typical ferry range	4,500–5,000 nm (5,180–5,755 miles; 8,340–9,265 km)
Typical endurance	12 hr

The author examines the interrelated crises that confront NATO, assesses the balance of forces in Europe, and discusses what must be done to preserve the viability of . . .

NATO IN A TIME OF CRISIS

BY BRIG. GEN. RICHARD C. BOWMAN, USAF
DEPUTY DEFENSE ADVISOR, US MISSION TO NATO

THE nations of the North Atlantic Alliance are faced with a new dimension of defense needs at a time when they are barely able to maintain current levels of defense. To solve this dilemma, they must seek increased effectiveness through greater cooperation within the Alliance.

The crisis in energy and economics is fairly well understood. A fourfold increase in the cost of oil will obviously create severe problems in industrial societies. Unfortunately, security problems and requirements are not so easy to demonstrate, especially after thirty years of peace. And they seem even less real in a period described as détente, a period when the major governments are engaged in negotiating arms limitations and force reductions.

The security balance has undergone a change as fundamental and difficult to deal with as the energy situation. But the change in the security balance has come about slowly, and its effects will not be fully understood unless there is an overt military threat to Europe or, at worst, an attack.

For thirty years, the threat of strategic nuclear war has inhibited any major attack against the West. All nations have worried about that threat, but the full weight rested most heavily on any would-be aggressor. Today, however, Soviet strategic nuclear missile strength has grown to the point that a NATO strategic nuclear retaliation against a conventional attack in Europe is certainly not credible as the sole basis for defense.

As Soviet strategic capability increased during the 1960s, some American strategists favored putting the nuclear genie back in the bottle and returning to a purely conventional defense. A few were even willing to accept another Dunkirk, if necessary, fighting back to the Continent as in World War II, rather than ever using nuclear weapons.

But the fallacy in this thinking was that a purely conventional defense would not ensure deterrence. There would always be some military leader who would invent a new Schlieffen plan or *blitzkrieg* technique that would appear to guarantee victory, given the advantage of choosing the time and place of attack. And Europeans pointed out that the US might not be so willing to give up nuclear deterrence if the Soviet tank force were deployed on the US-Canadian border, instead of in Central Europe.

Consequently, the approved NATO strategy became neither massive retaliation, nor tactical nuclear operations, nor a conventional defense, but rather "flexible response." This strategy was designed to avoid war by preserving the deterrent value of each of the three levels of warfare, while reducing the likelihood of suffering the worst consequences if an attack should occur.

Any conventional attack would be met by a conventional defense designed to prevent significant penetration of NATO territory. Even if some stratagem should succeed against the conventional defense, attacking forces would have to operate in concentrated formations, against which tactical nuclear weapons would be effective. And the attacker could expect no great advantage from continuing the conflict at the nuclear level, for he would be fully countered in

that type of warfare as well. There would be the possibility of selected strategic strikes against his supply lines and the ultimate danger of strategic war.

Some have argued that it would be less expensive to disband conventional forces and depend on fewer men equipped with many small nuclear weapons. But if NATO lacked conventional capability, the attacking units could move in dispersed formations, against which nuclear weapons would provide little advantage.

Continued deterrence depends on a NATO triad of conventional, tactical nuclear, and strategic nuclear capabilities. As long as the United States held strategic superiority, it was enough to have conventional forces loosely organized to trigger strategic retaliation. But now those forces must be ready to carry out an effective conventional defense of Alliance borders if deterrence is to continue. And this calls for major improvements in conventional forces.

Present Strength of the Alliance

The Alliance has pursued many improvements in the past for the sake of extra insurance, usually falling far short of its goals. Today, the same improvements have become vital to maintaining deterrence. It remains to be seen whether this difference will be understood in time to prevent a military or political defeat.

Some improvements in Alliance forces are under way. Our European allies, in the period 1973–76, are acquiring 1,550 new tanks, 3,000 other armored vehicles, 1,150 heavy and medium antitank weapons, 62,000 light antitank weapons, and 550 new tactical aircraft. The tactical aircraft include nine squadrons of F-4 Phantoms in the tactical support and reconnaissance roles (175 F-4Fs for the Federal Republic of Germany alone); seven squadrons of Jaguars in the offensive support role; and seven squadrons of F-104S aircraft for air defense and attack roles. Plans call for the acquisition of 820 Multi-Role Combat Aircraft (MRCA) toward the end of the decade, with 320 going to West Germany, 380 to the UK, and 120 to Italy.

The US is equipping its forces in Central Europe with new antitank weapons and will soon introduce new types of tactical aircraft. New ground-launched and air-launched antitank weapons offer the means to defend against Warsaw Pact tank strength.

NATO has the basis for an adequate defense, with approximately the same number of men under arms as the Warsaw Pact. But raw numbers must be viewed in the light of certain major strengths and weaknesses on both sides. The Pact has standardized doctrine and equipment, and the advantage of interior lines of communication for concentrating forces, although there is some question how effective satellite troops would be in attacking the West. NATO would

Top left, US troops prepare to move out on a NATO exercise. Top right, a Leopard medium tank, of which there are more than 3,000 in the ground forces of Belgium, Germany, Italy, the Netherlands, and Norway. Above, the Milan antitank missile, developed cooperatively by Germany and France.

have the advantages of defensive positions and the superior moral strength of the defender, but allowance must be made for the large contingents from countries such as Greece and Turkey, which do not have sufficient modern equipment.

In the critical Central Region of Europe, the Warsaw Pact has about 925,000 ground-force personnel (about half of them Soviet troops) located in East Germany, Poland, and Czechoslovakia; NATO has about 775,000 (including 193,000 US troops) in West Germany and the Benelux countries. In the same region, the Pact has 15,500 tanks, while NATO has only 6,000. NATO, however, has more and better antitank weapons, and, with rapid reinforcements, an advantage in tactical air capability due to longer-range aircraft with heavier payloads and more accurate weapons.

Why US Troops in Europe?

Many Americans do not understand why US troops are still defending Europe nearly thirty years after World War II. So far, Congress has accepted the argument that three decades of peace in Europe justify the cost of keeping US troops there, especially since it would cost almost as much to maintain them at home. While aiding in the defense of Europe, those US forces ultimately exist for the defense of the United States. The Nunn Amendment to the

British Royal Marines participating in an exercise in Norway. Mobility is a key to defending NATO's northern flank.

1974 Procurement Authorization Act provides for a reduction of 18,000 US support troops in Europe, but it allows the Secretary of Defense to replace those men with combat troops—which he intends to do.

The USSR has more than 4,000,000 men under arms, while the US has only 2,100,000. The Soviets spend at least eight to ten percent of their GNP (probably much more) on military forces, while we spend less than six percent. Yet an effective security balance exists because the US is a member of NATO.

To this Alliance, the US contributes strategic capabilities and well-armed general-purpose forces. Europe contributes only minor strategic forces, but more than 3,000,000 men for general-purpose forces. Neither the US nor its European allies could provide adequate security with current defense capabilities if it were not for the Alliance.

If the two sides of the Atlantic partnership were to decide to go it alone, each would have to move toward the much higher level maintained by the Soviets—Europe to preserve its independence, and the US to avoid the gradual subjugation of its friends around the world and an even more expensive "Fortress America" existence.

The proper sharing of the burden is, of course, a difficult judgment to make. The United States defense budget amounts to sixty-five percent of the sum of all the defense budgets of Alliance nations, but it would be only fifty-seven percent if corrected for higher pay scales in the US. That figure is fairly close to the US share of the total Gross National Product of all Alliance nations. Also, some deduction would have to be made for US defense expenditure in other parts of the world. With respect to forces stationed in Europe, the US provides only ten percent of the ground forces, twenty percent of the sea forces, and twenty-five percent of the air forces.

The proportion of overall effort contributed by the US may not be far out of line, but it remains to be seen whether European governments can maintain their share in the face of their relatively worse position with respect to energy resources.

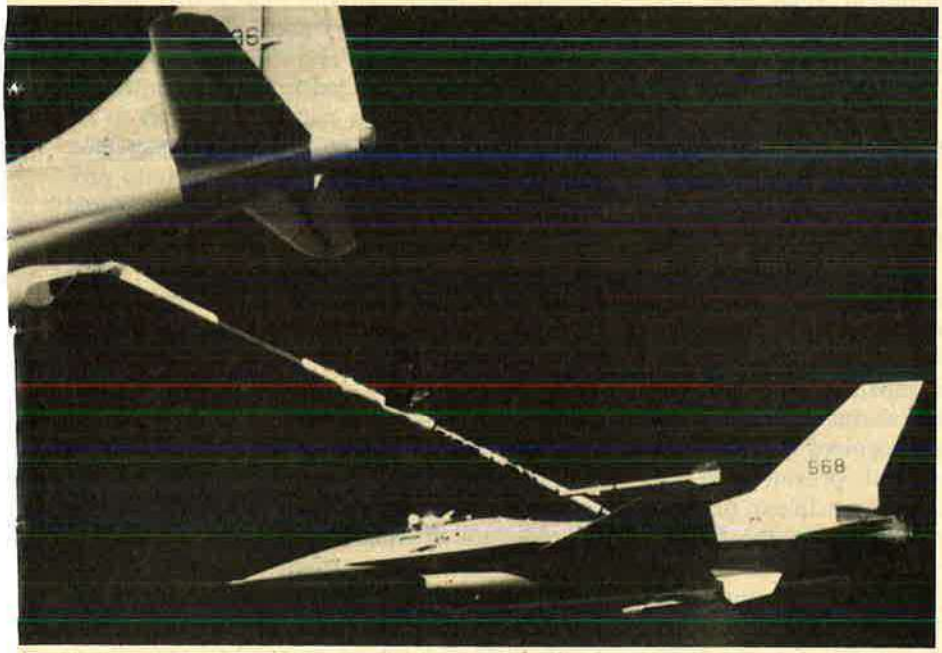
Balance-of-payments problems also will prove difficult to solve. The Jackson-Nunn Amendment, passed in November 1973, required that the Europeans eliminate that part of the US balance of payments deficit caused by troops stationed in Europe, or that the number of US troops in Europe be reduced by the percentage of the deficit not offset. For FY '74, the period covered by the Amendment, European countries appear to have fully offset US expenditures of approximately $2.1 billion, for the most part by European defense purchases in the United States. However, the Europeans will have far more difficulty in future years when they face a heavy outflow of currency due to the increased price of oil.

NATO Requirements

What is required of the Alliance under present circumstances? We know that the Warsaw Pact has steadily increased its defense spending by three to five percent a year. If that increase continues, NATO can provide an adequate defense only by increasing Alliance cooperation.

In the words of Secretary of State Henry Kissinger, "We must strike a new balance between self-interest and the common interest." National authorities are under strong pressure from military services, industries, and segments of the voting public to pursue specific short-term national interests, at the expense of Alliance interests that involve longer-term economies.

In the area of research, development, and procurement of defense equipment, national industrial representatives are usually more interested in competing than cooperating. Each country hopes to develop weapon systems that it can sell to the Allies and Third World countries, but the usual result is development and adoption of four or five different national systems, all for the same purpose, eliminating any possibility of common logistics support. Dr. John S. Foster, Jr., former DoD Director of Defense Research and Engineering, estimated that there is more than $1 billion of unnecessary



The NATO European allies are acquiring 550 new tactical aircraft, among them seven squadrons of Jaguars (top) for support roles. Toward the end of the decade, Germany, the UK, and Italy plan to buy 820 MRCA aircraft (bottom). The US F-16 (center) is a candidate to replace NATO F-104s.

The author, Brig. Gen. Richard C. Bowman (Maj. Gen. selectee), is a West Point graduate who holds a doctorate in political science from Harvard University. Prior to his appointment in 1973 as Deputy Defense Advisor, US Mission to NATO, he was Chief of the Research and Analysis Division, Office of the Secretary of the Air Force. He was a B-26 flight commander in the Korean War, and has served as a flight instructor, a member of the political science faculty at the Air Force Academy, a planner at Air Force Headquarters, and as Military Assistant to the Chairman of the Joint Chiefs of Staff. General Bowman is a graduate of the National War College and a member of the Council on Foreign Relations.

duplication in R&D each year within the Alliance. This figure does not include the cost of duplicate logistics and training systems, or the military costs of compensating for nonstandard equipment.

In his retirement speech in April 1974, Gen. Johannes Steinhoff, former Chairman of the NATO Military Committee, said that unrestrained national competition in armaments "has helped to make NATO look today like an army museum." And Gen. Andrew Goodpaster, until recently the Supreme Allied Commander in Europe, has said that existing forces would be improved by one-third with no increase in size if NATO had greater weapons standardization. Different weapons mean different types of logistics support and problems in cooperation during combat.

NATO has now reached the point where progress in standardizing weapons is a necessity instead of just a topic for debate. Adequate defense requires effective capability for both nuclear and conventional warfare. The United States, for its part, has recognized that the high cost of R&D combined with pressures on defense budgets will make it impossible to develop all the necessary new weapons in the United States. Secretary Schlesinger said at the December 1974 NATO Ministerial Meeting that weapons standardization must become a two-way street across the Atlantic. And in January 1975, the United States selected the German-French Roland antiaircraft system to be produced under license by US industry for the US Army.

In Europe, there are a number of cooperative weapons programs involving more than one country, such as the German-French Milan and Hot antitank missiles, the British-French helicopter program and Jaguar attack aircraft, and the British-German-Italian Multi-Role Combat Aircraft. The NATO Eurogroup, composed of most of the European countries except France, is working toward additional projects, with current emphasis on selecting a common replacement aircraft for the F-104.

But there would still be far too much duplication of effort if the Eurogroup, France, and the US each went its own way. Also, NATO would not fully realize the great military value of standardized weapons and interchangeable logistics support.

A Long-Term Requirement

The European allies must not let their goal of eventual European Union rule out defense cooperation with the United States either now or in the future. The idea that European Union requires European allies to work toward an exclusively European defense system is a fallacious, even dangerous, notion. To promote European cooperation programs and European standardization, to the exclusion of improvements in Alliance-wide defense capabilities, would overlook the fact that the United States provides the bulk of reinforcement forces, and those forces must be able to operate wherever they are needed. The United States, for its part, must be willing to adopt a fair share of suitable weapons developed in Europe.

The Alliance as a whole needs to recognize, now, that cooperation both ways across the Atlantic is not a temporary need, but a long-term benefit. While it might be less troublesome to have completely independent defense forces, we do not have them now and are not likely to return to that situation in the future. Democracies, with no aggressive intent, are not likely to provide twice the defense resources they would otherwise need merely to relieve their governments of the need to cooperate with each other. If European Union succeeds and force-reduction agreements are negotiated, allied publics will demand appropriate reductions in defense efforts rather than a return to more expensive independence in defense matters.

Cooperation in the Alliance must include an allotment of research-and-development tasks, prototype competitions, and long-term sharing in production of Alliance weapons in accordance with the resources contributed. There must also be an acceptable method of sharing any additional sales to non-NATO countries. NATO's Conference of National Armaments Directors is working hard on this overall problem.

The Alliance is also working on rationalization of military tasks. The goal is to avoid unnecessary duplication in such areas as training, communications, and logistics facilities.

The task before NATO is to move toward a single efficient defense program, compatible with the continued political independence of its members. The Alliance must institute the cooperative programs necessary to maintain an effective defense in the face of new military requirements and economic crisis. ■

The Immortal SPITFIRE

BY LT. COL. WILLIAM R. DUNN, USAF (RET.)

On August 27, 1941, while assigned to the RAF's No. 71 Eagle Squadron, the author shot down his fourth and fifth German aircraft and became the first American ace of World War II. Here he tells what it was like to fly . . .

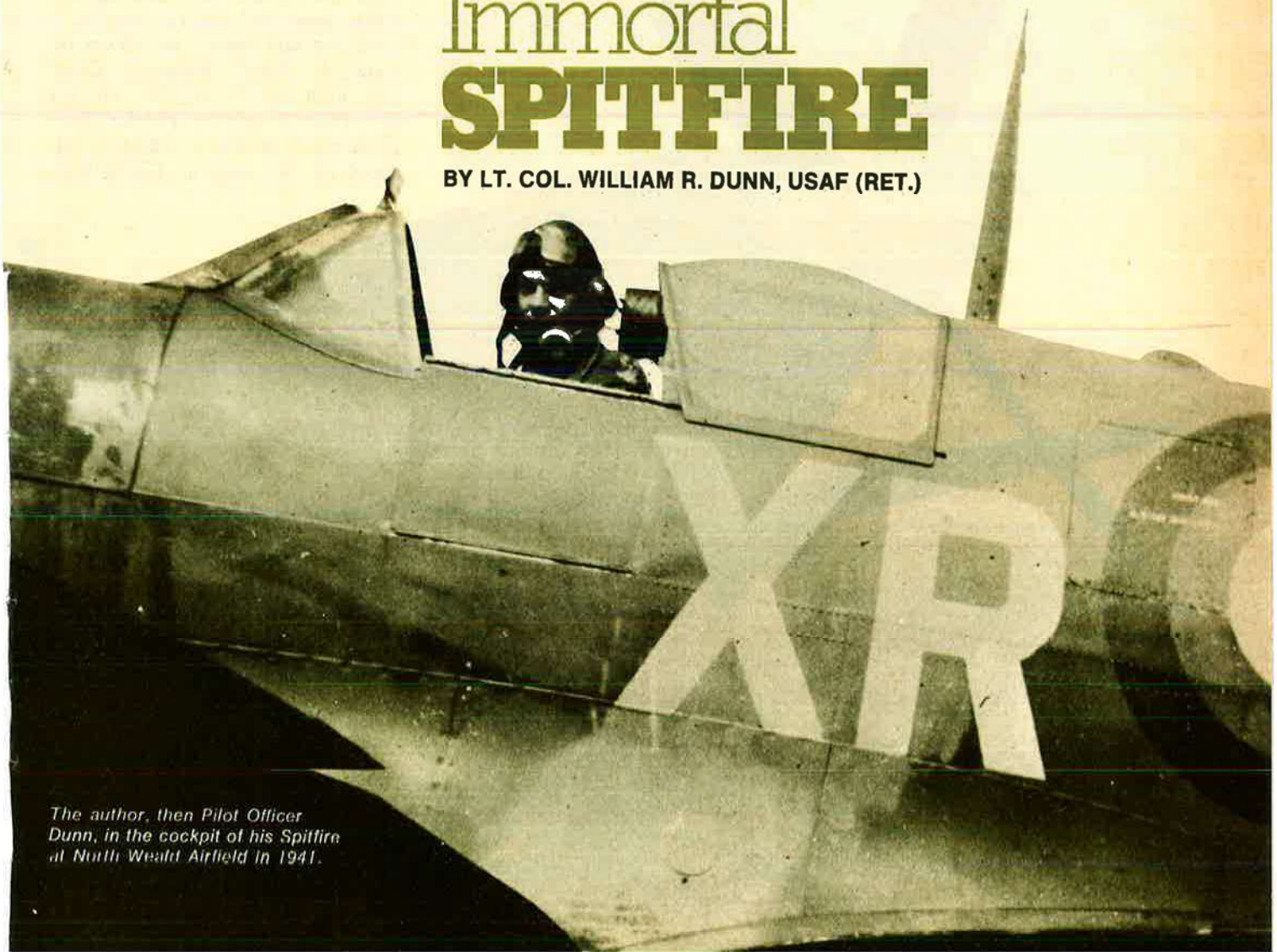
THE Vickers Supermarine Spitfire —the iron fist of the Royal Air Force's Fighter Command during World War II—has gained well-deserved immortality in the annals of aerial warfare. It was the answer in those bygone years to the fighter pilot's dream of a near perfect fighting machine—fast, highly maneuverable, with exceptional climb rate and deadly firepower, yet gentle and easy to fly with absolutely no bad characteristics.

If you've ever flown a "Spit," you know exactly what I mean. If you haven't, you'll never know the sensations and enjoyment that you've missed.

In its day—fighter vs. fighter—the Spitfire was absolutely the best combat aircraft. And I know something about fighters. I flew combat tours in the Hawker Hurricane IIB; Supermarine Spitfire IIA, VB, and IX; the Republic Thunderbolt P-47D15, D20, and D25; and the North American Mustang P-51B and D. I have also flown the Typhoon, the P-38 Lightning, the P-39 Airacobra, and the P-40 Warhawk, but not in combat.

Well, in those long-ago days of World War II, the Spitfire was, in my view, the only aircraft to measure up, and far exceed, the claims of its manufacturer. Am I prejudiced? You bet I am, especially when it comes to a discussion of the prowess of WW II propeller-driven fighter aircraft. I'm not implying that other fighters weren't good—they were—but not quite as good as the Spitfire.

When discussing the Spitfire, we must consider the entire evolution of its production series, from the Mark I of 1938–40 to the last of the many,



The author, then Pilot Officer Dunn, in the cockpit of his Spitfire at North Weald Airfield in 1941.

the Spitfire F21 and F22, of 1946. (Some Spitfires remained on active service with the RAF until 1954.) Each version, in its day, was fully capable of more than handling its adversary.

The Spitfire I and II were a match and more for the German Me 109Es, Me 110s, and bombers during the 1940–41 era, with the Battle of Britain ending in complete defeat for the enemy's air armadas. The Spitfire V could take care of the newer German Me 109Fs and FW 190As from 1941 and beyond, and the Spitfire IXs outclassed the Me 109Gs and FW 190Ds from 1942 until the European war ended in total defeat for Germany.

Fighter pilots of today seem to look back on our WW II aircraft as sort of primitive, flimsy, slow machines. Well, they weren't primitive by the standards of that time. Nor were they flimsy. I know a couple of guys who went through brick walls and came out the other side in one piece. I've seen Spits shot up and apart, with pieces of wings and tails blown off, but they still managed to recover safely at their home bases.

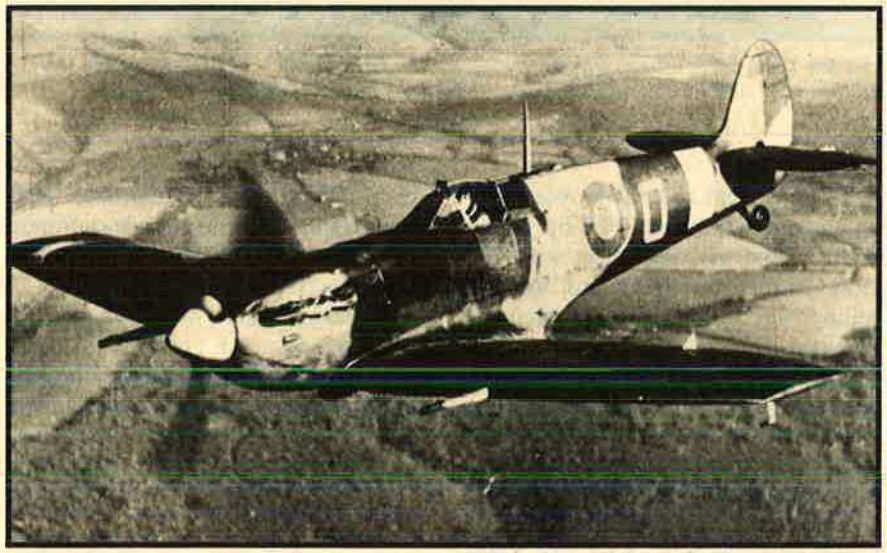
Slow? Not bloody likely! One pilot I know hit 440 mph IAS (indicated airspeed) at 27,000 feet, which figures out to be about 600 mph TAS (true airspeed)!

High-altitude operations? For the Spit, 35,000 to 41,000 feet was not unusual. Indeed, several versions of the Spit had pressurized cockpits and could operate at 45,000 feet. I have heard, but can't honestly confirm, that a stripped-down Spitfire in the North African theater shot down a German photo-reconnaissance aircraft at 56,000 feet in 1943!

My stepfather and uncle were both fighter pilots in World War I, and I suppose I thought their machines—the Spad and Sopwith Camel—were a bit crude and rickety. But I'll bet that if I had told them so, I'd have gotten an earful—just as I'm telling you "new boys" now.

How the Spits Grew

Just for the record, here are a few bits of information concerning the Supermarine Spitfire and its several versions. The basic Spitfire, conceived by Reginald J. Mitchell, evolved from his 1925 to 1931 designs for high-speed aircraft to compete in the international Schneider Trophy Races, which his aircraft won several times. In 1933, Mitchell began work on his prototype Spitfire, but he unfortunately suffered a setback when he underwent an operation for cancer. He continued his work, however, and on March 5, 1936, the first Spitfire was flown by Capt. J. "Mutt" Summers, Chief Test Pilot for Vickers. The aircraft performed exactly as Mitchell had predicted it would, reaching a top speed of 342 mph at 17,000 feet.



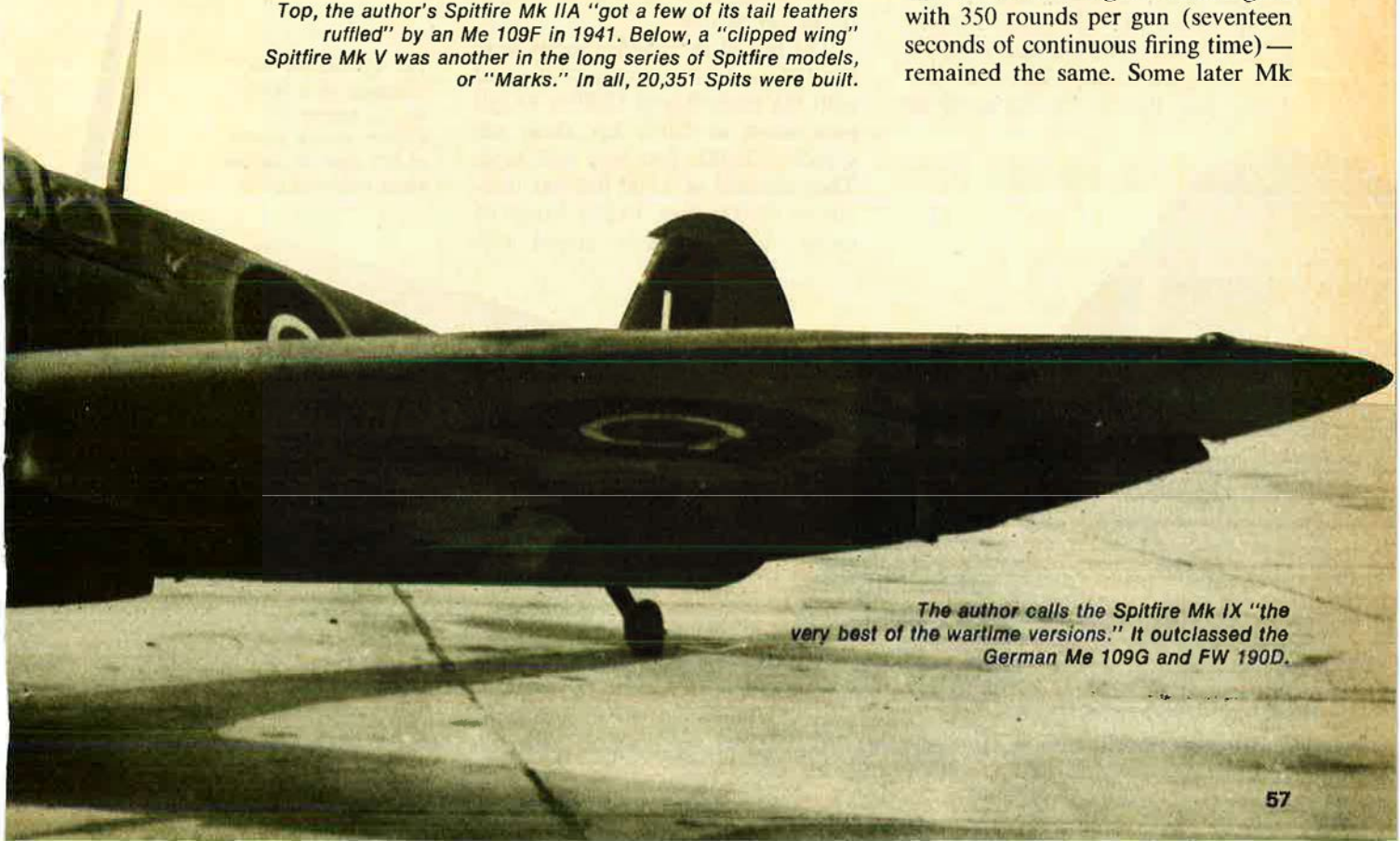
Top, the author's Spitfire Mk IIA "got a few of its tail feathers ruffled" by an Me 109F in 1941. Below, a "clipped wing" Spitfire Mk V was another in the long series of Spitfire models, or "Marks." In all, 20,351 Spits were built.

Mitchell died in 1937, at the age of forty-two, his body worn out from work and ravaged by cancer.

The British Air Ministry placed an initial order for 310 Spitfires on June 3, 1936. Production began in early 1937, and the first operational aircraft were delivered to No. 19 Fighter Squadron on August 4, 1938 —the Supermarine Spitfire Mark I. By the outbreak of WW II in September 1939, nine RAF fighter squadrons were equipped with Spitfires.

The Spitfire Mk I had a Rolls-Royce Merlin II 1,030-hp engine (later models had Merlin III engines), armament of eight .303-caliber Browning machine guns, a maximum speed of 362 mph at 18,000 feet, a range of 575 miles, a climb rate of 2,530 feet per minute (fpm), and a ceiling of 31,900 feet. The aircraft was small: Weight, loaded, was 6,200 pounds, wingspan 36 feet 10 inches (wing loading twenty-six pounds per square foot), and length 29 feet 11 inches.

My first Spitfire, a Mk IIA, had a Rolls-Royce Merlin XII 1,150-hp engine, which made it about ten mph faster than the Mk I, gave a better rate of climb by about 100 fpm, and increased the ceiling to 32,800 feet. The armament—eight machine guns with 350 rounds per gun (seventeen seconds of continuous firing time)—remained the same. Some later Mk



The author calls the Spitfire Mk IX "the very best of the wartime versions." It outclassed the German Me 109G and FW 190D.

IIB models had two 20-mm Hispano cannons installed, plus four machine guns, but we had a lot of trouble at first with the feed mechanism, which caused the cannons to jam after a few rounds were fired.

I might add here that the letter following the Mark number of the aircraft indicated the type of wing armament and configuration. "A" indicated eight machine guns; "B" indicated two cannons and four machine guns; "C" indicated a universal wing that, with its guns, could also carry air/sea rescue flares, smoke bombs, food containers, and dinghies; the "D" had 133-gallon internal fuel tanks fitted into the wing's leading edge; and "E" indicated two cannons and two .50-caliber machine guns.

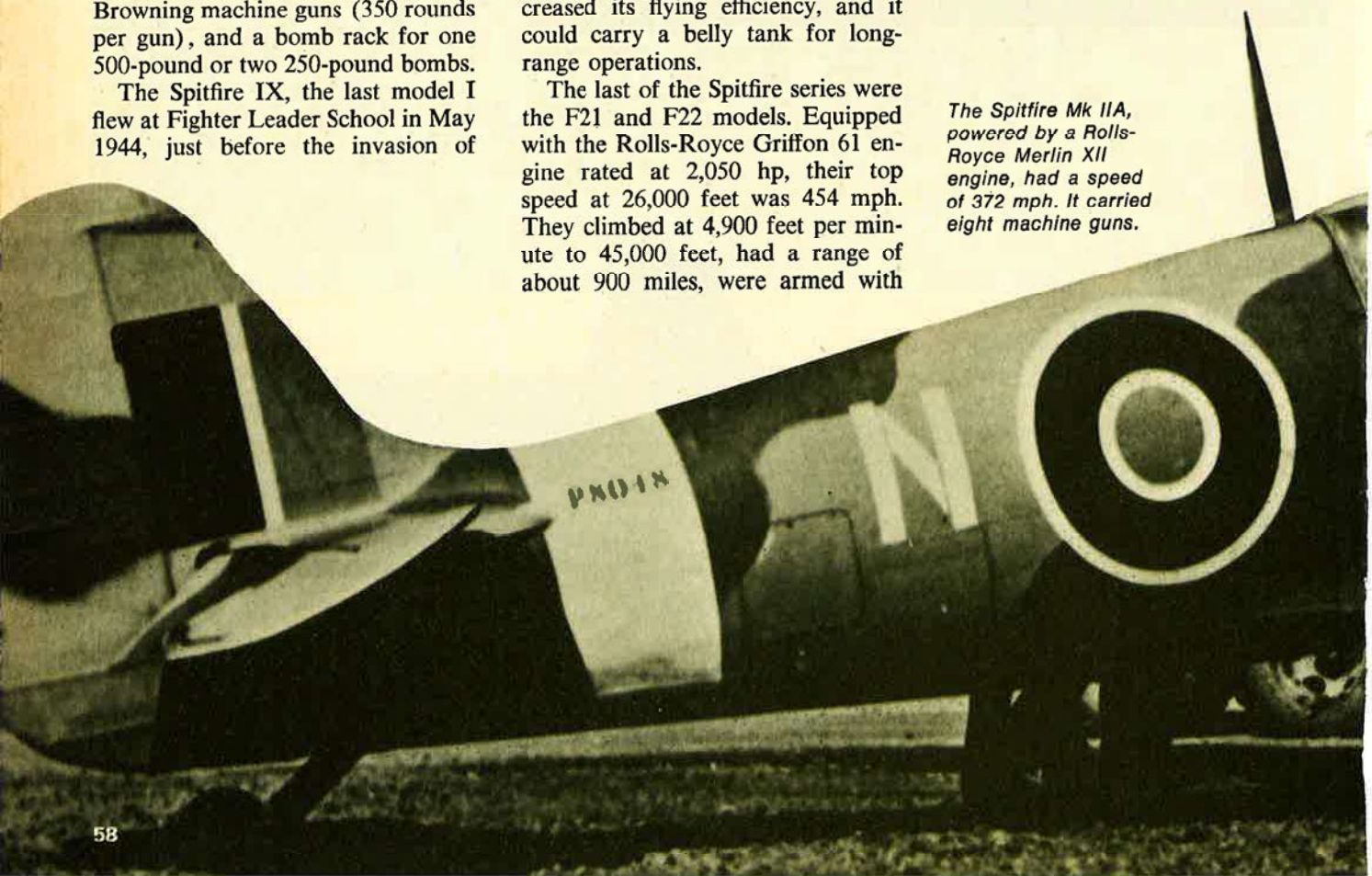
The Spitfire Mk VB, a greatly improved version, had various Rolls-Royce Merlin engines installed, ranging from 1,470 to 1,585 hp. Its weight was increased to 6,785 pounds. Range was extended to 1,000 miles, climb increased to 4,750 fpm, and the maximum ceiling was 35,500 feet. Speed reached 375 mph at 19,500 feet. Armament consisted of two 20-mm Hispano cannons (120 rounds per cannon), four .303 Browning machine guns (350 rounds per gun), and a bomb rack for one 500-pound or two 250-pound bombs.

The Spitfire IX, the last model I flew at Fighter Leader School in May 1944, just before the invasion of Normandy, had a Rolls-Royce Merlin 66 engine rated at 1,720 hp. Maximum speed at 25,000 feet was 408 mph, climb was 4,100 fpm, and its ceiling was 43,000 feet. Armament included two 20-mm cannons (120 rounds per cannon), two .50-caliber machine guns (250 rounds per gun), and a rack for one 500-pound or two 250-pound bombs. This aircraft had a four-bladed propeller that increased its flying efficiency, and it could carry a belly tank for long-range operations.

The last of the Spitfire series were the F21 and F22 models. Equipped with the Rolls-Royce Griffon 61 engine rated at 2,050 hp, their top speed at 26,000 feet was 454 mph. They climbed at 4,900 feet per minute to 45,000 feet, had a range of about 900 miles, were armed with four 20-mm Hispano cannons (175 rounds inboard, 150 rounds outboard per cannon), and had the standard bomb racks.

Of course, there were a number of other models—or "Marks," as they were designated—between the several versions I have noted here. There were the "clipped-wing" Spit V; the high-speed and high-flying

The Me 109F (foreground) was no match for the Spitfire Mk V after 1941, while the Spitfire Mk I and II decimated the Me 109E in the Battle of Britain.



The Spitfire Mk IIA, powered by a Rolls-Royce Merlin XII engine, had a speed of 372 mph. It carried eight machine guns.

Mk VIII; the Mk XIV with its five-bladed propeller and 2,035-hp Griffon engine, which was the first prop-driven fighter to catch and shoot down a German Me 262 jet fighter; and the photo-reconnaissance and Fleet Air Arm versions. It is my intent, however, to illustrate how the Spitfire progressed in development and capability during its service life to twice the engine power, 100 mph faster, nearly doubled climb rate, 13,000 feet more altitude, and firepower more than doubled. A total of 20,351 Spitfires were built and they served on every front, including the Russian front, during World War II. The Spit was the only Allied fighter aircraft in continuous production throughout the war.

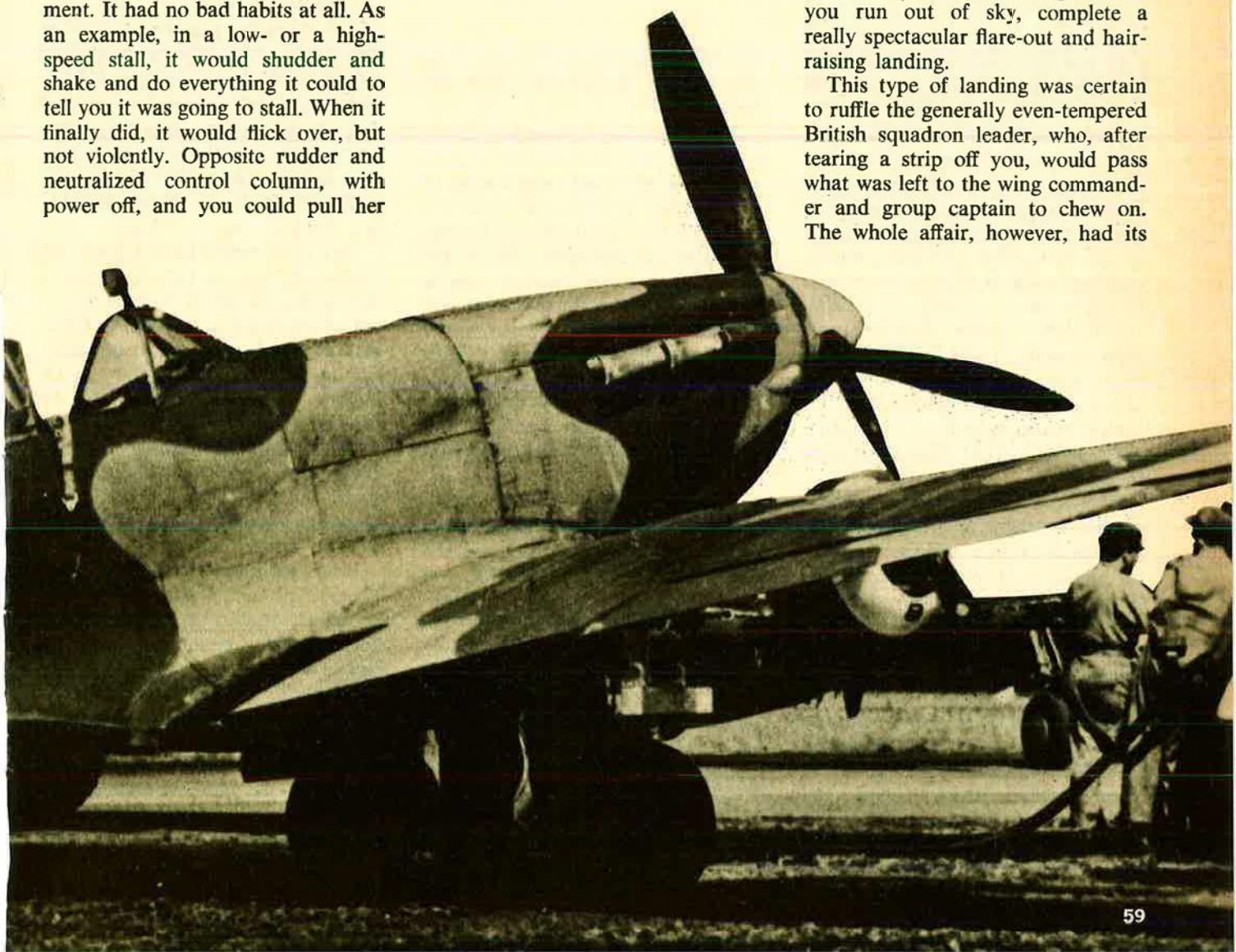
And How They Flew

The Spitfire was the most thoroughly honest aircraft I've ever flown, and I know that every Spit pilot would concur with my statement. It had no bad habits at all. As an example, in a low- or a high-speed stall, it would shudder and shake and do everything it could to tell you it was going to stall. When it finally did, it would flick over, but not violently. Opposite rudder and neutralized control column, with power off, and you could pull her out in one turn or a turn and a half at the most. Normal stalling speed in level flight was about seventy mph, and you could gently control its fall-through with ailerons. In a high-speed turn you could easily hold the aircraft just above a stall without falling off.

Takeoff speed was about 100 mph with a takeoff run of 450 to 500 feet. By the time you passed over the airfield perimeter, the speed had increased to nearly 200 mph. (I've seen Spits in a stiff wind get off the ground in 150 feet!) Normal landing speed with the undercarriage (landing gear, to you Yanks) and flaps down was eighty-five to ninety mph, with touchdown at about seventy-five. You could make a precautionary landing on a short field by dragging in the Spit nose high with prop in full fine pitch, drop the gear and flaps, maintain a final speed of seventy-five mph, cut the power at the field's edge, and actually sink and touch down at about sixty-five mph. The landing roll in this latter instance was usually less than 300 feet.

Some of us Spit pilots used to make an occasional landing designed to scare the bejesus out of everybody—especially ourselves. It was done in this manner, and I don't recommend it for you jet jockeys: Approach the airfield at about 1,000 to 1,200 feet altitude and cross over it downwind. As you near the far edge of the field, change the fuel mixture to rich, roll the aircraft over on its back, and put the gear down—or rather up, in this case—and slowly pump the Ki-gas knob to keep the engine running smoothly while inverted. Now put the prop in full fine pitch, throttle back, and let the nose drop through the vertical, and dump the flaps. Then, with a few words of quiet prayer that you can pull the aircraft through before you run out of sky, complete a really spectacular flare-out and hair-raising landing.

This type of landing was certain to ruffle the generally even-tempered British squadron leader, who, after tearing a strip off you, would pass what was left to the wing commander and group captain to chew on. The whole affair, however, had its



About the Author

Retired USAF Lt. Col. William R. Dunn became a fighter pilot the hard way. As a youth of seventeen with 100 hours of flying time, he tried to join the Royal Canadian Air Force in 1939. Since the Canadians were not taking US pilot training volunteers, he enlisted in Canada's Seaforth Highlanders and saw action as a mortar platoon sergeant at Dunkirk. A few months later, he was accepted by the RAF and, after sixty-four hours of flying training, went into combat with No. 71 Eagle Squadron, flying Hurricanes and later Spitfires. Four months after that, he became America's first ace of World War II. After transferring to the USAAF as a captain, he was credited with 8½ more kills. His World War II career ended in China as an adviser to the Nationalist Air Force. Colonel Dunn retired from his last assignment at ADC Headquarters in 1973. Now living in Colorado Springs, he follows a second career as writer and artist. An account of his career as an infantryman and fighter pilot with both the RAF and AAF appeared in our April '73 issue.

own reward, since you would probably be grounded for a couple of days and could sneak off to London and that preplanned heavy date. Oh, well, we were young and carefree in those days—and perhaps not too bright. Yeah, sure, we lost a few at the flare-out point of the landing. It was sort of like Russian roulette, each guy wanting to make his inverted approach lower than anyone else, and it didn't always work out quite right. Finally, 1,000 feet above the deck was determined to be just about the right altitude to start this foolishness in a Spitfire. The Hurricane guys could generally do it from 800 feet.

The Rolls-Royce Merlin, an exceedingly reliable hand-made engine, was the smoothest and most powerful engine available, and, certainly, coupled with a beautifully designed airframe, made the Spitfire the outstanding fighter aircraft it was. At takeoff you could pour the coal to it, the cockpit armor plate hit you in the back, the tail was in the air, and you were airborne in the length of time it takes to read the words in this sentence. In just seconds, you were passing through 200 mph, starting a climb of nearly 5,000 feet per minute, and in six minutes or so you were at an altitude of 30,000 feet.

There was an Emergency Boost control in the cockpit that, if you got into trouble and needed a lot of extra engine power, you could engage with the throttle. If you had occasion to use Emergency Boost, the engine gave a roar and, for about five minutes, a surge of power you wouldn't believe—and then you'd better throttle back before it blew up. But that boost was just what was sometimes needed in a dogfight to get you out of a bad situation or into a good position to squirt and bump off a bad guy.

I've flown several fighter aircraft with the US Packard-built Merlin engine (P-51s) and the Allison "time-bomb" engine (P-39s), all mass produced, and there is absolutely no comparison with the dependable hand-made Rolls-Royce Merlin engine. (For you ground types, the difference would be like getting out of a Ford and into a Cadillac.)

A Thing of Beauty

I've been asked many times if the Spit had ground-looping tendencies because of its narrow undercarriage. The answer is no, none at all. The aircraft was very light, had low wing-loading, and was highly maneuverable. Aerobatics were easy to do—horizontal and vertical rolls, loops, split S's, stall turns, low- and high-speed stalls, spins, inverted flight, etc. They offered no problems at all to the pilot, unless he was a clumsy, heavy-handed clod.

The aileron and elevator controls were light, needing only a gentle movement of the control column to respond. Yet, in combat, with the throttle firewalled, you could grasp the spade-grip control column with both hands and really haul the aircraft around flat out. There were two sets of rudder pedals in the Spit, a lower set for normal flying comfort and an upper set for dogfighting. This upper set bunched the pilot's body up more in the cockpit, and so went a long way toward preventing high-speed, high-G blackouts.

The Spitfire was a thing of beauty to behold, in the air or on the ground, with the graceful lines of its slim fuselage, its elliptical wing, and tail-plane. It *looked* like a fighter, and it certainly proved to be just that in the fullest meaning of the term. It was an aircraft with a personality all its own—docile at times, swift and deadly at others—a fighting machine *par excellence.*

One must really have known the Spitfire *in flight* to fully understand and appreciate its thoroughbred flying characteristics. It was the finest and, in its days of glory, provided the answer to the fighter pilot's dream—a perfect combination of all the good qualities required in a truly outstanding fighter aircraft. Once you've flown a Spitfire, it spoils you for all other fighters. Every other aircraft seems imperfect in one way or another.

It has been more than thirty years since a Spit and I have had a "go" at each other, yet somehow it doesn't really seem more than a couple of years ago. I still feel today, if I could fit my age-broadened posterior into its narrow cockpit, that we two old warbirds together could again "slip the surly bonds of earth and dance the skies on laughter-silvered wings . . . where never lark, or even eagle flew." ■

Does the Air Force need so many advanced degree-holders, or is it guilty, as some critics charge, of educational overkill? A hard look at the facts refutes that charge and discloses . . .

USAF's Graduate Degree Deficit

BY ED GATES
CONTRIBUTING EDITOR, AIR FORCE MAGAZINE

Is THE Air Force overeducated? The charge that it is has been leveled frequently. After all, the Air Force is nearing a 100 percent bachelor's degree officer force, and one of every five holds a graduate degree. That's far more than the other services. USAF enlisted members also outdistance their Army and Navy counterparts in degrees acquired.

With off-duty course enrollments soaring throughout the Air Force, indications point toward even more graduate degree-holders in the future.

To some critics this is "educational overkill." They particularly challenge USAF's decision in the early 1960s that all new officers have a baccalaureate degree. "Don't need to go to college to fly airplanes," the old saw goes. The truth of that statement may be debatable, but it's a fact that only about a third of all Air Force officers are pilots, and not all pilots do nothing but fly airplanes.

Equal criticism centers on the existence of USAF's 21,000 advanced-degree-holding officers contrasted with an official "job-requirements" figure of fewer than 10,000. Despite this apparent overage, the Air Force is actually short 3,330 officers with advanced degrees that match genuine job needs, mainly in the technical and scientific areas (*see table, p. 62*).

The controversy over the services' education programs goes back many years. Money and utilization are basic to the issue—money because an outlay for any personnel program now commands top-level attention; utilization because proper assignment of persons who acquire advanced degrees should result in a sustained payoff for the government.

Cases of malassignment, where education obtained at taxpayers' expense was not utilized, have given the services some embarrassing moments. And it didn't help their arguments for funds, presented each spring to the congressional appropriations committees.

Because of the stormy background, the education programs are perhaps the most studied of all military personnel projects. A host of agencies, commissions, and educational groups have conducted probes, but have found little, if anything, wrong.

One significant study is being conducted by the Surveys and Investigations staff of the House Appropriations Committee. Its findings should be completed in time for the annual grilling, due momentarily, that the purse-string unit will give military witnesses defending the FY '76 military personnel budget.

The study, according to committee staffer Derek J. Vander Schaaf, has spotlighted the ultra-sensitive issue of "requirements." He said the committee wants to know exactly "how the services determine their graduate-level job needs. How valid are they? Why can't they be cut?"

Actually, the Air Force often has explained how it determines which billets require the assignment of officers with specific graduate degrees. Maj. Gen. Oliver W. Lewis, Director of Personnel Programs, Hq. USAF, recently described the exhaustive validation process.

Twice-a-year reviews, he told AIR FORCE Magazine, begin with immediate supervisors at local levels. Their answers to the questions ("Does this post really need a master's in research management? Aeronautical engineering? Something else? Won't a B.A. do?") are reviewed and then rereviewed by successive higher levels of the hierarchy before winding up at the Educational Requirements Board, chaired by General Lewis, for the final check.

Throughout the validation process, General Lewis said, authorities are guided by the basic principles underlying USAF views of the role of graduate education. The cornerstones are based on (1) professional and technical competence; (2) recognition of

'...the demands for expertise in engineering, physical sciences, and technical management specialties are holding firm or increasing.'

individual aspirations; (3) recruitment and retention of quality people; and (4) optimum duty performance.

These objectives, in fact, are the driving force behind USAF's insistence on a bachelor-level degree as the minimum officers must possess.

Keeping Up With Russia

One of USAF's big problems is that it is already the most technical of the services. Even though personnel strength is declining, the demands for expertise in engineering, physical sciences, and technical management specialties are holding firm or increasing.

Pressures on the service to curtail the selection of officers for specific graduate degree programs worry Air Force leaders, particularly as they learn of increases in the Soviet Union's production of graduate engineers and scientists.

"It now appears," Hq. USAF personnel authorities told AIR FORCE Magazine, "that by the early 1980s we will be unable to man many of our laboratory and systems acquisition activities with properly qualified officers, and this situation will certainly have an adverse long-range impact on our national security posture.

"We must rely on technological superiority to maintain parity with our potential adversaries, and we will lose if we do not have sufficient numbers of superior people," they said.

Until recently, USAF counted more than 11,000 positions requiring specific graduate degrees, and 14,000 "usable assets," or people who have appropriate graduate degrees and are available for assignments that make use of those degrees. But the Requirements Board, during its latest review, squeezed these figures down to 9,250 and 13,000, respectively.

It is the 9,250-man figure General Lewis and his associates will defend, probably early in April, before the House Defense Appropriations subcommittee. They will be bidding for FY '76 education funds.

But if 21,000 active-duty officers hold graduate degrees (2,100 doc-

USAF GRADUATE EDUCATION

Academic Discipline	*Current Shortage*	*5-Year Projected Shortage*	*FY '76 AFIT Input*
Interarea Specialization (ops research, computer science, etc.)	724	671	146
Management (engr mgt, log mgt, sys mgt, etc.)	855	1,199	282
Humanities, Education, etc.	153	262	20
Biological Sciences	9	10	0
Engineering	716	1,047	293
Mathematics	49	42	8
Physical Sciences	658	677	143
Social Sciences	166	196	24
	3,330	4,104	916

The FY '76 new AFIT entries include 823 who will pursue master's degrees, ninety-three doctorates. Total AFIT student load is currently 1,570, because many participants spend two years in school. But each year new entries and total loads are falling. The projection by the end of FY '79: 666 new entries, 1,000 total students.

torates, 18,900 master's), what's the problem? Isn't that enough to more than cover the 9,250 "validated" slots?

Defining the Deficit

The Air Force says no, and here's why: 650 of the degrees are in fields of no direct use to the mission. Another 2,300 officers with otherwise usable degrees have too much rank for billets that require their degrees; 3,300 are unavailable at any given time because they hold flying or other operational jobs; and 1,800 are assigned to remote sites or "special category" posts.

This leaves about 13,000 who are "usable and available." However, 3,750 of these are surplus degrees. While their educational backgrounds match job requirements, so do those of an equal number of other officers.

What it boils down to is that because of rotations, cockpit needs, remote duty sharing, etc., a one-for-one match is out of the question. The more realistic formula, according to General Lewis, is a 1.5 to 1 ratio of officers with proper graduate degree credentials for each validated billet. Thus, if ten slots require M.A.s in metallurgical engineering, the Air Force should carry fifteen in its inventory.

Sounds reasonable, yet critics can't see it.

Also a target of knocks over the years is the Air Force Institute of Technology at Wright-Patterson AFB, Ohio. AFIT conducts engineering and logistics courses at its in-residence facilities and oversees the Air Force's graduate schooling at civilian universities.

Until recent years, the AFIT program annually funneled about 1,500 new officers into advanced degree programs conducted by the Institute and by universities. But with budget reductions, enrollment is down to 1,050 new entries this fiscal year and a projected 916 in FY '76. That will be the lowest in fifteen years.

This continual slicing forecasts the aforementioned rising deficit of graduate degree expertise USAF so urgently needs. It is the deficit that carries serious national security implications.

When Air Force became a separate service in 1947, most of its officers lacked even a B.A.-level degree. The typical individual had entered service in 1940–43 with two years or less of college. Late in the decade he had not had a chance to continue his formal education.

USAF leaders were disturbed over the scarcity of degrees. This helps explain why a college diploma rated unusually high in deciding among applicants for the "integration" of 1946–47, when thousands of World War II officers received commissions in the Regular service.

The Air Force, in short, was in a hurry to boost its officer education level. During the 1950s and early 1960s, it sent sizable numbers to universities in search of their initial degrees, and others to graduate programs. Many were field-graders with fifteen and more years of service, whose retirement sometimes was only a few years away. This limited USAF's return on its investment.

In 1962, then Chief of Staff Gen. Curtis E. LeMay laid down the B.A.-level degree requirement for all incoming officers, and applied pressure on nondegree holders in uniform to earn degrees if at all possible. The result today: Ninety-four percent of the corps has reached that level.

Among airmen, approximately 7,500, or 1.5 percent, own college diplomas.

Off-Duty Programs

Other USAF-sponsored study projects sprouted during the 1950s and 1960s, and helped elevate the service's educational level. They included off-duty undergraduate and graduate-level courses financed by the "tuition assistance" (seventy-five percent government subsidized) and GI Bill (up to 100 percent government-paid) programs.

"Permissive TDY," under which members spend as much as a year on campus in full-time study, added another dimension to the several programs known as "education services."

Why USAF Insists on an All-Degree Officer Force

Here, somewhat paraphrased, is USAF's response to the question, "Why is a 100 percent college degree officer force necessary?" Actually, the figure has just reached ninety-four percent, but it will hit 100 percent before long.

The Air Force employs a "generalist concept" to manage the officer force. This "permits greater flexibility and utility" and requires newcomers who can perform "in a wide spectrum of duties and situations."

In addition, the Air Force is becoming more "sophisticated, complicated, and intellectually demanding." Thus, officers must be able to absorb new ideas, master new techniques, and be able to grow. Generally speaking, the college graduate should handle this better than the nondegree member.

Furthermore, the antidegree thesis ignores the fact that USAF officers today are exposed to much more than military matters. Their horizon extends "to the broader realms of the social, economic, and political issues" of this country and the world. Here again, by and large, the degree-holder should persevere.

Noncollege graduates have washed out of flying training at twice the rate of college graduates. And contrary to critics' charges, rated officers don't spend all their Air Force careers driving airplanes. Many assume "middle and upper management duties" that provide "personally challenging environments and minimize the job dissatisfaction/morale issue" (that some say prevails among highly educated officers in cockpit assignments).

A college education "provides the basis upon which the individual may build and expand his talents and expertise as necessary to assume a diversity of responsibilities.... The maintenance of a strong ... aerospace force dictates that the commissioning prerequisite of a baccalaureate degree must be maintained."

Closely allied is the Minuteman Education Program conducted at SAC missile sites whereby missile officers can win master's degrees in management. Nearby universities bring the courses to the bases, and each year 150 missile officers have received such degrees without sacrificing duty time.

"ROTC educational delay" officers—they enter active duty after winning graduate degrees at their own expense—have added as many as 1,000 officers annually to USAF's advanced-degree pool. However, the current year's expected acquisition is down to about 350, Hq. USAF advised.

USAF reports it has made good use of many officers who received their advanced degrees from these various programs. Minuteman program grads, for example, have been used heavily in meeting the service's needs in general-management positions.

While some cannot be slotted to assure full utilization of their schooling, their graduate study provides a general boost to the quality of USAF's executive force.

These various degree avenues account for many of the 21,000 officers and 450 airmen who now hold M.A.s and Ph.D.s. Through the Educational Services programs alone, USAF expects to add 1,600 officers and 250 airmen to its master's degree-holders list this fiscal year. Twelve officers and one airman are slated to earn doctorates via the same routes.

USAF off-duty graduate course enrollments, meantime, are soaring to an estimated record-breaking 70,000 officer and 6,500 airman enrollments this fiscal year. This high participation rate strongly suggests increases in advanced degree winners the next few years, although, unfortunately, many won't be of direct benefit to the service.

Universities that conduct off-duty courses, such as Maryland, USC, Southern Illinois, and Oklahoma, have facilitated the graduate degree-granting process by bringing many courses to the bases and easing or waiving residency requirements.

All this is "voluntary" graduate study, financed mainly by GI Bill entitlements through the Veterans Administration, rather than by tuition assistance. The reason is that VA pays up to the full tab, vs. seventy-five percent paid under the tuition-assistance route. Also, there is no service commitment with the VA program.

Investments Pay Off

For its "fully-funded" project—which sends officers to civilian graduate schools—USAF lays on a three-year service commitment for each year of schooling. But it's hardly needed, because eighty-five percent of them stay aboard until retirement.

Since Air Force normally requires that this study take place between a member's fifth and tenth years of service, the potential return on the investment is excellent. These officers have ten to twenty-five years of service ahead of them.

What about the old utilization problems? Malassignments were frequent years ago. Consider, for example, the present assistant dean of the business school of a prominent Eastern university. As a major in the 1950s, he was sent by the Air Force to Harvard's prestigious two-year Master of Business Administration course. Upon his graduation (with honors), USAF promptly returned him to the same information assignments the MBA effort was supposed to spring him from. He remained there for ten years until he retired in 1968 as a full colonel.

While that expensive exercise netted USAF next to nothing, it did wonders for the officer's second career.

That's all changed, the evidence clearly indicates. Currently, eighty-five percent of such graduates are promptly assigned to validated graduate degree slots. And the rate "is heading toward the ninety to ninety-five percent mark," according to General Lewis' office. Officials there pointed out that an occasional "special category" assignment must take priority.

USAF, meantime, believes that having eleven percent of its officers in jobs requiring graduate degrees is conservative compared to US industry. Giant firms, such as IBM and Alcoa, want twenty-five percent of their executives to have M.A.s and Ph.D.s. Yet industry's functions generally don't focus on the most important business of them all: national security.

An overeducated Air Force? Not by a long shot. ■

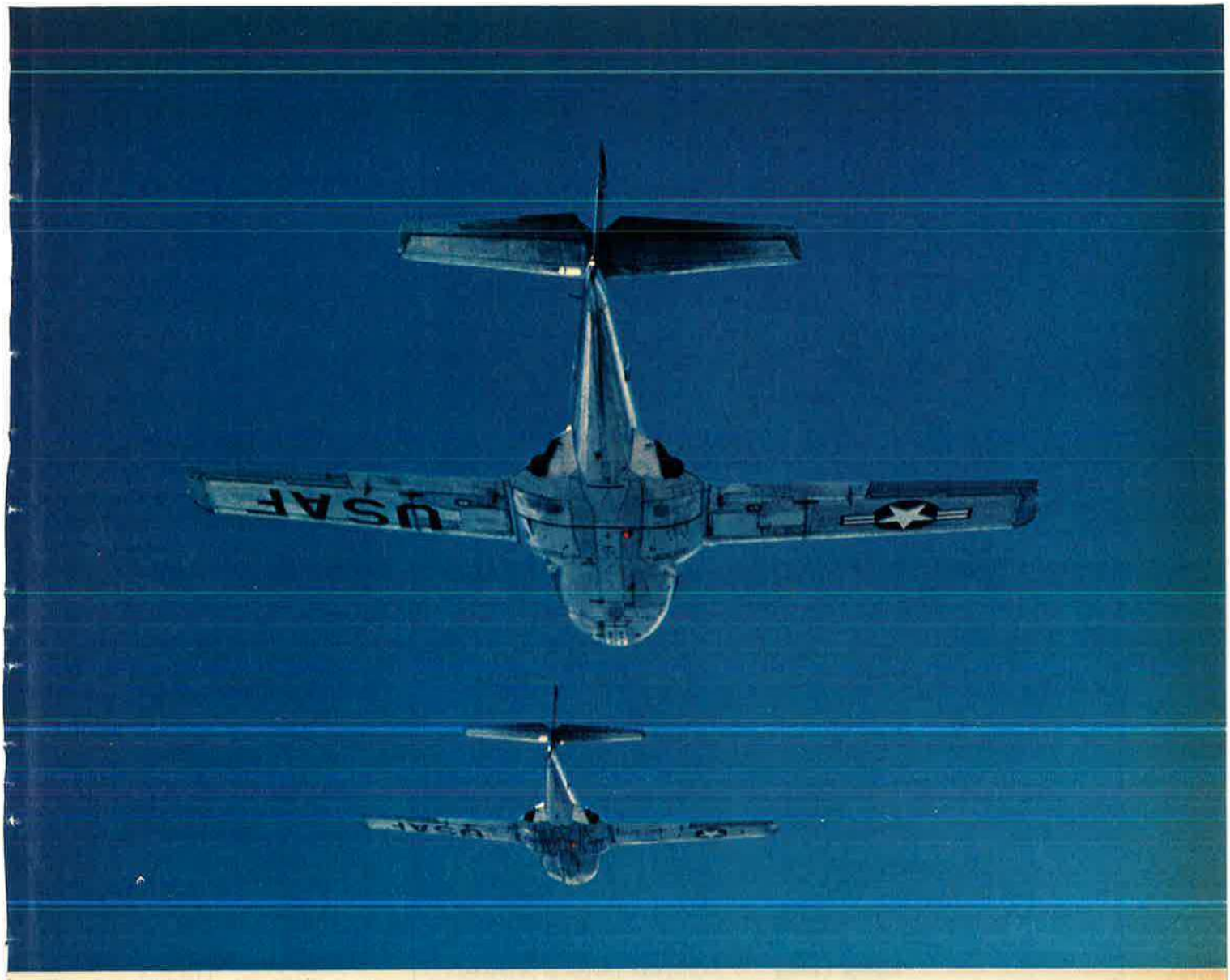
Tough Fight Ahead for AECP

The Air Force will make a strong pitch in congressional hearings soon to commence for funds to restore the Airman Education and Commission Program. It could be a tough fight. The big hurdle is the House Appropriations Committee, which last year, via a budget slash, halted the project that for years has given the service thousands of outstanding officers. AECP has recorded the best retention record of any commissioned source.

But the committee held that AECP production is "not directly job related." More recently, a committee source told AIR FORCE Magazine that as long as USAF continues to RIF officers, "restoration of AECP may be hard to justify."

AECP opponents also argue that Air Force can commission airmen with college degrees by sending them to Officer Training School. USAF's rebuttal contends that the pressing need for new officers is in the scientific and technical areas, but it is difficult for airmen to obtain appropriate degrees through off-duty study programs.

For example, officials probably will tell the committee that the board that convened shortly before AECP closed last year considered 1,464 airmen, of whom 554 held degrees. However, only twenty-three were in the fields of science and engineering. Accordingly, Air Force feels it must continue to send airmen to college full-time under AECP. It wants to enroll 400 new airmen in colleges next fiscal year.



The Trail of the T-37

Where it all began for 30,000 USAF pilots

BY CAPT. DANNY PIPER and CAPT. DAN MCCAULEY, USAF

THE horizon disappears and the stick begins to lose responsiveness. Airspeed bleeds off rapidly, and, with a shudder, the nose drops sharply. The ground fills the canopy, and the world spins crazily as autorotation takes over. The rate of rotation increases, and the aircraft stabilizes at about a forty-five-degree dive angle with a blurred horizon. The pilot tightens his grip on the stick and feels a surge of adrenalin as he tries to stay ahead of what's coming next.

Does this sound like the preface to a major accident report? It could be, but it's not. As the thousands of Air Force pilots trained since 1957 may guess, the description is that of a Cessna T-37 spin entry.

The T-37 is the first jet that more than 30,000 pilots flew in Air Force Undergraduate Pilot Training (UPT) during the past eighteen years. The "Tweet" has chalked up nearly 6,000,000 flying hours and more than 10,000,000 landings in training the most highly qualified pilots in the world.

When a budding pilot finishes his ninety hours of flying time in the T-37 phase, he has been introduced to Air Force flying and has the basic skills necessary to fly any Air Force aircraft. Almost 2,400 UPT graduates in 1974 flew nearly half of their total UPT flying hours in the T-37. This amounts to about 325,000 hours of spins, aerobatics, instruments, formation, navigation, stalls, and landings.

How is the relatively inexperienced flyer able to master the many demands of becoming a pilot with only ninety hours in the cockpit? It is a step-by-step building process that might be more easily explained by looking at a typical flight in the T-37 during the pre-solo phase.

The day begins with the student

T-37B JET TRAINER—FACTS AND FIGURES

Manufacturer	Cessna Aircraft Co.
Historical Highlights	First flight, XT-37—Oct. 12, 1954; first flight, production model—Sept. 27, 1955; first T-37A delivered to ATC—Dec. 1956; first T-37B delivered to ATC—Nov. 1959 (all "A" models have been converted to "B" standards); T-37Bs in service—755.
Powerplant	Two Continental J69-T-25 centrifugal-flow gas turbine engines, each with 1,025 lbs. thrust at sea level.
Length	29 feet, 3 inches.
Height	9 feet, 2 inches.
Wingspan	33 feet, 9.3 inches.
Landing Gear Tread	14 feet.
Gross Weight	6,574 pounds.
Range	870 miles at 340 KIAS.
Speed	382 KIAS at 20,000 feet.
Rate of Climb at Sea Level	3,370 feet per minute.
Service Ceiling	39,200 feet, limited to 25,000 by lack of cabin pressurization.
Stall Speed	72 KIAS straight-and-level flight.
Design Load	6.67 G positive; 2.67 G negative; 4.8 G asymmetrical.
Crew	Two, seated side-by-side.
Programmed Flying Life	15,000 hours.
Nicknames	"Tweet," "Squeak," "Hummer," "6,000-Pound Dog Whistle," "Baby Jet."

reporting to the flight line for briefings by the flight commander, the weather forecaster, safety officer, and standardization officer. Then comes an individual table briefing with the instructor pilot (IP), who explains all the maneuvers to be done during the flight. Every minute spent briefing, flying, and debriefing complements the learning process.

A typical mission includes departure to a contact flying area to practice stalls, spins, and other airwork. The mission would probably continue with a short hop to an auxiliary field to practice traffic patterns and landings. Before soloing, the student will become proficient in all types of patterns, so he can handle emergencies. These include the simulated single-engine overhead pattern, the no-flap pattern, the straight-in approach, and enough normal patterns to induce dreams about that final turn, final approach, and flare.

"Handle, horn, light, lights, pressure as the gear goes down, flaps at the turn point, think about winds, pull the power, runway, airspeed, recheck gear, back pressure . . . ugh! Take *that,* runway!"

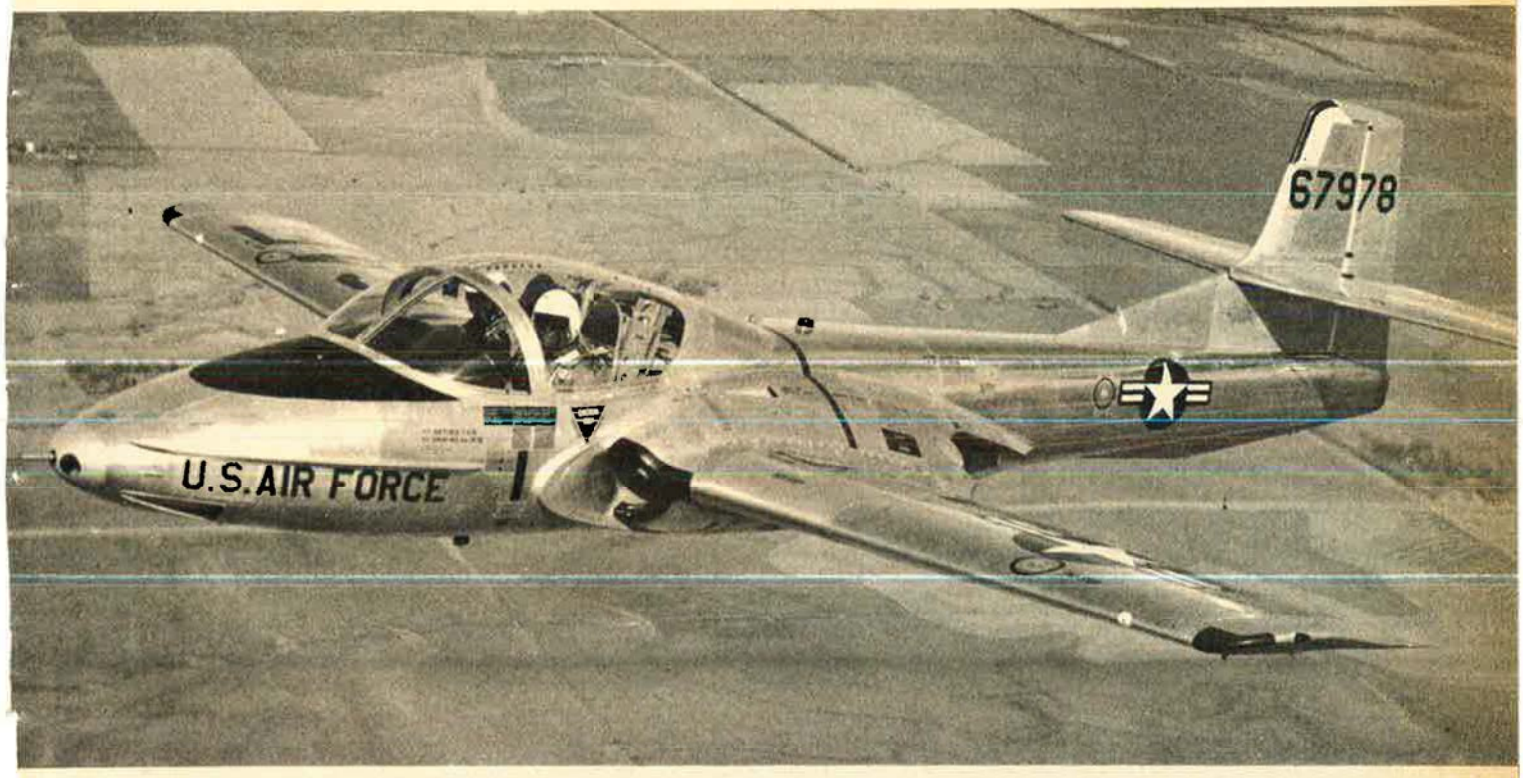
Slowly—sometimes ever so slowly—mechanical processes and faith in his IP gradually build the competence and judgment that are a permanent part of an Air Force pilot's flying ability.

The T-37 makes an excellent learning tool because of its rather forgiving nature and stable performance. The wide wheel base and relatively strong gear make it a safe and practical trainer. However, don't get the idea that it's slow or sluggish. Many pilots who have flown the "Tweet" as instructors compare it to a sports car. Although not overpowered, it is a snappy and responsive airplane that can do a loop in 2,500 feet of altitude.

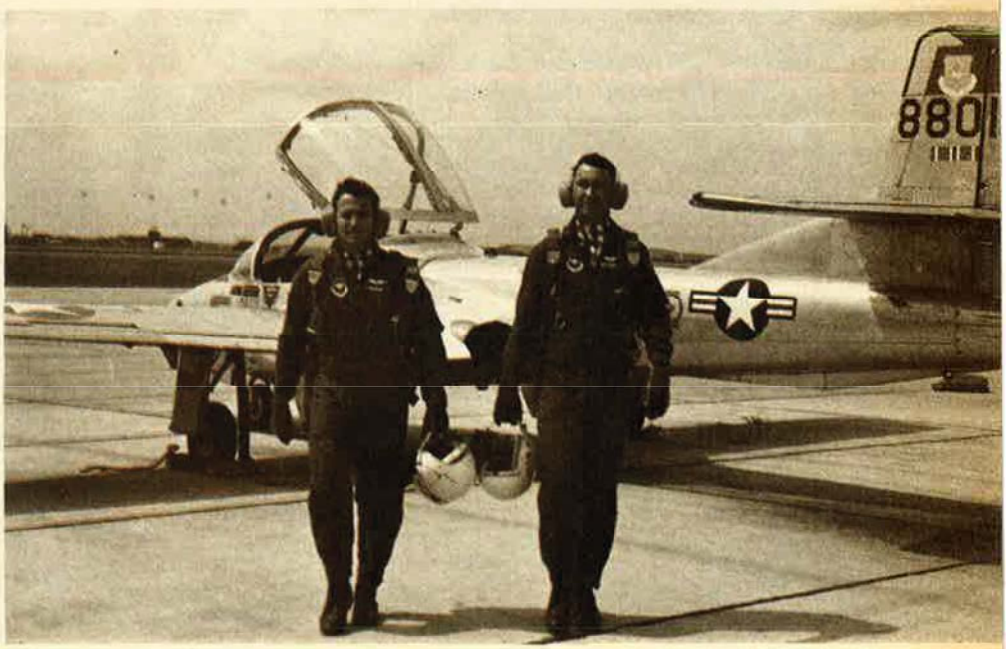
The flight characteristics of the T-37 let the student do such things as formation flying safely, including soloing on the wing after as little as 6½ hours of dual instruction. Yet the aircraft's power response is such that there is a definite challenge in maintaining fingertip position throughout a formation flight.

On the Gauges

When the student enters the instrument phase of training, he encounters a different kind of challenge and discovers that he has to master another skill—a good crosscheck while under the hood. With considerable "prompting" from his IP, the student learns to use the attitude indicator as his window to the outside world. He then begins to form the habit of flying on this



A favorite with instructors and student pilots alike, the T-37 has been instrumental in training more than 30,000 undergraduate pilots for the Air Force.



The authors, Capts. Danny Piper and Dan McCauley, are both serving at the Pilot Instructor Training School, Randolph AFB, Tex. Captain Piper, left, a '67 graduate of the Air Force Academy, and a SEA veteran, has more than 1,500 hours of instructor time in the T-37 and T-41. He and Captain McCauley, who graduated from Texas A&M in '69, were UPT instructors at Moody AFB, Ga., prior to their present assignments.

artificial horizon rather than searching frantically about the instruments for some clue to what's happening to his aircraft.

Slowly the small mechanical steps become so automatic that he can precisely maintain an altitude, heading, and airspeed without having to think about each correction. Shortly thereafter (six instrument rides later), he starts to "put it all together" by combining basic instrument flying with instrument flight procedures as he incorporates GCA and VOR approaches into his repertoire.

When a student graduates from the T-37 phase, he is proficient in precision, nonprecision, and VOR approaches. At this point he has proved his ability to fly the T-37 to Air Force weather minimums for both radar and VOR approaches by passing an instrument check equivalent to AFM 60-1 instrument qualification.

During the T-37 phase, the student is exposed to several instructional methods a step at a time, both on the ground and in the air. Certainly much of the past success for instilling responsibility and aeronautical skill in the new pilot must be attributed to the instructor pilot force.

The IP manages many variables to accomplish his mission. Bad weather, syllabus requirements, aircraft limitations, student history of training, and student personality all bear directly on each instructor in the young IP force. This challenge is met many times every day at the eight UPT bases.

These instructors are trained in techniques by the 559th Flying Training Squadron (FTS) at Randolph AFB, Tex. The 559th has set an example of sustained safe flying with no major accidents in more than 284,000 flying hours. The safety record of all T-37s is commendable, especially when considering the experience level of the student pilots and close-to-the-ground maneuvering inherent in teaching a man to fly.

All-Weather Mods

In 1974, the Air Training Command T-37 major accident rate was 1.1, compared to an Air Force major accident rate of 2.9 per 100,000 flying hours. Strict adherence to safe flying procedures and professionalism are the primary factors in the low rate. Except for icing restrictions, bad weather does not restrict training in the T-37. The aircraft was, however, originally designed to be a VFR aircraft.

Improvements in the "Tweet" have been a continuing process as the Air Force has modified the little bird to increase its capacity as an all-around trainer. Like its combat-capable cousin, the A-37 "Dragonfly," the "Tweet" has handled everything asked of it and then some. With the advent of advanced radar control capability and the requirement for total IFR operation, a transponder-equipped T-37 was mandatory. This modification was completed in 1970. Distance measuring equipment was installed in all "Tweets" by December 1973.

A significant increase in general aviation operations in the areas where the "Tweet" flys also called for improvements in collision-prevention devices and the installation of flashing strobe lights. Safety modifications include the birdproof windscreen. Five T-37 accidents causing three deaths heralded the need for a windscreen able to withstand the impact of a four-pound bird at 250 nautical miles per hour. The first 100 of these new, improved windscreens will be installed in 1975.

The future holds continued promise for the "Tweet." A new self-contained attitude indicator has been approved for installation. The "almost all-weather" trainer will benefit by having an additional attitude indicator, since the present MM3 will be moved to the right cockpit. A new solid-state UHF radio and a total ILS (to replace the present localizer-only capability) will complete the transformation of the "baby jet" into a sophisticated aircraft able to spread its stubby wings with anyone, anytime, anywhere.

Where does the T-37 go from here? Like the C-47 Gooney Bird, the "Tweet" may fly forever. But, just in case this noble little bird begins to falter when passing the programmed 15,000-hour airframe life, plans for a replacement aircraft, or perhaps a single aircraft to replace both the T-37 and Northrop T-38 trainers, are being studied. One suggestion is an 0.9 Mach, tandem-seat trainer capable of satisfying all UPT training requirements. It would eliminate the need to maintain two different aircraft at each of the UPT bases.

Whatever the future brings, we who have taught in the "Tweet" have grown fond of this fine little airplane. Through periods of rotten weather and countless atrocities committed by unknowing students, the sturdy and tenacious "Tweet" has stood the test and emerged as an outstanding trainer. ■

After years of slowly declining defense appropriations, the Defense Department seeks to restore modest growth to the nation's military budget in FY '76. Congressional denial of the funding increase, DoD leaders warn, could jeopardize the current worldwide military equilibrium . . .

DoD's Five-Year Force Planning

BY EDGAR ULSAMER
SENIOR EDITOR, AIR FORCE MAGAZINE

THE Defense Department's FY '76 budget request calls for $104.7 billion in TOA (total obligational authority, including funds authorized but not spent in previous years) and $92.8 billion in outlays (the estimate of what the Department will actually spend between July 1, 1975, and June 30, 1976). Measured in current dollars, both accounts are record highs; expressed in constant dollars which denote purchasing power, TOA is moderately increased from the current year, while the outlays category declined by about $400 million from FY '75. The $92.8 billion outlays estimate is some $24 billion below the equivalent of $117 billion that the US intelligence community estimates the Soviets will spend on their armed forces during the same period.

Two principal factors are being stressed by DoD leaders in supporting the new budget on Capitol Hill. One is that under the FY '76 budget, there will be a continued decline of Defense resources—as a percentage of total federal outlays, of net public spending, of the Gross National Product, and of the nation's total labor force. The other factor, offered "without apologies" by Defense Secretary James R. Schlesinger, is that the new budget provides for a "real growth" of about two percent and makes up for the "inflation gap," which, along with congressional cuts, reduced the current Defense budget by about $12 billion.

This year's budget request includes, for the first time, a long-haul, five-year funding projection that carries an annual two percent growth forward to FY '80. The resultant forecasts, adjusted for the anticipated inflation rate, and expressed in outlays, are $104 billion in FY '77; $119 billion in FY '78; $130 billion in FY '79; and $140 billion in FY '80. In terms of TOA, the corresponding values are about $117 billion, $128 billion, $138 billion, and $148 billion. "Continuation of the present trends," which fail to provide for increases in real purchasing power, "raises a real threat to the maintenance of a worldwide military equilibrium," according to Secretary Schlesinger.

A special feature of this year's budget is made necessary by a change in the federal fiscal year which, beginning in 1976, will start on October 1, rather than July 1. The current budget request, therefore, includes a transition period, from July 1, 1976, to September 30, 1976, for which a total of $24.6 billion is being requested in total obligational authority.

What the Budget Will Buy

In terms of manpower, including military, civil service, and defense-related industry, the new budget projects a total of 4,554,000 spaces by mid-1976, some 63,000 fewer than in the current year or less than fifty-five percent of the FY '68 total of about 8,000,000. At the end of the new fiscal year, total military manpower is expected to decline slightly, to about 2,100,000, while DoD's civil servants will number approximately 985,000. The projected Air Force totals are 590,000 and 256,000, respectively.

In his statement to the Senate Armed Services Committee on the nation's military posture for FY '76, Gen. George S. Brown, Chairman of the Joint Chiefs of Staff, reported that active-duty military personnel of the USSR number at least 4,200,000, but cautioned that that figure might not include all such support forces as supply, training, and research staffs. He gave the total of US Reserve and National Guard forces at 1,900,000, in contrast with 5,700,000 active Soviet reservists, each of whom has served "at least twelve months with the active forces in the last five years. The total [Soviet] ground force reserve alone is composed of 20,000,000, more than half of whom have had twelve or more months of active service."

Total DoD personnel costs, including military and civil service pay, allowances, and military retired pay, are estimated at $49.2 billion, predicated on the Administration's plan to hold this year's inflation-induced general pay increase to five percent. This sum accounts for about fifty-three percent of all outlays and, if realized, would represent a decline from 55.2 percent in the current fiscal year.

Procurement and RDT&E (research, development, test, and evaluation), the two budget accounts on which future US defense capabilities pivot, are increased significantly from current levels. FY '76 procurement (TOA) is pegged at $24.7 billion, providing for $2.5

billion in real growth, in addition to compensating for the inflation factor. R&D is boosted to $10.3 billion, an increase of about $1.0 billion in real growth from current levels. (The DoD budget does not include R&D and production costs associated with nuclear weapons. Those are now borne by ERDA, the Energy Research and Development Administration, which took over most of the functions of the former Atomic Energy Commission. ERDA's FY '76 budget request covering national security programs is for about $938 million, in addition to $186 million sought for naval reactor development work. NASA also does work for DoD, including about $25 million in advanced aeronautical research. That agency's development of the Space Shuttle, for which it budgeted more than $1.2 billion in FY '76, benefits the Defense Department and the Air Force in a major way.)

DoD's single largest acquisition program for FY '76 is the Air Force's F/TF-15A, for which $1,683,400,000 is being sought, although the combined funding requests for the new Trident submarine and its Trident I missile exceed that amount by about $450 million. In round numbers, other key Air Force acquisition items include $780 million for Minuteman modernization, $750 million for the B-1 program, $690 million for AWACS, and $460 million for the A-10. DoD's largest single R&D item is $273 million for developing USAF's new F-16 Air Combat Fighter.

Principal Capabilities

The new budget breaks out three major components of the military force structure: strategic, general purpose, and airlift and sealift forces (*see p. 75*).

Funding for strategic forces is pegged at $7.7 billion, not significantly different from the current level. By the end of FY '76, the strategic missile forces are scheduled to consist of 450 Minuteman IIs, 550 Minuteman IIIs, fifty-four Titan IIs, thirteen Polaris submarines, and twenty-eight Poseidon submarines. The forty-one submarines carry a total of 656 SLBMs.

The number of strategic bombers remains unchanged, but the B-52 force has been reorganized into one less squadron, for a total of twenty-two. The alert rate of the heavy bomber force is to be reduced from forty to thirty percent. FB-111 squadrons remain constant at four. The strategic defensive force will continue at six manned fighter-interceptor squadrons, and includes provisions for the Army's Safeguard antiballistic missile defense system protecting Minuteman ICBM silos at Grand Forks, N. D.

In contrast with the stagnant level of US strategic forces, the USSR, according to General Brown, can be expected to "press forward vigorously with massive programs for near-term deployments involving every facet of offensive strategic power." The Soviet arsenal is likely to include a total of 1,591 ICBM launchers by mid-1975, he reported. While he gave no timetable for the growth of the Soviet SLBM force, he said, "We believe that they will build a force close to sixty-two modern submarines and 950 SLBMs [as] allowed" by the SALT interim agreement.

In his annual Defense Department report, Secretary Schlesinger disclosed that the new Soviet variable-sweepwing bomber, the Backfire-B—which is now operational—is "clearly designed for air-to-air refueling." With that capability, and by "staging through Arctic bases and flying a high subsonic profile all the way, the Backfire-B could cover virtually all targets in the US and return to the Soviet Union," he explained. The Defense Department does not know at this time how extensive a force of Backfire bombers and supporting tankers the USSR plans to field. But Secretary Schlesinger foresaw a need to increase this nation's air defense against bombers if the Backfire deployment should turn out to be a "large force."

Dr. Schlesinger's comparative report on US and Soviet defensive strategic systems credits the USSR with about 4,000 air defense surveillance radars, 2,500 interceptors, and about 10,000 SAM launchers, and sixty-four ABM launchers. The US inventory is a paltry sixty-seven surveillance radars, 405 interceptors, and no operational SAM or ABM launchers.

On the plus side, Dr. Schlesinger reported, there is "still no evidence that the Soviet Union has developed an advanced AWACS or a 'look-down, shoot-down' capability for its air defense interceptors"; hence, the

DEPARTMENT OF DEFENSE BUDGET

FINANCIAL SUMMARY

DoD/MAP AS PERCENTAGE OF:	FY '64	FY '68	FY '74	FY '75	FY '76
Gross National Product	8.3%	9.4%	5.8%	5.9%	5.8%
Net Public Spending	28.1%	29.2%	17.7%	16.8%	16.3%
Federal Budget (Outlays)	41.8%	42.5%	28.2%	26.1%	25.7%
Labor Force	7.9%	9.7%	5.3%	5.0%	4.8%

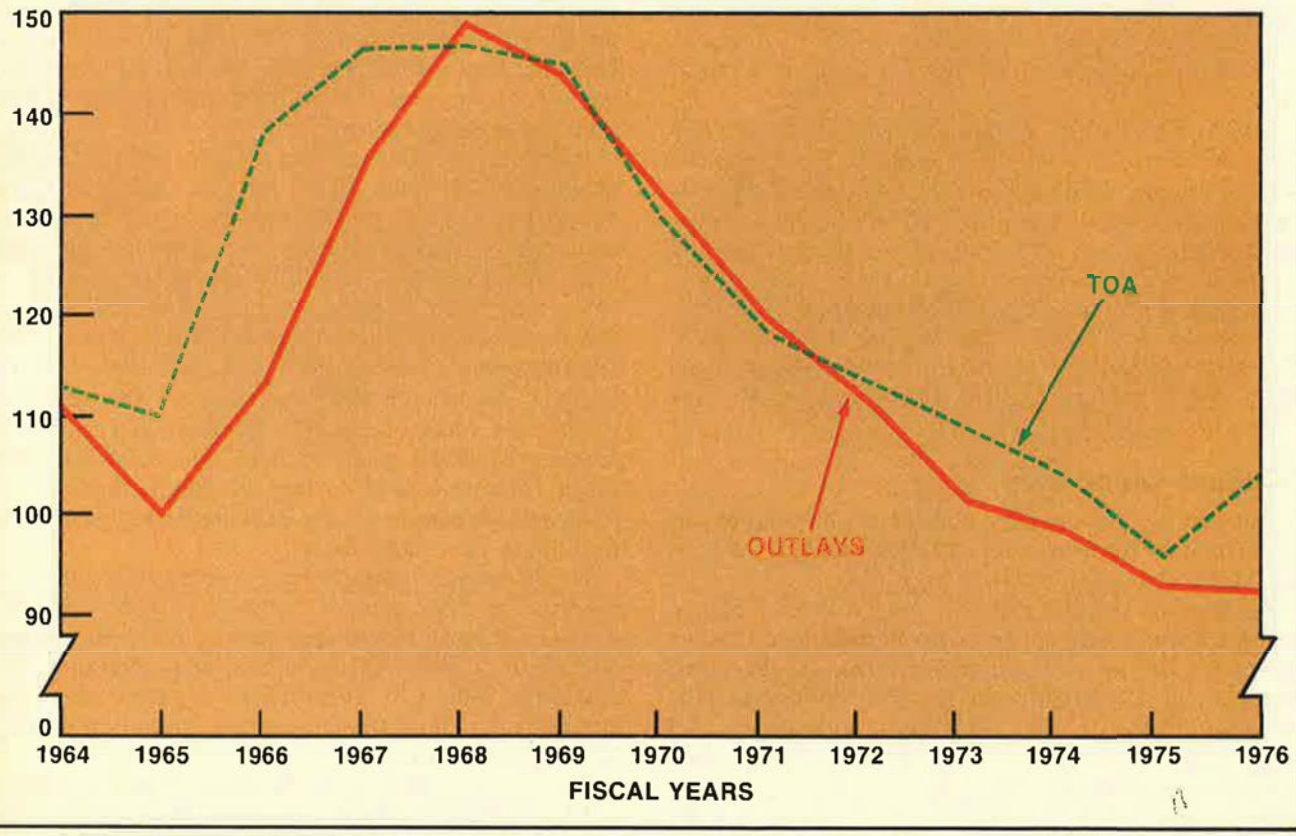
DEFENSE BUDGET TOTALS

($ in billions)

	FY '73 Actual	FY '74 Actual	FY '75 Estimate	FY '76 Estimate	Transition Period 7/1/76–9/30/76	Increase FY '75–'76
Total Obligational Authority (TOA)	80.2	85.0	89.0	104.7	24.6	15.7
Outlays	73.8	78.4	84.8	92.8	25.4	8.0

DEPARTMENT OF DEFENSE BUDGET TRENDS

(Billions of Constant FY '76 Dollars)



DoD's request for FY '76 funds, related to the indexes above, is the lowest in twelve years. The projected increase in outlays does not quite compensate for inflation; the increase in TOA is to offset past underestimates of the inflation rate.

superior force of Soviet interceptors is "not likely to offer a serious obstacle to our bomber force." General Brown described how the Soviets are modernizing their air defenses by replacing older gun-armed interceptors with such advanced all-weather interceptors as the MiG-25 Foxbat and Su-15 Flagon-E and by wider use of late-model SA-3 Goa and SA-5 Gammon strategic SAM systems. Despite this modernization, "there exists major weakness in low-altitude defense against penetrating bombers and in defense against the US short-range attack missile [SRAM]," General Brown pointed out.

Two divergent but not contradictory premises permeate the DoD rationale behind the force levels and technological options sought in the Department's five-year budget plan: In the near term, as Secretary Schlesinger put it, "There are, in short, no immediate grounds for fears about bomber or missile gaps." Yet in the long term, as General Brown warned, "the USSR . . . has embarked upon massive strategic force improvements and deployments which, if not constrained by the negotiating process or balanced by major US arms initiatives, will result in serious superiority over the United States."

Elaborating on this, Dr. Schlesinger pointed out that if the Soviet Union "decides to replace all of its existing ICBMs with [its] new family of ICBMs, it could acquire an ICBM throw-weight advantage of five to six to one, *i.e.*, ten to twelve million pounds for the Soviet Union vs. two million pounds for the US. Such a great disparity in throw weight, in my judgment, would be very destabilizing." The need, therefore, is for the US to "move forward in an orderly and deliberate manner with the qualitative improvements initiated last year for the ICBM forces. This action is unavoidable if essential equivalence in strategic power between the US and the USSR is to be preserved through the 1970s and beyond," Dr. Schlesinger reported.

Until the early 1980s, he told Congress, "the only way in which we can achieve a major improvement in our ICBM capabilities, particularly in expanding our options and keeping pace with growing Soviet hard-target kill capabilities, is through the modification of Minuteman III. For the long term, mid-1980s and beyond, we can provide an option to develop an entirely new ICBM," designated the M-X (*see page 26*), Dr. Schlesinger said.

General-Purpose Forces

In terms of mission areas, the lion's share of the proposed FY '76 budget, $35.9 billion, is devoted to general-purpose forces, defined by Dr. Schlesinger as theater nuclear and nonnuclear capabilities, including US mobile forces and support of other nations. This budget account gets an increase of $5.5 billion, in constant dollars. It will help attain the following force levels by the end of the new fiscal year:

- Army strength will be sixteen divisions, up from thirteen at the start of this year. This will be accomplished with a stable active force strength of 785,000 by converting support to combat elements, a key factor in improving the "teeth-to-tail" ratio of the armed forces.
- Three Marine Corps divisions will be retained unchanged.
- USAF's active fighter force holds steady at twenty-two wings. Because of the introduction of the first two F-15 squadrons, one F-4 and two A-7 squadrons will be phased out; the majority of their aircraft are going to the Air Guard.
- Naval airpower will consist of thirteen wings and a like number of attack carriers, with one presently existing wing eliminated, and the carriers *Hancock* and *Oriskany* dropped from the active force.
- The nuclear attack submarine force will number sixty-eight, four more than at present. Other general-purpose warships will number 185, and amphibious assault ships sixty-three, both categories reflecting slight reductions from present levels.

General Brown assessed the readiness state of these forces, terming the combat readiness of Army forces "significantly improved" over the past year. Tactical air squadrons, he told Congress, "have, in spite of turbulence, responded to increased emphasis on combat capability and maintained a reasonably high standard of readiness." The general-purpose Navy, he declared, "again this year, reflects an adverse readiness trend caused by insufficient special skills and manning, deferred preventive maintenance, and the high tempo of operations. A Navy effort to stem that trend was supplemented by a decision to further reduce force levels. This effort should produce favorable results in the not too distant future."

The Chairman of the Joint Chiefs pointed out with equal candor that "the material readiness of our forces remains below desired levels," explaining that "deficiencies are the cumulative result of many years of constrained funding . . . during our protracted active involvement in Southeast Asia." Austere funding, the energy crisis, and "unprogrammed material demands for support of allies" since then have thwarted DoD's efforts to correct these deficiencies, he said.

Soviet General-Purpose Forces

While the capabilities of US general-purpose forces must be measured against those of a number of nations and alliances, DoD's key gauge is the Soviet Union, whose ground forces, not counting paramilitary organizations, are estimated to number about 1,700,000 men. This force, according to Dr. Schlesinger, is "marshaled into 166 divisions of varying sizes and degrees of readiness. These forces could deploy over 40,000 tanks and would have the support of more than 7,000 tactical aircraft—excluding the medium bombers of Long-Range Aviation and Naval Aviation. Soviet naval forces consist of about 220 major surface combatants—including one new aircraft carrier already launched and two helicopter ASW carriers—and approximately 265 general-purpose submarines, of which about eighty are nuclear."

Concerning tactical nuclear forces, Dr. Schlesinger told Congress that "while we have heard a great deal about US forward-based systems with nuclear capabilities, remarkably little has been made of the large number of noncentral nuclear systems that the Soviets deploy, some of which—under certain circumstances—would be capable of hitting parts of the United States,

most obviously Alaska." These Soviet peripheral attack and theater nuclear forces, he added, are "numerous, diversified, and of high quality [and] represent a powerful potential threat to our allies in Europe and Asia as well as to US forces stationed in these theaters.

"In addition, Soviet sea-launched cruise missiles [SLCMs] . . . could be used for strategic missions, including attacks on European and Asian targets as well as on US coastal cities and installations. Other long-range forces include a major portion of the Soviet [Badger] medium bombers which, while assigned to the Long-Range Aviation of the USSR, and having a marginal intercontinental attack capability, are oriented primarily toward targets in Europe and Asia. Shorter-range Soviet capabilities include nuclear-capable tactical aircraft and a series of mobile surface-to-surface missiles, many of which have an off-road capability."

Heretofore, the massive quantitative superiority of Soviet general-purpose forces was assumed to be compensated for by US quality. But this era of relative balance is drawing to a close, General Brown warned. The USSR "has embarked on a vigorous development and modernization program designed to increase significantly the military capabilities of its general-purpose forces [which] may reflect Soviet doctrinal change as well as modernization."

The Soviet Union's modernization program appears to seek improvement of its ground forces in three phases, the first of which centers on the development and deployment of a strong tank force. While this cycle is completed—40,000 tanks deployed by the USSR vs. 9,000 by the US—that force is being modernized through the introduction of new equipment, especially the Soviets' new M-1970 medium tank.

The second phase, General Brown reported, involves the complementary deployment of armored troop-carrying fighting vehicles to enable the infantry to move with the tank force. He described these as being notably different from conventional personnel carriers because they have "significant armament and antitank capability and incorporate CBR [chemical, biological, and radiological] protection."

The third phase of the Soviet program, General Brown suggested, centers on the deployment of self-propelled artillery "to keep pace with highly mobile tank and motorized rifle units," involving such new ordnance as 122-mm and 152-mm self-propelled artillery and "the self-contained SA-8 and SA-9 systems which join the fully tracked SA-6 in providing highly mobile, responsive air defense to the armored column on the move." General Brown suggested that this emphasis on conventional artillery, "as distinguished from missiles, may represent a Soviet doctrinal conclusion that conventional war need not escalate to a strategic nuclear exchange now that the strategic balance is in dynamic equilibrium."

The last element in the Soviet Union's program to "substantially increase the effectiveness" of its ground forces is the Hind-A helicopter now entering the Soviet inventory in quantity. Capable of carrying 57-mm rocket pods and antitank missiles, or up to sixteen troops, the new helicopter provides through "its extensive armament payload . . . a formidable ground attack capability against tanks, trucks, or troops in addition to enhanced mobility," General Brown said.

Dr. Schlesinger proposed to counter the growing capabilities of Soviet ground forces through continued emphasis on tactical airpower and the increase of US ground forces from thirteen to sixteen divisions. The FY '76 investment in tactical air capabilities of the United States will amount to about $24 billion, about evenly divided between USAF's tac air, and the combined Navy and Marine Corps tactical air. US emphasis on tac air, Secretary Schlesinger explained, rests on "the fact that the United States tends to substitute tactical air forces for ground forces more heavily than does the USSR."

Although accepting the need for systems capable of performing deep penetration and interdiction missions—such as the F-14 and F-15—Dr. Schlesinger saw a requirement to "increase our investment" in shallow interdiction and close air support through "more emphasis on the air combat fighter for air defense and local air superiority in the vicinity of the FEBA [forward edge of the battle area] and on the A-10 for shallow interdiction and close air support." Such an adjustment of emphasis, he added, "should bring our tactical airpower more effectively to bear during the early phases of conflict when the main effort, particularly in Europe, must go to halting fast, armor-heavy assaults on the ground."

Strategic Mobility

The nation's strategic mobility forces remain essentially unchanged under the FY '76 budget proposal. The number of C-5 and C-141 squadrons remains level at four and thirteen, respectively, but the number of troopships, cargo ships, and tankers is increased from forty to forty-three. The funding requested for these forces goes up, in constant dollars, from $1.0 billion to $1.6 billion, accounted for mainly by modernization. (*See February 1975 cover story, "Airlift's New Look."*)

The Soviet Union, according to DoD assessments, places less emphasis than the United States on strategic airlift due to geographic factors. Nonetheless, General Brown warned, the Soviet Union's capability "is significant," consisting of four-engine, turboprop An-22 Cock transports and the Il-76 Candid long-range jet transports, which are capable of transporting tank forces and have entered the Soviet operational inventory this year, according to General Brown. Complementing these airlift systems are An-12 Cub aircraft that are used for both tactical and strategic airlift, he reported. While General Brown did not give specific numbers of Soviet transport aircraft, he said the inventory was large enough to support the Soviet Union's seven airborne divisions (vs. one US airborne division) over the distances stipulated by Soviet military planners.

In an epilogue to the FY '76 budget request, General Brown stressed its "austere and essential" character and recalled Tom Paine's aphorism of 200 years ago: "Those who expect to reap the blessings of freedom must . . . undergo the fatigue of supporting it." The buck now has been passed to the Ninety-fourth Congress. ■

FY '76 DEPARTMENT OF DEFENSE BUDGET

SUMMARY OF SELECTED ACTIVE MILITARY FORCES

	ACTUAL JUNE 30, 1964	ACTUAL JUNE 30, 1974	ESTIMATED JUNE 30, 1975	ESTIMATED JUNE 30, 1976
STRATEGIC FORCES:				
Intercontinental Ballistic Missiles:				
Minuteman	600	1,000	1,000	1,000
Titan II	108	54	54	54
Polaris-Poseidon Missiles	336	656	656	656
Strategic Bomber Squadrons	78	28	27*	26*
Manned Fighter-Interceptor Squadrons	40	7	6	6
Army Air Defense Firing Batteries	107	21	0	0
GENERAL-PURPOSE FORCES:				
Land Forces:				
Army Divisions	16⅓	13	14	16
Marine Corps Divisions	3	3	3	3
Tactical Air Forces:				
Air Force Wings	21	22	22	22
Navy Attack Wings	15	14	14	13
Marine Corps Wings	3	3	3	3
Naval Forces:				
Attack and Antisubmarine Carriers	24	14	15	13
Nuclear Attack Submarines	19	61	64	68
Other Warships	370	187	189	185
Amphibious Assault Ships	133	65	64	63
AIRLIFT AND SEALIFT FORCES:				
Strategic Airlift Squadrons:				
C-5	0	4	4	4
C-141	0	13	13	13
Troopships, Cargo Ships, and Tankers	100	37	40	43

* Reflects reorganization; total number of strategic bombers remains unchanged from FY '74

DEPARTMENT OF DEFENSE BUDGET

FINANCIAL SUMMARY

(Billions of $)

MILITARY PROGRAM	CONSTANT FY '76 DOLLARS TOTAL OBLIGATIONAL AUTHORITY FY '73	FY '74	FY '75	FY '76	FY '76T
Strategic Forces	$10.1	$8.4	$8.0	$7.7	$2.0
General-Purpose Forces	34.5	33.2	30.4	35.9	7.0
Intelligence and Communications	7.9	7.4	7.0	7.3	1.6
Airlift and Sealift	1.2	.9	1.0	1.6	.3
Guard and Reserve Forces	5.1	5.2	5.3	5.6	1.5
Research and Development	8.3	8.1	8.3	9.4	2.3
Central Supply and Maintenance	13.0	11.3	10.1	9.9	2.5
Training, Medical, other Gen. Pers. Activ.	21.7	21.9	21.3	21.7	5.3
Administration and Assoc. Activities	2.4	2.3	2.3	2.4	.6
Support to Other Nations	5.4	5.7	2.8	3.3	.5
TOTAL	$109.4	$104.4	$96.5	$104.7	$23.7

Airman's Bookshelf

Peccable Arguments for Disarming

The Permanent War Economy: American Capitalism in Decline, by Seymour Melman. Simon & Schuster, New York, N. Y., 1974. 384 pages with notes, appendices, and index. $8.95.

The kindest thing one can say about this book by Professor Seymour Melman is that the author means well. He wants to beat swords into plowshares, to convert what he calls "the permanent war economy" into a permanent peace economy. Defense production, in his view, is wasteful and parasitic, depleting the national economy and leaving vast, unmet civilian needs. Poverty, inflation, the decay of cities, and other social ills are laid at the door of military-oriented enterprise.

Melman would have the aerospace plants turning out prefabricated housing sections and other consumer or industrial goods. For the displaced defense workers, he proposes a "bill of rights," which includes a year of occupational retraining, family income maintenance, family health insurance, relocation expenses, a moratorium on mortgage and credit payments, and reemployment rights in defense industry or on military bases.

The federal government would foot the bill for conversion costs, but Melman is not a big government man. No, sir! Big government means centralism, and centralism smacks of authoritarianism. He wants the federal government to yield a substantial portion of its taxing power to states and cities. Municipal incompetence and graft are not uncommon, but the waste is peanuts compared to cost overruns of the weapons makers.

Melman plays a familiar trade-off game: one Huey helicopter equals sixty-six low-cost homes; money for the B-1 bomber program would buy solid waste treatment for the whole country; what was spent for the C-5 aircraft program would eliminate hunger in America; and so on. He cannot guarantee, of course, that money withheld from defense would be spent in the desired ways, but he is willing to prepare the ground by cutting the defense budget by about two-thirds, bringing it down to $29 billion a year.

Rehashing the theme of *Pentagon Capitalism,* an earlier book, Melman identifies as the dominant feature of our economy a state-directed system of capital investment and weapons acquisition, which keeps contractors in business by cost-plus and subsidy arrangements. This era of profligacy and waste, as Melman sees it, was ushered in by the Kennedy Administration. He points repeatedly to Robert S. McNamara as the architect and evil genius of the system. In former times, the ruling business élite sought "world hegemony" through colonies, raw materials, and opportunities for investment and export. The new government breed thirsts simply for "decision power." Vietnam was its training ground.

The author recognizes that his version of the good society is difficult to achieve. Too many managers, technicians, clerks, and production workers have a vested interest in the permanent war economy, which pays well, even if it does not produce anything useful. The people are complacent, taken in by the prevailing ideology of the Pentagon ruling class.

The Congress is no help, because too many congressmen want their constituents to have the benefit of defense industry jobs and payrolls. It will take a "popular revulsion," stemming from "widespread ideological demystification," to change things. It is up to Melman and like-minded intellectuals to carry on the lonely work of persuasion.

The author means well, but he does not do well. The theorizing is shallow, the statistics bounce around from year to year, the conclusions from questionable premises often are flatly wrong, many of the sources are peccable, and there is much use of jargon and cliché. One finds such tautological gems as: "Some decision-making activity must accompany all production, since there can be no production without decision-making [p. 210]."

This book must be put down as preachment, not scholarship. It is a tract for unilateral disarmament without any regard for the consequences. Melman, who teaches industrial engineering at Columbia University, lives in his own fantasy world.

—Reviewed by Herbert Roback, staff member, Committee on Armed Services, US House of Representatives.

Number Two Nazi

The Reich Marshal: A Biography of Hermann Goering, by Leonard Mosley. Doubleday & Co., Garden City, N. Y., 1974. 361 pages. $12.50.

The ashes of Hermann Goering, who was cremated after killing himself with a vial of cyanide at Nuremberg, were dumped into a muddy gutter. Today, nobody appears to know where the gutter is.

Leonard Mosley, who was a British newspaperman in World War II and has written several books as a result of that experience, knew Goering personally and found much that he admired in the man. One of the few things he does not know about the No. 2 Nazi is where those ashes were put on a rainy night in October 1946. His biography of Goering will stand beside the memoirs of Albert Speer as one of the best books in print about the hierarchy of the Third Reich.

Airmen, in particular, will find the account of Goering's key role in the formation, rise, and collapse of the Luftwaffe a thrilling story. There is no doubt about it, the Reich Marshal was a superb aviator and is entitled to his standing in the profession. That disaster was the outcome, and his cause evil, has nothing to do with it.

In July 1918, there was this order from Berlin to the Western Front:

"By direction of the Supreme Commander of the German Armed Forces, Lt. Hermann Wilhelm Goering, Pour le Mérite, Iron Cross First Class, Zaehring Lion with Swords, Karl Friedrich Order with Swords, Hohenzollern Medal with Swords Third Class, presently commanding Jasta 27, is hereby appointed Kommandeur of Jagdgeschwader Freiherr von Richthofen No. 1."

The Red Baron had met his match, and Goering was his replacement. Ernst Udet, no slouch himself in the cockpit, had been passed over. The selection gave the von Richthofen squadron a boss with an insatiable ego, it is true. But, according to Mosley, he still was able to give lessons to what was already the world's most famous group of combat flyers. For details, read the book.

The biography is replete with yarns about Goering's personal life and loves, his Carin and his Emmy, his resplendent clothes and homes, his devotion to Hitler, the way he organized the storm troopers in the days before he could get the Luftwaffe into the air. Parts are grim, but the author had sources, some of them in the Goering family, that make the detail fascinating.

Did you know, for example, that Hermann Goering would qualify for honorary membership in the Sierra Club? Mosley says that if the Reich Marshal could be judged today "simply for what he did for Germany's flora and fauna, he would probably [be] hailed as a conservationist of great imagination and achievement. . . . He restocked the forests . . . imported elk and bison . . . ducks, swans and game . . . tightened hunting laws." In his office there was a sign that said *Wer Tiere quaelt, verletzt das deutsche Volksempfinden.* ("He who tortures animals wounds the feelings of the German people.") Mosley, of course, points out the irony of this kindness to beasts in the midst of horrors against men.

It also is in the record that prior to the Nuremberg trials, where Goering was sentenced to die and cheated the gallows, twenty-one of the Nazi big wheels, including such men as von Ribbentrop, Doenitz, Schacht, and Speer, were given intelligence tests. Goering ranked No. 3 when the results were posted.

In early November of last year, it was reported from Paris that Gen. Paul Stehlin, a former Chief of Staff of the French Air Force and one of the deputy speakers of the French lower house, had created a scandal. General Stehlin had written a memo, leaked as memos sometimes are in Washington, that said the American YF-16 and YF-17 were "unquestionably superior" to their rival French airplane, the Mirage F.1 M-53. There is a strong possibility the General is right.

Well, the same Paul Stehlin figures prominently in the Goering biography. In 1936, Stehlin was a young captain in the French Air Force assigned as an assistant attaché to the embassy in Berlin. His German was fluent; he was handsome, daring, and smart. Goering cultivated Stehlin.

It was arranged that the French captain receive invitations to the right dinner parties, even at the home of Olga Rigele, who was the Reich Marshal's sister. At one of them, Goering put his arm around Stehlin and started to promote what he viewed as the deterrent power of the Luftwaffe. Said he: "Come out into the field, come and see our exercises, look at our factories, I'll hide nothing from you, and you will get a more accurate idea of how it is with the Luftwaffe."

Stehlin accepted the invitation, and the resulting memorandums he sent back to Paris are credited by author Mosley with an impact that was felt even at Munich in 1938 when Neville Chamberlain and Edouard Daladier signed a death warrant for Czechoslovakia. He says Stehlin fell "for one of Hermann Goering's most effective ploys for subjecting the French to Nazi propaganda."

It is odd that the book contains no reference to Charles Lindbergh, who carried out a similar liaison for Gen. Hap Arnold. That chapter was covered in the memoirs of Albert Speer.

Of course, there were vast and powerful forces unknown in the mid-1930s to both Goering and Stehlin. They were the RAF and the AAF. They, in effect, dumped the ashes in the gutter.

—Reviewed by Claude Witze, Senior Editor of this magazine. As a young newspaperman, Mr. Witze spent 1934 in Germany, where he witnessed the early rudiments of the new Luftwaffe.

L'audace, toujours l'audace!

The Patton Papers 1940-1945, by Martin Blumenson. Houghton Mifflin, Boston, Mass., 1974. 889 pages with index, chronology, maps, and photographs. $20. Volume I (1885–1940) published in 1972.

When Martin Blumenson came out to the Air Force Academy in March 1972 to deliver the fourteenth annual Harmon Memorial Lecture in Military History, he chose as a title for his remarks, "The Many Faces of George S. Patton, Jr." He made a good case for that title. This volume, even more than the lecture or Volume I [reviewed in these pages by Maj. Al Gropman, July 1972, pp. 78–79], makes the case beyond any dispute, forcefully illustrating Blumenson's earlier remark that everything that anyone has ever said about Patton is probably true.

This volume opens with Patton's transfer from the polo grounds of Fort Myer to the tank grounds of Fort Benning in July 1940, when Patton, age fifty-five and a colonel with thirty-one years of service, took command of a brigade of the newly formed 2d Armored Division. It follows him through prewar maneuvers, the California-Nevada-Arizona desert training center, North Africa, Sicily, Normandy, St.-Lô, the sweep across France, the race to Bastogne, the crossing of the Rhine, relief from command of the Third Army, to his death on December 21, 1945—"too soon after the war for him to be forgotten, too soon for him to spoil irretrievably the reputation he had earned."

Simply stated, his reputation was that of the most audacious, unconventional, impatient, unpredictable (to both enemies and superiors), and effective ground combat commander of World War II. Whether in training, between actions, or in the midst of combat, "no one else produced the sense of excitement he generated," and it is noteworthy in this context that for all the public-relations scrapes Patton got himself involved in, Eisenhower could never bring himself to fire Patton until after the last battle had been won.

Blumenson's pattern of presentation remains the same—a weaving together of Patton's letters, diary notes, lectures, articles, poems. As in Volume I, Blumenson's connecting narrative never imposes itself on the basic material, and the whole forms an invariably coherent narrative. The diary entries are by far the most revealing, whether of his impatience with his superiors, his fear under fire (especially "straffing"), his insistence that men—not machines—count first in bringing victory, or his insatiable lust for fame.

The account of his final six months and his disenchantment with postwar occupation policies (he wanted to rebuild Germany as a bulwark against the "Mongols") is all but heartrending. He seemed to sense the end was coming. "Peace is going to be a hell of a let down [p. 563]. . . . Another war has ended and with it my usefulness to the world. Now all that is left to do is to sit around and await the arrival of the undertaker and posthumous immortality [p. 736]. . . .

Airman's Bookshelf

The great tragedy of my life is that I survived the last battle [p. 800]."

Military officers of whatever service will find this volume a gold mine for introspection on preparing themselves for command in combat, for Patton had it all together when the going got rough—whether it was a tactical plan so at variance with established procedure as literally to frighten others, or simple advice to his son on the luck of the draw under fire: "One of those damned jet planes that goes 470 mph just dropped a bomb. They also shoot rockets at us, but one gets used to such things. It is like a thunder storm. You are not apt to be in the way. And if you are, what the Hell, no more buttoning and unbuttoning [p. 625]."

—Reviewed by Lt. Col. David MacIsaac, Department of History, Air Force Academy.

F.Y.I.

Of the press, by the press, for the press (And others, too), edited by Laura Longley Babb. The Washington Post Co., Washington, D. C., 1974. 237 pages with bibliography. $3.95 in Dell paperback.

Readers of this magazine who are familiar with Claude Witze's crusade for greater professional responsibility among newsmen will be pleased to note that the cudgel has been taken up by that pillar of the "Eastern Liberal Establishment," the Washington *Post.*

In its new book, *Of the press, by the press, for the press (And others, too),* the *Post* addresses those questions and issues that Mr. Witze has been bringing to the fore in his column, "The Wayward Press."

Of the press . . . is "A critical study of the inside workings of the news business. From the news pages, editorials, columns, and internal staff memos of *The Washington Post.*" Nearly 100 items by fourteen past and present staffers are assembled into sixteen loosely arranged chapters.

The bulk of the book is by two former *Post* ombudsmen, Richard Harwood and Robert C. Maynard, whose job it was to call to the newspaper staff's attention those errors in fact and judgment that distorted the news. Much, but not all, of the criticism is hard and direct. It should lead the reader to look between the lines and under the rug for what is not said.

Even the defense establishment gets some attention—and a few belated apologies. One chapter is devoted to press coverage of the Vietnam War. According to Harwood, there was, in the 1950s, "great ignorance about Indochina on the part of the press, Congress and the public," and the press did little to remedy the situation or to develop independent viewpoints before the US was deeply committed.

Harwood also reports that *Post* summer interns found coverage of the Cambodian incursion "one-sided and unfair."

The book deals with press reports of the Besson study (a number of newspapers, including the *Post,* headlined the study as critical of top Administration war planning; in fact, the study was overwhelmingly complimentary); the Pentagon Papers; the fictitious "Buckley Papers"; "The Selling of the Pentagon," a pseudo-documentary produced by CBS, whose slanted editing was first called to public attention in this magazine by Claude Witze.

Among other current and perplexing journalistic ailments dealt with are the pressures of the news business (deadlines, advertising, competition) and their impact on accuracy and completeness, the trap of stereotyping, granting unidentified sources credibility, and increasing monopolization of the news business. Each is counterpointed against real examples of how the news has been distorted, intentionally or not.

While *Of the press* . . . asks questions and raises issues, it does little to answer them. But it is an important first step from within, an attempt by a news organization to look at itself with relative objectivity. The *Post's* "F.Y.I." editorials (which prompted the newspaper to publish this book) and NBC's new "Editor's Notebook" are two small movements in that direction.

The real importance of *Of the press* . . . lies in what it tells the reader, listener, and viewer about the news business. An educated and skeptical news consumer can be the best defense against deception, and the most powerful prod toward a loftier journalism ethic.

—Reviewed by Richard J. Knapp, Deputy Director, Field Organization, AFA.

New Books in Brief

Almanac of Liberty, by Benjamin F. Schemmer and the Editors of *Armed Forces Journal.* Here is a compilation of American military facts from Patrick Henry to Gerald R. Ford. It is the first reference volume of this kind to cover all the armed forces. Brief summaries of events are arranged by year in the first section, by month in the second, and indexed alphabetically in the third. Includes some 300 photographs, engravings, and maps. Macmillan, New York, N. Y., 1974. 262 pages. $15.95.

Hitler's Naval War, by Cajus Bekker. This history of the German Navy's war at sea from 1939 to 1945 was among the ten best sellers in Germany in 1972. The writer, a former intelligence officer in Hitler's Navy, is the author of *The Luftwaffe War Diaries.* He writes of the conflicts within the German Navy and between it and Hitler's high command, and describes the Navy's early failures and their later consequences. Doubleday, Garden City, N. Y., 1974. 400 pages with index and appendices. $12.95.

Pacific Sweep, by William N. Hess. This account of action by the Fifth and Thirteenth Fighter Commands in World War II begins with their desperate attempt to stop the Japanese push into the Philippines. When the Philippines fell, the Fifth and Thirteenth moved to Australia and later took part in the battles for Guadalcanal, Solomon Islands, and New Guinea. In 1944, both the Fifth and the Thirteenth were involved in the triumphal return of US forces to the Philippines. Doubleday, Garden City, N. Y., 1974. 278 pages with index. $9.95.

Sunward I've Climbed, by Lt. Gen. Howard A. Craig, USAF (Ret.). This autobiography covers the military career of General Craig from pilot training in 1917 to retirement in 1955. The early chapters are full of anecdotes about flying in the 1920s and '30s. Later chapters recount his experiences as a World War II commander and top-level planner. There are interesting insights into the personalities and operating methods of Gens. Billy Mitchell, Marshall, Arnold, Eisenhower, Patton, and other senior commanders, and an account of a bizarre encounter with Churchill. Texas Western Press, El Paso, Tex., 1975. 173 pages with appendices. $10. ■

The Bulletin Board

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

Officer Promotions Trimmed

A smaller force, fewer vacancies, and lower selection opportunity have combined to trim USAF officer promotions. The official figures appear in a report on grade ceilings that USAF recently furnished Congress. It shows actual promotions in FY '74, and projected totals this fiscal year and for FY '76.

To	FY '74	FY '75	FY '76
General	4	3	6
Lt. Gen.	16	18	16
Maj. Gen.	38	38	30
Brig. Gen.	52	65	46
Colonel	1,152	874	833
Lt. Col.	2,833	1,503	1,727
Major	3,895	2,211	2,072
Captain	4,777	5,734	5,217*
1st Lt.	3,412	7,254	5,962*

**Variations due to change in phase points from three to four years for captain, eighteen to twenty-four months for first lieutenant.*

Congressional pressure to trim rank, the continued absence of authority to force early retirements of Regular officers, and modest overall retirement levels have curtailed vacancies. Promotion opportunity dropped last year when USAF lowered the overall chance of making major from ninety to eighty percent and lieutenant colonel from seventy-five to seventy percent.

Officer strength at the start of FY '74 was 110,316. The official end-FY '76 projection is 99,967.

USAF's promotion pace falls well short of what Headquarters says is needed to meet job "requirements." FY '76 budget figures shown below reflect the wide gap between what the service was forced to ask for and what it really needs:

	FY '76 Budget Programmed	Actual Grade Requirements
General Officer	375	537
Colonel	5,480	5,905
Lt. Colonel	12,344	13,855
Major	19,368	22,941

The next temporary colonels board, to have convened April 28, has been rescheduled for late September. Actual promotions won't be delayed, however, because an earlier list of 540 colonel selectees won't be exhausted until about December. The first increment from that list—up to the top fifty names—was to pin on the eagles on March 1.

Approximately 950 LCs are expected to be elevated by the September board, starting with an initial increment next January.

Physician Manning Steady

USAF physician strength is running about 400 below authorized strength, the same as last year. But the service is enjoying good doctor recruiting, and the new physician bonus is proving effective in the battle to retain this most critical of all military occupational groups. The look ahead appears less gloomy than was indicated earlier.

The USAF Surgeon General's Office spelled it out for AIR FORCE Magazine. As of the end of January, a spokesman said, physician strength stood at about 3,100, but was expected to rise to 3,200 by June 30.

The special medical recruiting program USAF established last year has put 131 doctors in uniform. Another seventy-six are about to enter, and 192 applications are being processed. Meantime, 860 Air Force doctors have signed bonus contracts (worth $9,000 to $13,500 annually) that require extended service.

Expanded use of doctor assistants and nurse practitioners is also helping the medical manning situation.

Late in the decade, Air Force expects to procure sizable numbers of physicians from its sponsored medical education programs, followed by an influx of graduates of the new Defense medical school in the early 1980s.

Authorized USAF medical officer strength remains at 3,630 through the end of FY '76. Although active-duty members continue to decline in number, the retired community is steadily increasing, the patient load remains high. Of the 9,500,000 persons eligible for military medical care (all services), 7,400,000 are retirees, their dependents, survivors of service members, and active-duty kin.

In related developments:

- Informed sources said the large-scale medical study by Defense and the Office of Management and Budget has been delayed until June. Originally due late last year, it is expected to call for major changes.
- Defense Secretary James R. Schlesinger, in his annual posture statement, referred to the eventual change military authorities fear most: gearing the military medical system to "the medical needs of our active-duty forces . . . rather than on active-duty personnel plus dependents and retirees. . . ." Dr. Schlesinger said Defense was "examining the possibility" of doing that.

Manpower Cost Ratio to Decline

Military manpower-personnel costs as a percent of the defense budget are about to decline—from

In the first session this year, AFA's Junior Officer Advisory and Airmen Councils met jointly in Washington, D. C. The Councils heard a candid appraisal of the coming legislative year from John Ford, Staff Member, House Armed Services Committee. Above, Council Chairmen Capt. Richard Farkas and CMSgt. Harry Lund with Mr. Ford and AFA President Joe Shosid, left.

fifty-five percent this fiscal year to fifty-three percent in FY '76. That's the prediction of Assistant Secretary of Defense (Manpower and Reserve Affairs) William K. Brehm.

How can this be accomplished when such costs, year after year, have taken a larger share of the budget? Mr. Brehm cited a variety of economies in operation or planned, such as $60 million to be saved in reduced lump-sum leave payments next year.

Other estimated savings Mr. Brehm cited include $366 million in FY '76 from the "three-way" pay legislation enacted last year (which distributes pay hikes between allowances and basic pay); troop reductions overseas; elimination of proficiency pay; reduction of officers receiving fully funded graduate education; and, starting in FY '77, the new flight pay program.

Mr. Brehm included in his list of cost-saving "initiatives" the Quadrennial Review of Military Compensation, which he heads. He did not state directly that one aim of the Compensation study is to cut military compensation costs, but the strong implication is there.

Chairman Calls for Fair Play

Gen. George S. Brown, Chairman of the Joint Chiefs of Staff, in his recent posture statement to Congress, had an important message about military people for the lawmakers:

"Those who make the still required sacrifices of peacetime service and stand ready to make the even greater sacrifices inherent in battlefield protection of this nation require an occasional word of praise and appreciation.

"I do not ask that legitimate criticism be stifled or abuses covered up. They must be exposed to be corrected. However, we will not attract to the service anyone but pretentious second-raters if the real value of a service career must be ferreted out of an image of inept second-class citizens.

"Our military tradition requires that even unjustified and unsubstantiated attacks remain unanswered publicly by uninformed personnel. Your judgment and fairness publicly expressed, together with the voices of the Secretary of Defense and his civilian associates, are the only real protection the armed forces have against those who constantly belittle a service career."

DoD's "Legislative Program"

The Defense Department's "legislative program" for the Ninety-fourth Congress is dominated by carryover proposals the lawmakers ignored the last two years. Top items include the Retirement Modernization Act (RMA), the Defense Officer Personnel Management Act (DOPMA), and authority to recall Reservists other than during a national emergency.

Also high on the new list of measures the Pentagon wants Congress to approve are the Reserve Retirement Modernization Act (cut the retirement age from sixty to fifty) and the Reserve Officer Personnel Modernization Act (align Reserve personnel changes with those planned under DOPMA).

Defense's plan to erase the "pay-inversion" problem by giving post-October 1, 1974, retirees pay equal to that enjoyed by earlier retirees still lacks Administration blessing. Passage this year is held unlikely.

Also in Defense's program is a plan to pay up to seventy-five percent of enlisted Reservists' tuition for attending trade school or college courses. But it also has a price-tag problem. A flock of Reserve-Guard proposals Congress rejected earlier, including improved medical benefits, are being resubmitted.

One of the many measures of special interest to small groups would provide travel-transportation money for separating civilian employees who remain outside CONUS.

Secretary Schlesinger has revealed that the Department may propose a slash in enlisted members' lump-sum leave payments, to the officer level of sixty days over a full career. Enlistees now collect for up to sixty days on each reenlistment. Dr. Schlesinger also said he's interested in a Stateside variable housing allowance, which a study group will evaluate. However, because of the cost involved, no formal proposal is expected to emerge.

There is some Administration support for eliminating the one percent "add-on" raise that accompanies each retired pay increase, but no proposal had been hammered out by press time, an authority said.

The lawmakers, meanwhile, have introduced service academy, retired pay recomputation, and many other military bills. But with the Armed Services Committees concentrating on hardware authorization, construction, and other matters, personnel proposals—Defense's included — are unlikely to receive serious early consideration. The Administration earlier withdrew its previously lukewarm support for a modified recomputation measure.

Road to Commissions Open

While the main commissioning route (Airman Education and Commissioning Program) remains closed to most airmen, another path to gold bars is open to about 350 airmen. It's AFROTC.

A board slated to meet June 2 will select EM for college entry next fall. Air Force says two-, three-, and four-year AFROTC scholarships will be awarded for potential pilots and

Rae Louise Anderson, the Little General of the Arnold Air Society, during her meeting at the White House with Dr. Theodore Marrs, Special Assistant to the President. Rae Louise, a senior at Utah State University in Logan, Utah, was in Washington to review the agenda of the Arnold Air Society for the coming year. During her visit, she also met with Secretary of the Air Force Dr. John L. McLucas and James H. Straubel, Executive Director of the Air Force Association.

The Battle of the Commissaries

That uproar you may be hearing could be the "battle of the commissaries" now being waged at service installations and by the retired community and military-oriented organizations.

Under heavy attack is the Administration's decision to withdraw what has amounted to about $250 million annually in appropriated funds to pay the 430 comstores' 25,000 civilian and 2,500 military employees. Instead, patrons will pay the salaries through larger surcharges applied at store checkout counters.

Unless Congress overturns the Administration's blueprint.

The congressional decision will center on Section 814 of the President's FY 1976 military budget, which provides the legal underpinning for what many quarters see as the beginning of the end for the commissary system. Starting next October, the proviso says, half the direct costs of commissary operations will be borne by the customers. By October 1976, they will shoulder the full cost.

If the lawmakers don't reject or substantially alter Section 814, the entire commissary system will be in deep trouble. The big losers figure to be lower-ranking military families with children, enlisted retirees of advanced years, and widows of retired and deceased personnel. They can ill afford the projected price increases.

The key congressional elements involved are the House and Senate Appropriations Committees, whose members have been receiving heavy mail opposing the move. Commissaries, after all, are an integral part of service life, as vital to the military community as votes are to the legislators.

Their decision probably won't be known until late summer or early fall—that's the usual point for final action on annual military spending measures. A "compromise," where commissary appropriations are reduced but not entirely eliminated, should not be ruled out.

The Pentagon, meanwhile, is barreling ahead with implementing plans, seemingly oblivious to the unprecedented turmoil it is creating among the troops. The Administration's main argument—an echo of the recent Office of Management and Budget's "commissary study" that greased the skids for the funds reduction—is that "active-duty military compensation is now generally competitive with other public as well as private sector compensation."

Therefore, Administration reasoning holds, the twenty-two percent savings commissary patrons enjoy can properly be reduced.

The service community is incensed, perhaps more so than at any other time in recent years over an adverse benefits decision.

Not that the commissary issue is new. Retail store interests have consistently leveled criticism at the stores. But the government, though sometimes reluctantly, has always funded them, even in the face of an occasional blast from powerful figures, such as one delivered in 1947 by former House Armed Services Committee Chairman Carl Vinson.

A major threat to the commissary system surfaced in 1954. A rider inserted in that year's military appropriation act—and included every year since—bars commissary expenditures unless the Defense Secretary certifies that adequately stocked civilian grocery stores are not available "at a reasonable distance and a reasonable price."

Fortunately, the criteria established by the Pentagon in implementing that rider have not forced the closing of a single store.

It's a new ball game now, however. The Pentagon's next step will be to boost the surcharge. According to USAF officials, each single percent increase in the surcharge will mean an equal drop in savings to the shopper.

Thus, if the present three percent surcharge rises to nine percent, the current twenty-two percent savings will dip to sixteen percent. An additional three percent surcharge jump will reduce savings to thirteen percent, which appears to be the target area Defense is heading for. At press time, authorities said they hadn't figured out the exact size of the surcharge increase.

The Administration notes, however, that patrons of base exchanges save about fifteen percent over commercial store prices. Accordingly, commissary cutters hold, a thirteen to sixteen percent saving at the commissaries would still be significant. The OMB study puts it this way:

"The curtailment of subsidies would result in the commissaries approaching an operating concept more comparable to the exchanges. Since the latter are able to offer merchandise at prices that afford sizable benefits, competitive prices, even under the environment of a reduced subsidy, would likewise represent savings to the [commissary] customer."

But service personnel distrust Defense's rationale, feeling that reductions in commissary savings would represent a major step toward a complete phasing out of the stores. One NCO got to the heart of the matter when he put it this way:

"We drive the seven miles to the commissary maybe twice a month. We fight the traffic, parking problems, overcrowded aisles, and long lines because at each visit we may save $7 to $8 over the supermarket. But cut those savings in half, and it wouldn't be worth the effort. Our friends feel the same way. . . ."

The result, he and others predict, would be the eventual closing of all commissaries because Defense could site "lack of patronage."

The Pentagon says, though without great conviction, that it "intends to maintain the commissary store system and make whatever changes are necessary to improve the efficiency, organization, and operating structure of the system."

Part of that statement does contain a modicum of hope: Management improvements are sorely needed. The commissary "system" is a hodgepodge, crying for streamlining that conceivably would save considerable money.

Navy commissaries operate under a centralized system using chain-store methods; *e.g.*, a centralized warehouse services six Navy stores in the Virginia Tidewater area, with savings put at $450,000 annually. USAF-Army commissaries, on the other hand, operate independently under the control of each base commander (who normally knows little about retail grocery operations). There is no centralization of functions.

Service commissaries stock some items sold in exchanges and levy different surcharges, to cite two other areas of nonstandardization.

Various authorities are calling for creation of a single office to run all Defense Department commissary stores, or even a single commissary-exchange service. Such moves, experts agree, could slash overhead, lower distribution costs, and promote other savings. But will they surface in time to ease the present crisis?

The battle of the commissaries, meanwhile, is generating more and more heat. This is one skirmish in the hold-the-line-against-benefits-erosion effort that the service people desperately want to win. And rightly so—their most cherished fringe benefit is at stake. ■

navigators and persons pursuing degrees in technical-scientific areas. In addition, two-year pacts await certain applicants qualified for missile launch officer, nurse, and premedical studies. Personnel offices have application details. Completed applications are due at AFROTC Hq., Maxwell AFB, Ala., by April 30.

Two problems may clutter the AFROTC commission route: the twenty-six-year age limit for AFROTC entry freezes out many well-qualified NCO hopefuls; and time spent in AFROTC is not creditable for basic pay.

Under a recently reinstituted program, airmen already holding baccalaureate degrees—there are about 7,500 altogether—are eligible for the part of AECP that involves going to OTS for commissioning. A board was to meet March 18—the only one slated this year—to choose airmen for the April 22 and subsequent twelve-week classes. In a separate message, USAF said this limited AECP opportunity is "highly competitive."

Air Force leaders headed by Secretary John L. McLucas, meantime, are urging Congress to reopen the regular AECP process, under which promising airmen attend college at government expense to win their degrees and then attend OTS. Dr. McLucas, in recent military posture appearances, lauded AECP as an important enlisted morale program that with "ninety-five percent retention . . . is extremely cost-effective."

PME Schools Avoid Cuts

Reductions in funds and personnel strength have not adversely affected the professional military education (PME) schools USAF officers attend, most of them at Air University, Maxwell AFB, Ala. PMEs "are slated to continue at the present pace and scope," Hq. USAF authorities told AIR FORCE Magazine.

They said major command vice commanders, at a recent review, unanimously reaffirmed command support for the program. "Their strong recommendations to maintain resident attendance at present levels is being supported by the Air Staff," they added. This does not mean, of course, that Defense or Congress couldn't curtail the program by cutting funds.

USAF's policy is that eighty-five percent of young career officers should attend the Squadron Officer School in residence. For Air Command and Staff College and comparable-level schools, twenty-three percent of the top of the annual promotion list to major attend.

A new list, naming 888 O-4 selectees for such schools during the next three years, was recently released. It named 271 pilots, 103 navigators, and 514 nonrated officers, ranging in age from twenty-eight to forty. The board considered 2,874 officers and underscored USAF's enthusiasm for academic degrees. Of the 888 selectees, 402 hold graduate degrees and 478 baccalaureate degrees. Only eight are degreeless.

Seventeen percent of the annual lieutenant colonel promotion list attend the Air War College and other "senior" service schools.

Store Reforms Examined

The flap over commissary price increases has focused attention on the way the stores are run. Each service has its own "system." There is no central Defense Department authority, and operating rules vary widely *(see "Speaking of People," p. 81).*

Accordingly, a new Pentagon committee is looking into such questions as: Wouldn't a single commissary service Defense-wide provide economies to help offset coming price boosts? What about a single agency to operate all commissary stores and exchanges? The committee will also examine ways of providing "better service" to customers, the Pentagon said.

Army Brig. Gen. Emmett W. Bowers, Commander of the Fort Lee, Va., Troop Supply Agency, heads the committee. Air Force members are Col. John T. Miller, Chief, Air Force Services Office, Philadelphia; Col. Jerry E. Conners, a Hq. USAF legal officer; Capt. Jose N. Valez, a cost analyst at Hq. USAF; and Frank D. Derby, Deputy Director of Housing and Services, Hq. SAC, Offutt AFB, Neb. The group is to complete its study by July.

On Capitol Hill, meanwhile, the commissary crisis was aired early in the military posture hearings before the House Armed Services Committee. Several lawmakers with large military constituencies protested Pentagon plans to increase commissary prices. Rep. William Whitehurst (R-Va.) introduced a bill to continue the operation and maintenance of commissaries in the same status they were on January 1, 1975. Mr. Whitehurst represents the Norfolk area, which is heavily military.

GI Bill Shut-off?

Service authorities are alarmed over White House overtures to end GI Bill education and loan eligibility for future service members.

Since government-paid educational opportunities stemming from military service are the major reason youths give for joining up, Pentagon officials say President Ford's plan would reduce the quality and quantity of new manpower.

And service education projects like PREP (Predischarge Education Program), whereby enlistees complete high school under the GI Bill, would start dissolving immediately.

USAF officials say their graduate education programs would suffer with GI Bill money removed, because most enrollments are financed by it. Air Force would have to rely solely on tuition aid funds, though there is no indication it could obtain more.

The move to cut off the GI Bill for future service members began late last year in the Office of Management and Budget. In February, OMB told Defense of the President's desires. The big reason: The GI Bill carries a $4.2 billion price tag in FY '76 alone, and the chief executive wants costs reduced.

If he gets his way, according to OMB estimates, savings will start appearing by FY '77, increasing to $108 million the following year, and reaching $702 million annually by FY '80.

Short Bursts

The troublesome issue of **PCS travel costs** is likely to become even more acute, because the outlays are going up again. The Pentagon's new budget puts a $1,648 billion price tag (all services) on the item in FY '76. That's $200 million more than the estimate for the current fiscal year.

Also troubling to officials of all the services is the growing discontent about **erosion of benefits.** Veteran observers of the military manpower scene say the gripes are reaching record-breaking levels. And unless service members win the "battle of the commissaries," they will proliferate further, many hold.

Surviving budgetary cuts this year

is the **Air Force Worldwide Talent Show,** slated to be picked in June, with performances of the Tops in Blue "'75 Showcase" to begin July 2. It will include the usual fourteen categories of acts.

The **Daedalian Foundation** on May 10 will award a $2,500 fellowship to a USAF Academy graduate (class of 1962 through 1969) who is a pilot, lacks a master's degree, but wants one in aeronautical or astronautical engineering. If the schooling will cost more than $2,500, Air Force will pay the balance, a message from Headquarters indicated.

SAC's annual Missile Combat Competition, involving missile combat crews and maintenance teams from the command's nine missile wings, will be held April 24–May 2 at Vandenberg AFB, Calif.

A **revised TOPLINE**—the basic long-range USAF officer operational blueprint—is due out in April or May and will incorporate key features of the DOPMA legislative proposal. Of vital interest to thousands of career Reserve officers will be the timetable for phasing in the all-Regular force at the eleven-year service point. That's one of the key planks of DOPMA.

"Vocalizing is not enough. There must be strong, visible support demonstrated at every level" for social actions programs, Chief of Staff **Gen. David C. Jones** has told commanders in a tough, no-nonsense message.

USAF Headquarters wants absolutely no misunderstanding among field commanders: Enlisted crew members "will get **at least 120 days notice" before being grounded** and taken off flying pay, a recent letter to base personnel shops says. Seems that some bases may not have complied with this rule, which Congress laid on last summer. ■

Senior Staff Changes

RETIREMENTS: M/G Frederick C. **Blesse;** B/G Donald A. **Gaylord;** B/G Louis W. **LaSalle;** B/G George E. **Reynolds;** M/G Maxwell W. **Steel,** Jr.; B/G Charles A. **Veatch;** B/G Charles E. **Yeager.**

CHANGES: Col. (B/G selectee) William P. Acker, from Cmdr., 432d TFW, PACAF, Udorn Afld., Thailand, to Dep. Asst. DCS/P for Mil. Pers., and Dep. Cmdr., AFMPC, Randolph AFB, Tex., replacing B/G (M/G selectee) Walter D. Druen, Jr. . . . **B/G James H. Ahmann,** from Cmdr., AF Eastern Test Range, AFSC, Patrick AFB, Fla., to Chief, US Mil. Tng. Msn., Dhahran, Saudi Arabia . . . **B/G Tedd L. Bishop,** from Cmdr., 443d MAW (Tng.), MAC, Altus AFB, Okla., to Cmdr., 437th MAW, MAC, Charleston AFB, S. C., replacing B/G (M/G selectee) Thomas M. Sadler . . . **Col. (B/G selectee) Max B. Bralliar,** from Cmdr., USAF Med. Cen., ATC, Keesler AFB, Miss., to Surg., SAC, Offutt AFB, Neb., replacing retiring B/G Charles A. Veatch . . . **Col. (B/G selectee) William E. Brown,** from Cmdr., 82d Flying Tng. Wg., ATC, Williams AFB, Ariz., to Cmdr., 1st Comp. Wg., Hq. Cmd., Andrews AFB, Md. (B/G Milton E. Nelson was previously announced for this post) . . . **M/G Charles E. Buckingham,** from DCS/Acq. Log., AFLC, Wright-Patterson AFB, Ohio, to C/S, AFLC, Wright-Patterson AFB, Ohio, replacing M/G George Rhodes.

Col. (B/G selectee) Ernest J. Clark, from Comd. Surg., PACAF, Hickam AFB, Hawaii, to Dir. of Prof. Svcs., OTSG, Hq. USAF, Washington, D. C., replacing retiring B/G George E. Reynolds . . . **B/G Harold E. Confer,** from Dep. Dir. for Strat. Forces, DCS/R&D, Hq. USAF, Washington, D. C., to DCS/Log., ATC, Randolph AFB, Tex. . . . **Col. (B/G selectee) Robert F. Coverdale,** from Cmdr., O/L A (Operating Location "A"), 22d AF, MAC, Little Rock AFB, Ark., to Cmdr., O/L A, 21st AF, MAC, Pope AFB, N. C., replacing B/G Theodore P. Crichton . . . **B/G Theodore P. Crichton,** from Cmdr., O/L A, 21st AF, MAC, Pope AFB, N. C., to V/C, 21st AF, MAC, McGuire AFB, N. J. . . . **B/G Frank M. Drew,** from Comdt., Air Command & Staff College, AU, Maxwell AFB, Ala., to Chief, Air Sec., JBUSMC, and Chief, Air Sec., MAAG, Rio de Janeiro, Brazil, replacing B/G Louis W. LaSalle . . . **B/G (M/G selectee) Walter D. Druen, Jr.,** from Dep. Asst. DCS/P for Mil. Pers., and Dep. Cmdr., AFMPC, Randolph AFB, Tex., to Asst. DCS/P for Mil. Pers., and Cmdr., AFMPC, replacing M/G Travis R. McNeil . . . **B/G Norman C. Gaddis,** from Dep. Dir. for Op. Forces, DCS/P&O, Hq. USAF, Washington, D. C., to Dep. Dir. of Ops., DCS/P&O, Hq. USAF, Washington, D. C.

B/G Charles F. G. Kuyk, Jr., from Cmdr., 436th MAW, MAC, Dover AFB, Del., to Dep. Dir. for Strat. Forces, DCS/R&D, Hq. USAF, Washington, D. C., replacing B/G Harold E. Confer . . . **M/G George G. Loving, Jr.,** from Dir. of Plans, DCS/P&O, Hq. USAF, Washington, D. C., to JCS Rep. for Mutual and Balanced Force Reduction, JS, OJCS, Washington, D. C. . . . **M/G Travis R. McNeil,** from Asst. DCS/P for Mil. Pers., and Cmdr., AFMPC, Randolph AFB, Tex., to Dep. Insp. Gen., USAF, Hq. USAF, Washington, D. C., replacing retiring M/G Frederick C. Blesse . . . **B/G Richard E. Merkling,** from DCS/O, 4th ATAF, Ramstein AB, Germany, to Dir. of Aerosp. Safety, AFISC, Norton AFB, Calif., replacing retiring B/G Charles E. Yeager . . . **B/G George D. Miller,** from Cmdr., 307th Strat. Wg., SAC, U-Tapao Afld., Thailand, to Cmdr., 57th Air Div., SAC, Minot AFB, N. D.

B/G (M/G selectee) James P. Mullins, from V/C, Ogden ALC, AFLC, Hill AFB, Utah, to DCS/Acq. Log., AFLC, Wright-Patterson AFB, Ohio, replacing M/G Charles E. Buckingham . . . **Col. (B/G selectee) Walter B. Ratliff,** from Cmdr., 305th ARW, SAC, Grissom AFB, Ind., to Cmdr., 40th Air Div., SAC, Wurtsmith AFB, Mich. . . . **B/G (M/G selectee) Thomas M. Sadler,** from Cmdr., 437th MAW, MAC, Charleston AFB, S. C., to Chief, Security Police, Hq. USAF, Washington, D. C. . . . **M/G George E. Schafer,** from Cmdr., Aerosp. Med. Div., AFSC, Brooks AFB, Tex., to Dep. Surg. Gen., Hq. USAF, Washington, D. C., replacing retiring M/G Maxwell W. Steel, Jr. . . . **Col. (B/G selectee) George L. Schulstad,** from Cmdr., 3d TFW, PACAF, Clark AB, Philippines, to Cmdr., Pacific Exchange System, Honolulu, Hawaii . . . **Col. (B/G selectee) Eugene D. Scott,** from Cmdr., 390th Strat. Msl. Wg., SAC, Davis-Monthan AFB, Ariz., to Cmdr., 47th Air Div., SAC, Fairchild AFB, Wash. . . . **B/G Stanley M. Umstead, Jr.,** from C/S, ATC, Randolph AFB, Tex., to Comdt., Air Command & Staff College, AU, Maxwell AFB, Ala., replacing B/G Frank M. Drew . . . **B/G (M/G selectee) Robert M. White,** from Comdt., AFROTC, AU, Maxwell AFB, Ala., to C/S, 4th ATAF, Ramstein AB, Germany.

AFA News

By Don Steele
AFA AFFAIRS EDITOR

The Harry S. Truman Chapter, Kansas City, Mo., has established a fund to provide five scholarship awards annually to Richards-Gebaur AFB E-3s and below. Named for Maj. Gen. Paul R. Stoney, a former Air Force Communications Service commander, the first five Paul R. Stoney AFA Scholarship Awards were presented recently in ceremonies at the base. Shown during the presentation are, from left, Charles Church, Howard R. McHenry, and C. E. Sevier, Chapter Board Chairman, President, and Vice President, respectively; and the recipients, Airmen First Class Bonnie K. Fewel, Amy P. Kerchner, Kenneth P. Howes, and Noelani N. Vondrak. A1C Johann Rotaru was not present.

During a recent visit to San Antonio, Tex., AFA President Joe L. Shosid met wit area leaders of the Air Force, the community, and AFA at a small dinner hosted AFA's Alamo Chapter. Shown are, from left, Maj. Gen. H. P. Smith, Commander, USAF Security Service; Mr. Shosid; Lt. Gen. George H. McKee, Commander, Air Training Command; Alamo Chapter President Frank Manupelli; and Stanley Campbell, Vice President for AFA's Southwest Region.

More than 200 members and guests attended the H. H. Arnold Memorial Chapter's dinner in the Arnold Engineering Development Center Officers' Open Mess, Arnold AFS, Tenn., observing the twenty-fifth anniversary of the establishment of the Center. The principal speaker was Maj. Gen. L. J. Sverdrup, USAR (Ret.), Chairman of the Boards of ARO, the Center's operating contractor, and Sverdrup & Parcel, ARO's parent company and designer of the AEDC facilities. In the photo, Chapter President Tom Bigger, right, visits with four of the men who played key roles in the establishment of the Center. They are, from left, Elmer Johnson and Dr. Frank Wattendorf, members of the original planning committee; Steven F. Leo, an ARO Board member and a former AFA National Director who was on the Air Force Secretary's staff while the Center was being planned; and General Sverdrup.

More than eighty AFROTC cadets and twenty AFJROTC cadets from the Los Angeles area attended an Open House at Edwards AFB as guests of the Air Harbor, General Jimmy Doolittle, Long Beach, Los Angeles, Pasadena Area, San Fernando Valley, South Bay, and General Leonard E. Thomas AFA Chapters. Shown in front of a USAF F-15 are, from left, California AFA Vice President (South) Barbara Rowland, and AFROTC Cadets Herder, Webster, Borst, Cannon, White, and Ellis. With them are Gerald Gomme, kneeling left, Air Harbor Chapter President; and Gene White, Sr., San Fernando Valley Chapter President.

The Las Vegas, Nev., Chapter's dinner on December 7, the thirty-third anniversary of Pearl Harbor, featured an address by Congressman Samuel S. Stratton (D-N. Y.), a member of the House Armed Services Committee. Head-table guests included, from left, Maj. Gen. Homer K. Hansen, USAF (Ret.), Chapter Councilman; Mrs. William S. Chairsell; AFA Board Chairman Martin M. Ostrow; Mrs. Martinez; Congressman Stratton; Chapter President Cesar J. Martinez; Mrs. William C. Eubank; Maj. Gen. Gordon F. Blood, Commander, USAF Tactical Fighter Weapons Center, Nellis AFB; Chaplain (Col.) Thomas J. Newman; and TSgt. Louis Smith, winner of the Fitzgerald Trophy as the Outstanding Thunderbird Maintenance Man of 1974.

More than 300 AFA members, guests, and community leaders attended the Eglin, Fla., Chapter's community relations dinner. Sen. Barry Goldwater (R-Ariz.), right, the guest speaker, visits with Congressman Bob Sikes (D-Fla.), left, and Chapter President Walter B. "Benny" Putnam, Maj. Gen., USAF (Ret.). The dinner, a sellout for two consecutive years, has become a major social event in the Fort Walton Beach area.

CROSS COUNTRY...

• Past Presidents of the **San Diego, Calif., Chapter** were the guests of honor at a recent patio dinner party sponsored by the Chapter. Honorees attending the party included: **Frank Brazda,** 1954; **Jim Snapp,** 1955; **William Dunning,** 1957; **George May,** 1959; **Schlesinger Foushee,** 1962; **Muriel Tierney,** 1963; **Ray Booth,** 1964; **Portis Christianson,** 1966; and **William Parker,** 1972–74.

• The **Northern Virginia Chapter's** Second Annual Dinner benefiting the Air Force Enlisted Widows Home Foundation, which was held recently in the Andrews AFB NCO Club, featured remarks by **CMSgt. Richard Kisling,** USAF (Ret.), the former Chief Master Sergeant of the Air Force. During the program, Chapter President **Thomas Anthony** presented a check for $500 to **D. N. "Nick" Masone,** Executive Director of the Foundation.

• More than seventy members and guests attended the **Falcon, N. Y., Chapter's** Third Annual Champagne Brunch at West Point. The guest speaker, **Col. Norma E. Brown,** Commander, 6970th Air Base Group, Fort Meade, Md., spoke on the opportunities for women in the Air Force. AFA National Director **Gerald V. Hasler,** who also is the New York AFA President, was a special guest.

• The **165th Military Airlift Group,** Georgia Air National Guard, hosted a recent meeting of AFA's **Savannah Chapter.** The "open house" type function included tours through the Group's new C-130E Hercules aircraft, and an address by **R. D. Roche,** the top Lockheed-Georgia official on the C-130 project. Special guests included cadets from the AFJROTC units at Wayne County and Appling County High Schools, and the Savannah CAP Squadron; Alderman **Roy Jackson,** representing the Savannah Mayor and City Council; and **TSgt. William Hooper,** the top Air Force Recruiter of the Year in the 302d Recruiting Detachment.

• **John V. Sorenson,** DCS/Aerospace Education and Cadet Program, Civil Air Patrol National Headquarters, was the guest speaker at a joint meeting of **AFA's Ark-La-Tex and Ark-La-Tex Belle Chapters** of Shreveport, La. Mr. Sorenson's address was entitled, "America: Too Young to Die." Ark-La-Tex Chapter President **Dr. John H. Allen** presided, and Ark-La-Tex Belle Chapter President **Bessie Hazel** was chairman of arrangements.

Gen. Robert J. Dixon, center, Commander, USAF Tactical Air Command, was the guest speaker at the Iron Gate Chapter's luncheon meeting at The "21" Club in New York City on February 11. Visiting with General Dixon prior to the meeting are J. Gilbert Nettleton, Jr., left, Chairman of the Chapter's Twelfth National Air Force Salute, held at the Hotel Americana on March 21; and Chapter President J. W. "Bill" Bailey, right.

AFA's Cheyenne, Wyo., Chapter recently became the sponsor of a new Civil Air Patrol Cadet Squadron in cooperation with the East High School AFJROTC program, providing the Chapter a close working relationship with two worthy programs. Participants in the charter presentation included, from left, William W. Brier, the Chapter's education officer; Col. Don Roberts, Aerospace Education Instructor of the East High School AFJROTC Unit; Chapter President Edwin J. Witzenburger; and Chapter Vice President Robert R. Scott, Brig. Gen., USAF (Ret.).

Edward Keil, right, President of AFA's Queens, N. Y., Chapter, presents his Chapter's Certificate of Merit to CAP Cadet Lt. Col. James Boniello, left, the "CAP Cadet of the Year" for the Queens Group of the CAP's New York Wing. The presentation was made during the Chapter's twenty-eighth Annual Dinner, at which Pan American World Airways Capt. Charles Hawkins was the guest speaker. Special guests included AFA National Director Herb Fisher and New Jersey AFA President Joseph Bendetto.

During recent ceremonies at Tinker AFB, Okla., Ivan H. Nelson, President of AFA's Thomas P. Gerrity Chapter, presents the Chapter's "Family Services Volunteer of the Year" award to Mrs. Bernadine Coats. Mrs. Coats, whose husband, MSgt. Robert Coats, is stationed at Tinker AFB, was recognized for her outstanding work in the Family Services Program at Tinker AFB as the Volunteer Coordinator.

Drawing winners for the Silver and Gold Chapter's annual Christmas raffle are, from left, Col. Joe T. Pound, Commander, Air Reserve Personnel Center; Chapter President John Wehman; Col. James Sveska, Director of Resource Management, Air Force Accounting and Finance Center; and Brig. Gen. Ed Wittbrodt, USAF (Ret.), former AFAFC Commander. The nearly $1,000 was used to buy food for needy families in the Denver, Colo., area.

Two hundred eighty-six high school students and twenty-two aerospace educators attended the Second Annual Aerospace Education Symposium for Aerospace Education Students and Teachers, AFJROTC and CAP cadets, and Sea Scouts. Held at Lowry AFB, the symposium was cosponsored by the Colorado AFA and the Rocky Mountain Region of the Civil Air Patrol, and included presentations on the USAF Air Training Command, NORAD, and US Navy Seapower, as well as tours of the facilities at Lowry AFB and Buckley Field (ANG). In the photo, Lt. Cmdr. Scott Milner, USN, is giving a briefing on Naval Aviation.

AFA'S COMING EVENTS

Massachusetts AFA Convention, Hanscom AFB Officers' Club, April 25–27...**Washington AFA Convention,** Seattle, May 9–11...**Alabama AFA Convention,** Montgomery, May 10...**California AFA Convention,** Edgewater Hyatt House, Long Beach, May 16–18...**Florida AFA Convention,** The Tides Hotel & Bath Club, Redington Beach, May 16–18...**AFA Board of Directors and Nominating Committee Meetings,** The Broadmoor, Colorado Springs, Colo., May 31...**AFA's Annual Dinner honoring the Outstanding Squadron at the Air Force Academy,** The Broadmoor, Colorado Springs, Colo., May 31...**Texas AFA Convention,** Hilton Palacio Del Rio, San Antonio, June 13–15...**Pennsylvania AFA Convention,** Hershey Motor Lodge, Hershey, June 20–22...**New Jersey AFA Convention,** Playboy Club Hotel, Great Gorge, June 27–29...**Oklahoma AFA Convention,** Oklahoma City, June 27–28...**New York AFA Convention,** Tarrytown Hilton, Tarrytown, July 11–13...**AFA National Convention and Aerospace Development Briefings and Displays,** Sheraton-Park Hotel, Washington, D. C., September 14–18.

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): **Cecil Brendle,** 3463 Cloverdale Rd., Montgomery, Ala. 36111 (phone 281-7770, ext. 28).

ALASKA (Anchorage, Fairbanks, Kenai): **Vernon R. Johnson,** c/o Peat, Marwick, Mitchell & Co., 736 G St., Anchorage, Alaska 99501 (phone 272-7401).

ARIZONA (Phoenix, Tucson): **Robert E. Poston,** 4818 E. Scarlett, Tucson, Ariz. 85711.

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Robert M. Tirman,** 1801 Hill Rd., Jacksonville, Ark. 72076 (phone 372-8361, ext. 383).

CALIFORNIA (Appie Valley, Burbank, 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, Santa Barbara, Santa Clara County, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **John W. Lee,** Box 5305, Fullerton, Calif. 92635 (phone 879-3951).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Ft. Collins, Greeley, Pueblo): **James C. Hall,** P. O. Box 30185, Lowry AFB Station, Denver, Colo. 80230 (phone 366-5363, ext. 459).

CONNECTICUT (East Hartford, 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.): **George G. Troutman,** 1025 Connecticut Ave., N. W., Washington, D. C. 20036 (phone 785-6500).

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): **Wayne A. Hilton,** 1338 Stratford Dr., Clearwater, Fla. 33516 (phone 531-4611, ext. 3006).

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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, Elmira, Griffiss AFB, Hartsdale, Ithaca, Long Island, New York City, Niagara Falls, Patchogue, Plattsburgh, Riverdale, Rochester, Staten Island, Syracuse): **Gerald V. Hasler,** P. O. Box 11, Johnson City, N. Y. 13760 (phone 754-3435).

NORTH CAROLINA (Charlotte, Fayetteville, Goldsboro, Greensboro, Raleigh): **Elton Edwards,** P. O. Box 37, Greensboro, N. C. 27402 (phone 275-7616).

NORTH DAKOTA (Grand Forks, Minot): **Kenneth A. Smith,** 511 34th Ave., So., Grand Forks, N. D. 58201 (phone 722-3969).

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): **John G. Nelson,** 901 S. E. Oak St., Portland, Ore. 97214 (phone 233-7101).

PENNSYLVANIA (Aliquippa, Allentown, Chester, Erie, Homestead, Horsham, King of Prussia, Lewistown, New Cumberland, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **J. Deane Sterrett,** 110 McMillen Ave., Beaver Falls, Pa. 15010 (phone 843-4589).

RHODE ISLAND (Warwick): **Matthew Puchalski,** 143 SOG RIANG, Warwick, R. I. 02886 (phone 737-2100, ext. 27).

SOUTH CAROLINA (Charleston, Columbia, Greenville, Myrtle Beach, Sumter): **A. M. Hendry, Jr.,** 837 Gordonia St., Sumter, S. C. 29150 (phone 469-2883).

SOUTH DAKOTA (Rapid City): **Kenneth Roberts,** P. O. Box 191, Rapid City, S. D. 57701 (phone 342-0191).

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TEXAS (Abilene, Austin, Big Spring, Corpus Christi, Dallas, Del Rio, El Paso, Fort Worth, Houston, Laredo, Lubbock, San Angelo, San Antonio, Sherman, Waco, Wichita Falls): **Vic Kregel,** P. O. Box 9495, San Antonio, Tex. 78204 (phone 266-2242).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Gil F. Friederichs,** P. O. Box 486, Clearfield, Utah 84015 (phone 825-9511, ext. 2363).

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WASHINGTON (Port Angeles, Seattle, Spokane, Tacoma): **Theodore O. Wright,** P. O. Box 88850, Seattle, Wash. 98188 (phone 237-9865).

WEST VIRGINIA (Huntington): **Nelson Paden,** 1641 Wiltshire Blvd., Huntington, W. Va. 25701.

WISCONSIN (Madison, Milwaukee): **Kenneth Kuenn,** 3239 N. 81st St., Milwaukee, Wis. 53222 (phone 747-5300).

WYOMING (Cheyenne): **Edwin J. Witzenburger,** Capitol Bldg., Rm. 116, Cheyenne, Wyo. 82001.

Bob Stevens'

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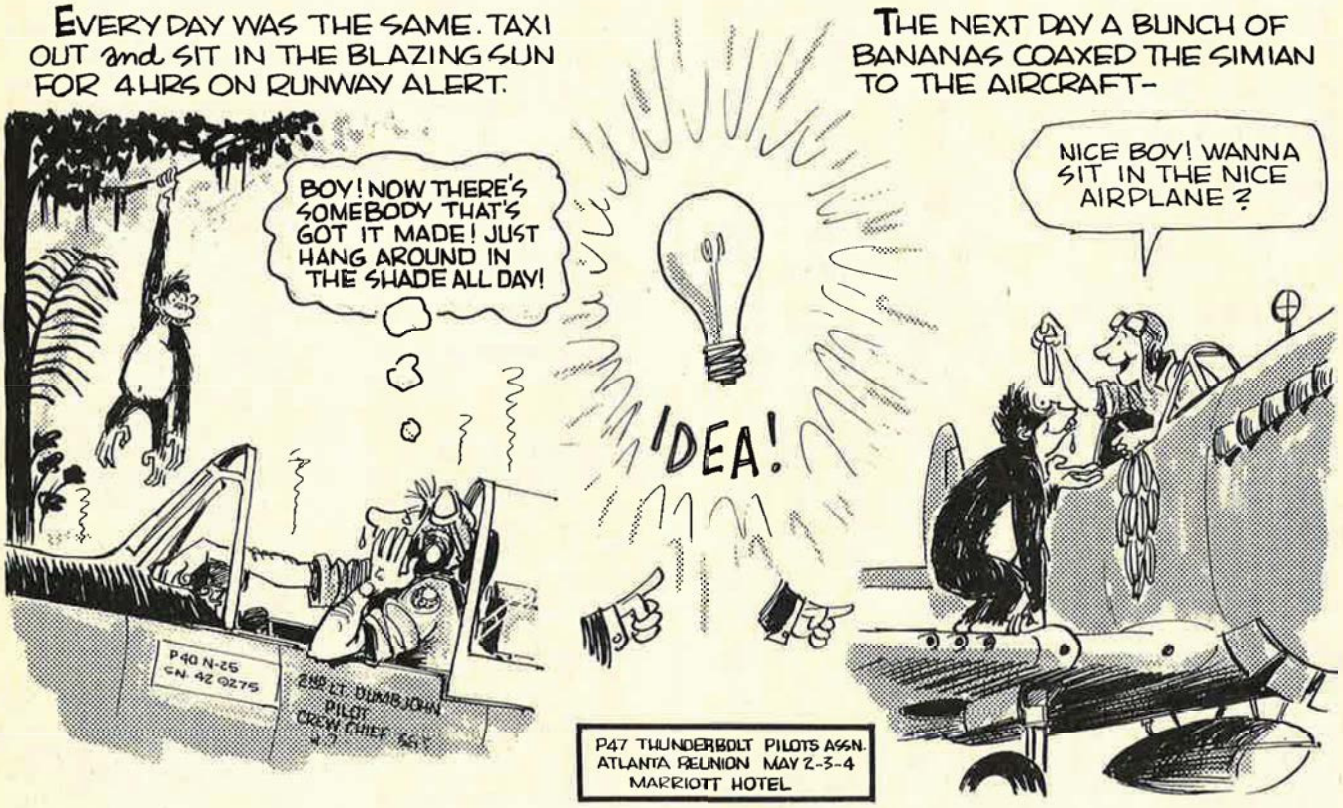

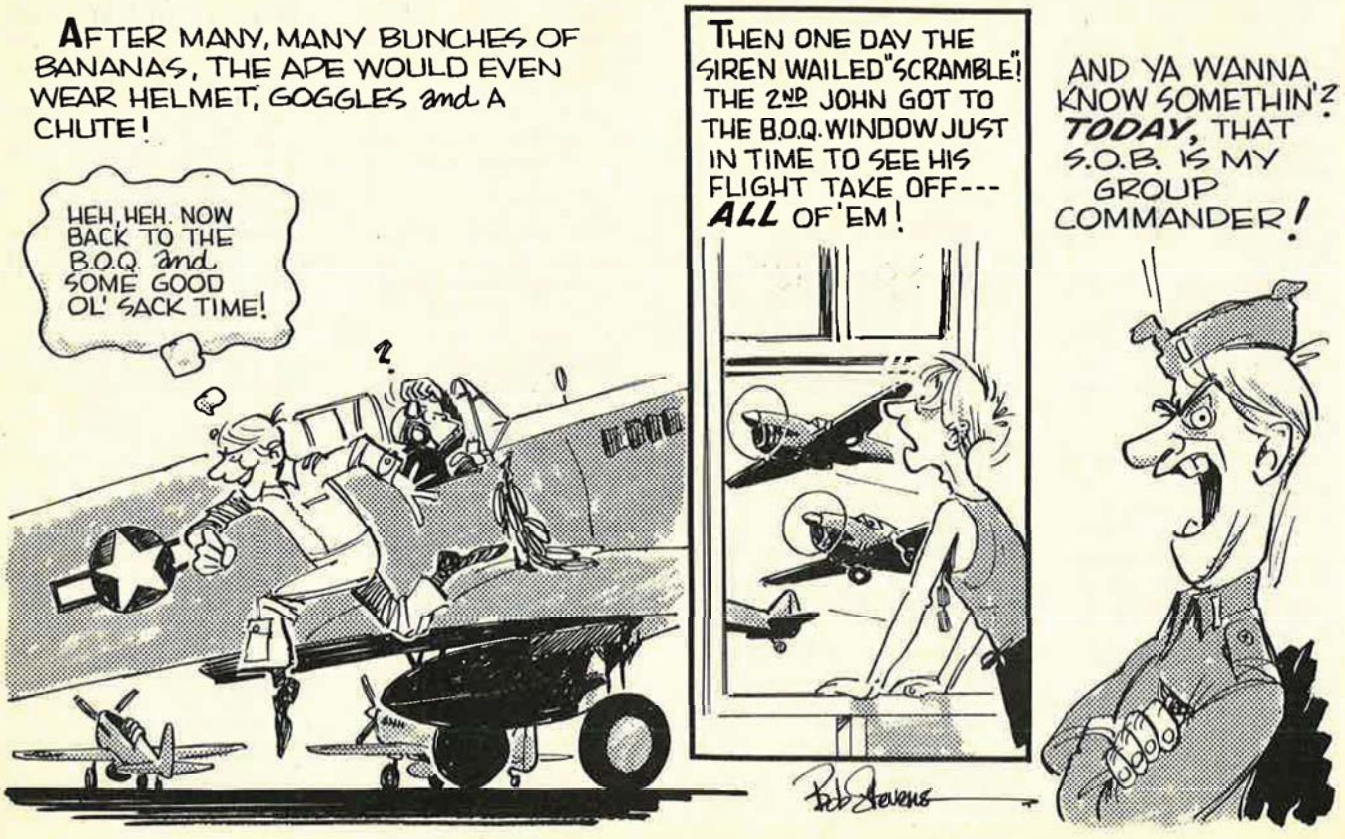

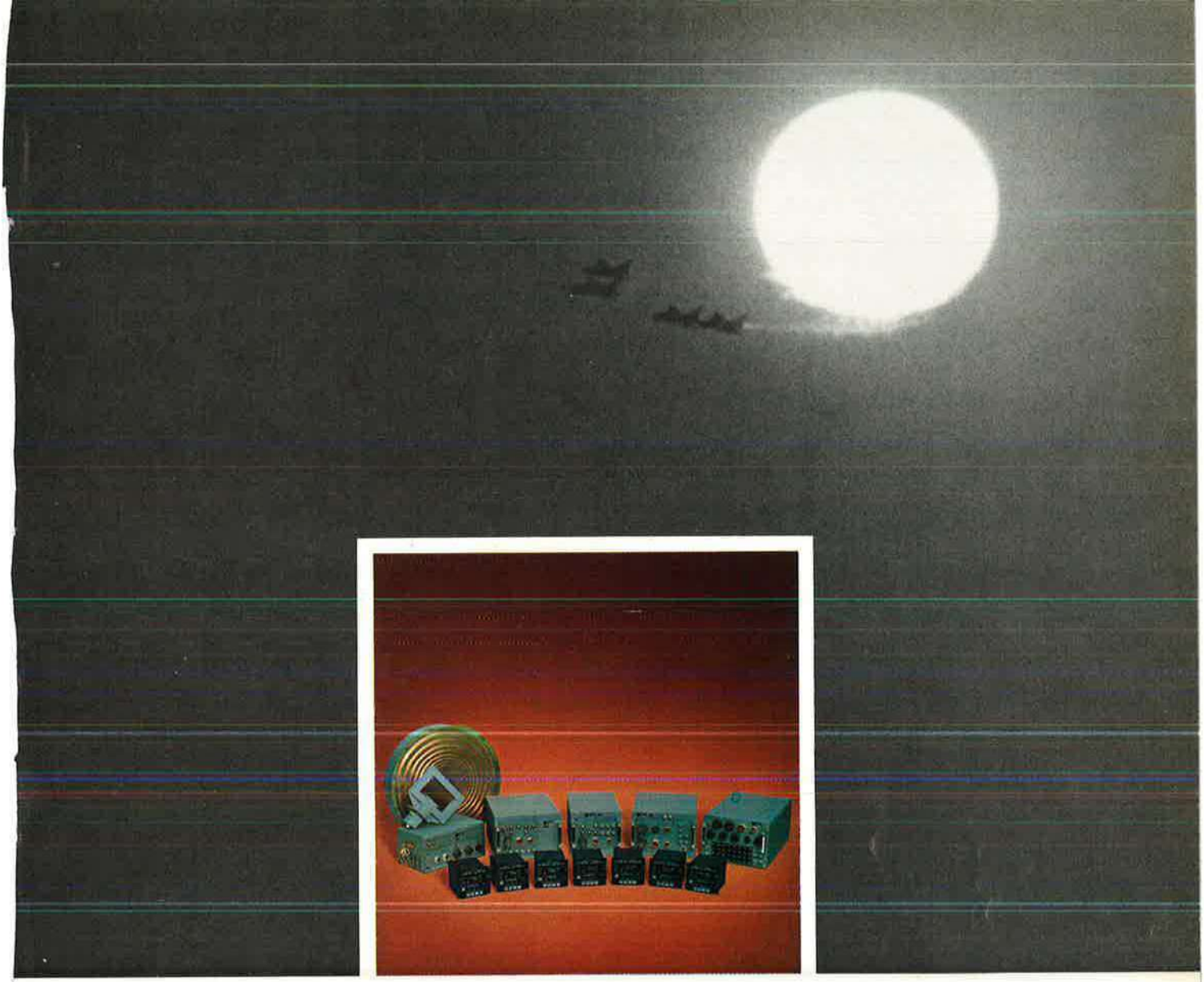

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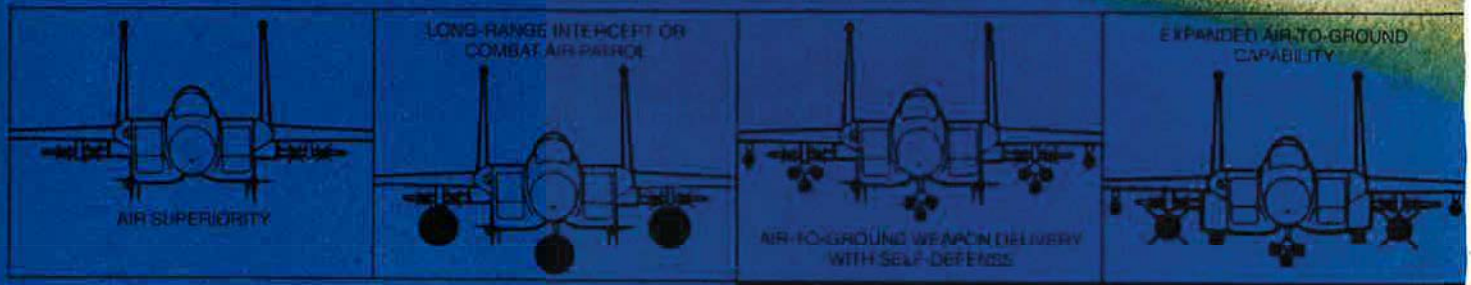

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