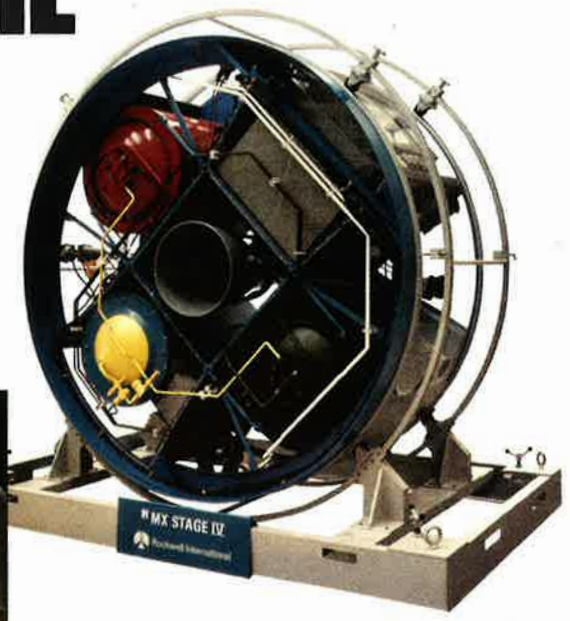
FEBRUARY 1978/$1

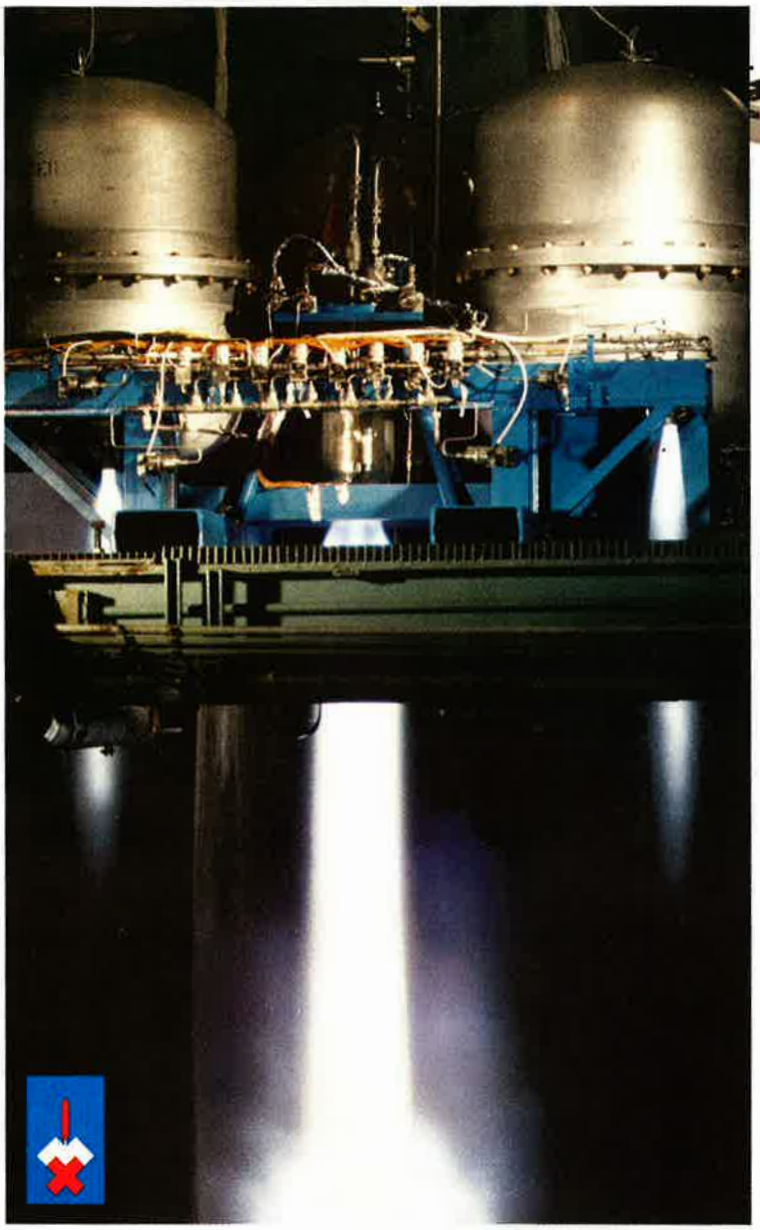
AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

THE A-10: NEWEST MEMBER OF USAF'S THEATER DETERRENCE TEAM

ROCKETDYNE IS READY FOR THE MX STAGE IV SYSTEM.





Rockwell International

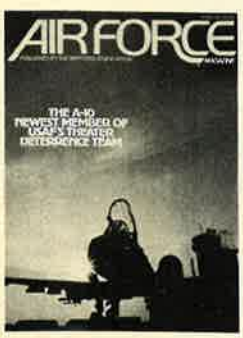
Rocketdyne Division, Rockwell International,
6633 Canoga Avenue, Canoga Park, CA 91304.

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

FEBRUARY 1978
VOLUME 61, NUMBER 2

This Month

ABOUT THE COVER



The A-10 and other tactical systems were subjects of AFA's Symposium on "Theater Deterrence for the '80s," held in Los Angeles, Calif., last October. Senior Editor Edgar Ulsamer covers highlights of the Symposium in his conclusion to a two-part series in "Streamlining Airpower for Theater Warfare," beginning on p. 28.

Departments

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IN THE LONG RUN, THE BEST

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vances in aviation science went into the YC-14. And were thoroughly tested to validate the design.

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AN EDITORIAL

Carter's First Year—Not a Good One

No President within memory has immersed himself so deeply in the details of US defense programs as has Jimmy Carter. The wisdom or folly with which defense affairs have been managed in the past twelve months is uniquely his. It has not, in our opinion, been a good year for defense.

Candidate Carter rode into office on a flood of campaign promises, most of them not his alone to fulfill. As it happened, many that could be honored by administrative fiat were in the defense sector. He opened the year by granting amnesty to Vietnam draft dodgers and closed it by slashing the $130 billion defense request that Secretary of Defense Harold Brown had recommended to about $126 billion. The first decision will make it extremely difficult for the US ever again to administer a military draft in time of emergency. The last would hold defense spending to 2.2 percent real growth, even on the improbable assumption that Congress sheathes its budgetary axe. That falls well short of the three percent growth figure President Carter has urged our NATO allies to meet.

Between these opening and closing scenes lay a number of other debatable moves, many inspired by indiscreet or uninformed rhetoric of the Carter campaign. Early in the year came the decision to withdraw US troops from Korea, decelerated but not reversed by opposition in the Congress.

Candidate Carter had preached the evils of arms sales abroad, incorrectly identifying the US as purveyor of more than half the world's traffic in military equipment. In May, he announced that arms sales would be used only "as an exceptional foreign policy implement," and that the volume of sales would be decreased in each succeeding year. There are indications that he now is discovering, to his embarrassment, that arms sales are an indispensable lever in dealing with producers of the raw materials we need, and also an effective roadblock to expanding Soviet influence around the world.

Then came a series of decisions in the strategic area that has reduced our bargaining strength in SALT negotiations: cancellation of B-1 production—a giveaway for which the President neither demanded nor got a Soviet *quid pro quo;* termination of Minuteman III (denied by an alarmed Congress) and scrapping of plans to upgrade Minuteman II; cancellation of SRAM-B; a stretch-out of development work on MX; abandonment of plans for a follow-on interceptor; scuttling the Navy's nuclear carrier strategy.

These decisions, associated with SALT bargaining, which has its own unsettling aspects (*see "The Equal Sign in the SALT Equation," January issue*), have foreclosed a range of strategic options relevant to arms control, strategic deterrence, strategic war-fighting capacity, and the viability of US conventional forces either by themselves or in concert with NATO allies.

Perhaps most disturbing to military men is the Administration's failure to define its defense priorities clearly and to explain how the President hopes to reach the goal of great-power stability through effective deterrence of both general and major theater war.

There are, we freely admit, some entries on the credit side of the ledger. The FY '78 defense budget showed some, though we think inadequate, real growth—about one percent. US forces dedicated to NATO will get at least a three percent real increase in funding under the FY '79 budget request. The service chiefs are consulted more frequently and have easier access to the President than has been true for many years. The Planning, Programming, Budgeting System (PPBS) is being streamlined and simplified. But these last-named procedural changes will be of little note unless there is a more realistic assessment of what we are planning *against;* hence, what we must plan *for.*

This new year promises to be a year of decision in defense. The SALT II negotiations on which so much defense planning hinges should be completed, for better or for worse. Our NATO allies will examine the US defense effort and decide whether to increase their defense spending. The new PPBS procedures will go into effect, resulting either in more efficient planning with more military input or, as some fear, a civilian general staff organization that smothers the military voice.

The President should make fewer defense decisions based on primarily economic grounds, or to mollify the Russians. He seems now to have accepted the unlikelihood of a balanced federal budget by 1980, and he has had ample opportunity to sense the Kremlin's temper and objectives.

Meanwhile, there is growing concern on Capitol Hill about the adequacy of the US defense budget and the sufficiency of the forces it will support.

With a year's experience behind the Carter Administration, greater public understanding that the military balance is shifting to our disadvantage, and increasing congressional doubts about the adequacy of our defense programs, 1978 could be a better year for defense. We hope so; 1977 was not a good year.

—JOHN L. FRISBEE, EDITOR

AN/ALQ-135

Designation of Internal Countermeasures Set (ICS) designed and built by Northrop for U.S. Air Force F-15 Eagle. First production ICS delivered February 1977, one month ahead of schedule.

Northrop ICS makes F-15 virtually invisible to enemy by automatically jamming their radar signals. Most advanced ECM system yet developed for tactical aircraft. Dual mode: continuous wave energy and time pulse energy. Internal installation does not compromise F-15 flight performance.

Northrop is proven leader in electronic warfare technology. Developer of ECM jammer for prototype USAF B-1 strategic bomber. Producer of ECM power management system for USAF B-52. More than 14,000 jamming transmitters delivered by Northrop since 1952.

Aircraft, Electronics, Communications, Construction, Services. Northrop Corporation, 1800 Century Park East, Los Angeles, California 90067, U.S.A.

NORTHROP

Airmail

Importance of Ability

I disagree with Col. Paul W. Arcari's view that the military pay system is based on a "needs" philosophy ["Battle of the Marrieds vs. Singles," p. 139, December '77 issue]. It is obviously based on a political or "squawks" philosophy. Those capable of squawking the loudest receive the best pay. Since there are more marrieds than singles in the military, and each of these marrieds represents at least two votes, they are entitled to whatever they can convince the Congress to give them. Air Force management takes the path of least resistance, and least cost.

As for the needs philosophy, regardless of individual needs, what the Air Force needs is the best people it can get for the money the country is willing to pay. This involves taking whatever money Congress appropriates for military pay and dividing it equally among those people Air Force management feels are best qualified regardless of their sex, race, religion, marital status, or whatever else is used to discriminate against people, with one exception—their ability to perform the mission of the Air Force.

If Air Force management thinks that single people are less qualified to perform the mission, then it should get rid of these people, not just pay them less. Conversely, if the Air Force decides that a single person is just as qualified as any other, then it will want to do all in its power to keep that person.

1st Lt. James T. Carlet, AFRES
Belton, Mo.

Elements of Professionalism

My compliments are offered to Capt. Donald M. Bishop for his timely article, "Leadership, Followership, and Unit Spirit," in your December '77 issue. [*For other reactions to this article, see "Perspective," p. 24.*]

Air Force members who have served in various jobs under similar conditions can share a renewed appreciation for the proven attributes Captain Bishop described. People, not gadgets and statistics, are also necessary to create and maintain teamwork. Leadership and followership are vital elements of professionalism, and both must be preserved if genuine unit spirit is to survive in today's Air Force.

SMSgt. Billy Seay, USAF (Ret.)
Spartanburg, S. C.

Soviet Military Theory

Secretary Stetson's "puzzlement" (*November '77 issue, p. 23*) over the Soviet military buildup is indeed shared by many. However, the divination of Soviet intentions and capabilities is not really the "occult science" that so many people profess.

It is a truism that space does not permit anything but a cursory discussion, yet some points do seem essential:

1. The Soviets' view of the development of weaponry as directed to acquiring the effective means of defeating any potential adversary in combat regardless of the circumstances or the conditions. This essential requirement has three basic components, namely (1) the means of destruction; (2) the means of delivery; and (3) the means of control.

2. The use of nuclear weapons by the US against Japan in August 1945 only underscored to the Soviet Union the abject necessity of developing an equivalent capability by the earliest possible date. The Soviet Union simply could not permit itself to be perceived as inferior to the US. To this end, the Soviet Union mobilized its entire scientific effort and social/economic system. The Soviet leadership considered this justified and dictated by external conditions.

3. In preparation for a modern war, any and all deficiencies in troop training and morale have to be achieved right at the outset of the war.

4. In the Soviet view, strategic nuclear forces represent the basic means by which modern war will be waged.

5. The means for waging modern war are a result of scientific-technical progress and close attention to the careful development of productive forces. It is necessary to constantly improve the efficiency of existing weapons and to develop more advanced ones. This, then, constitutes the central aspect in the ongoing revolution in military affairs and accounts for the major changes in the manner that a modern war will be fought. As a result, scientific-technical progress should be urgently pursued and represents a primary ingredient in the continued development of Soviet military theory.

6. Under no circumstances is a nuclear war considered unthinkable or nuclear weapons viewed as unusable or merely objects of benign deterrence. The basic strategic missions of the war will be accomplished with strategic nuclear weapons.

7. In the Soviet view, the post-1945 time era has gone through a number of stages. The first ended in 1953 and was marked by such developments as long-range aircraft and jet engines. During these years the Soviets emphasized improvements in conventional forces.

8. The second stage ended in 1959, and was notable for the Soviet Union developing nuclear capabilities and the stockpiling of nuclear weapons.

9. The third post-WW II stage thus began in 1960 and has witnessed the rapid expansion of Soviet military capabilities across the board. Rapid changes have occurred in both nuclear and conventional weapon systems—and have resulted in a revolution in military affairs where the destructive power of modern weapons has radically changed the very nature and conduct of modern war itself.

10. The Soviet Union has made every effort to develop effective means for utilizing the fast-improving and qualitatively different weapon systems that have evolved since 1960. The Soviet Union is motivated by the always-present danger, in its view, of an enemy nuclear attack. This means that all phases of Soviet military development and preparation for war have to be relentlessly pursued and, although strategic nuclear forces may have the first priority, air, land, and sea conventional forces are also considered extremely important.

Jeffrey T. Thomson
Los Angeles, Calif.

Department of Corrections

I am an avid fan of AIR FORCE Magazine and look forward to every

issue. I was pleasantly surprised to see my picture in the December issue's "AFA News," p. 145. I would like to set the record straight on two points, however.

Col. Guy L. Hecker, Jr., is the Wing Commander for the 509th Bombardment Wing. Col. James M. Greer, whom you listed as the Wing Commander, is the Vice Wing Commander. Also, my middle initial is M, not W.

I guess even AIR FORCE Magazine is allowed a mistake now and then. Keep up the good work.

SrA. Donna M. Allen
Pease AFB, N. H.

The pilot with the replica of the *Spirit of St. Louis* in your December "AFA News," p. 149, is Verne Jobst, not Jost.

Lt. Col. George MacDonald, USAF (Ret.)
Dearborne Hts., Mich.

Reference the December '77 issue, p. 149—"AFA News Photo Gallery." Your caption of the picture showing the replica of the Experimental Aircraft Association's *Spirit of St. Louis* was certainly in error. Mrs. Bev Turner was elected "Mrs. *Experimental* [not "Environmental"] Aircraft Association" at our July–August convention in Oshkosh, Wis. Looks like the "wayward press" did it again.

The "Spirit" was built in about four months by a dedicated group of employees at the EAA headquarters in Hales Corners, Wis., and was flown around the United States on approximately the same route Lindbergh used in 1927 on his return to the US from Paris.

C. J. Alexander
Morrisville, Pa.

Barrage Balloon Graduate

It is amazing and sometimes amusing what one reads in magazines and newspapers!

I refer to a letter which appeared in the "Airmail" section of the October '77 issue, written to the Managing Editor (Mr. Skinner) by Bob Stevens, author of "There I Was . . .," and your reply. Mr. Stevens seemed a bit perturbed due to the changing of some of the wording in his cartoon in a previous issue. The wording changed was "antiaircraft balloons" to "barrage balloons." Mr. Stevens states, ". . . changed . . . from 'antiaircraft balloons' (which they were) to 'barrage balloons' (which they were not)."

I believe that I am qualified to set the record straight.

Headquarters Company of the Barrage Balloon School detachment was activated early in 1941 at Camp Davis, N. C. I was a member from the beginning, and we set up the unit. We were trained by a detachment of Observation Balloonists from Pope Field, Ft. Bragg, N. C. I was a student in the first class, which was conducted there from September 8, 1941, to October 18, 1941. I was retained as an instructor in the Barrage Balloon School until it was deactivated early in 1944 at Camp Tyson, near Paris, Tenn.

According to Mr. Stevens's letter ". . . their correct title may be found in Gurney's book *War in the Air.*" I do not know the author of *War in the Air,* but I do know for sure if he called them antiaircraft balloons, he is dead wrong.

I am enclosing a photostat copy of one of the several certificates I received from the Barrage Balloon School for further proof of the correct title of the balloons.

MSgt. Eldredge G. Fuller, USAF (Ret.)
Mineral, Calif.

Author of the Book

The review of *Icebound in the Siberian Arctic* ("Airman's Bookshelf," December '77, p. 38) should have included the fact that this is the true story of the international search for famous Arctic pilot Col. Carl Ben Eielson, for whom Eielson Air Force Base, Alaska, is named.

Robert J. Gleason
Annapolis, Md.

Voluntary Action

The American Republic today stands in historical peril reminiscent of the situation of the French Republic in 1936. There is, however, this somber difference: Behind rotten France stood resolute Britain and rich America. Behind dithering America there stands *nobody.*

The point is: It is not enough to *speak* in defense of America; it is necessary to *act.* It is already too late to talk. The time has come for deeds. The minor quarter of us who will wind up doing the dirty work again as we have in the past are going to have to lead the rest of our nation in deed and in word.

As every combat crew, knows, the only kind of leadership that works is leadership by example. Accordingly, if we are to lead the nation, we must set the example for the nation. If we are to make the case for defending America convincing, we must do something visible and tangible.

The initiative I propose is neither new nor original—but it does work. It is *Voluntary Action.*

If every one of AFA's 150,000 members kicked in just $10 that would provide $1.5 million—no small change even today. If every member kicked in just $10 each month, there'd be $18 million each year.

What might this money buy?

- From one to a dozen modern combat airplanes (tangible) along with attendant publicity (visible).
- Relief for some of our tactical poverty pockets (units with aged or insufficient parts, fuel, etc.).
- Supplementary R&D, to accelerate existing projects or to start new projects that otherwise would not be funded at all.

I hear the objection: It wouldn't do any good, because the government would reduce appropriations by the amount subscribed through Voluntary Action. Nonsense. In that case, the government should be reducing HEW outlays by the amount solicited by private charities—and that, as everyone knows, is not happening.

Anyway, what are the alternatives?

- We continue to talk—our words will be overtaken by Soviet action, and silenced summarily.
- We perpetrate a minority government in our last resort.

Sinister alternatives. Repugnant to consider. But if we would avert them, we must act.

We must set the example by Voluntary Action. We must put our money where our mouths are.

Col. John M. Verdi, USMCR (Ret.)
Santa Ana, Calif.

Stalag Luft III Traveling Again

I am anxious to contact former USAAF POWs who were in Stalag Luft III during WW II. A trip is being planned for May 1978 to visit the campsite in Sagan, Poland, where

We suggest that readers keep their letters to a maximum of 500 words. The Editors reserve the right to excerpt or condense as required in the interests of space or good taste. Names will be withheld on request, but unsigned letters are not acceptable.

Airmail

wreaths will be placed on the memorial built by the British and Poles to honor the fifty Kriegies who were murdered after "The Great Escape."

A collection of American Kriegie memorabilia (pictures and artifacts) is being sought and will be given to the large POW museum built by the Poles on the site of the German camp headquarters. The British have an impressive display, the Americans nothing.

While on the trip we will dedicate the altar in the beautiful church in Poland where some 2,000 of us were sheltered the night of January 30, 1945, while on the march from Sagan to Spremberg. More than $1,200 has been donated by Kriegies to refurbish the altar and place a bronze plaque on it saying it was donated by USAF airmen.

The trip will follow our march from Sagan to Spremberg and will take us to Moosburg, Germany; the Bavarian Alps; many historical places in Poland; the Berlins; and a boat trip from Switzerland down the Rhine to Holland.

Anyone interested please contact

Maj. Gen. Delmar T. Spivey
13300 Indian Rocks Rd.
Largo, Fla. 33540

Special Issue of Flyer

The MAC Flyer staff is planning to run a special issue in June 1978, the thirtieth anniversary of MATS/MAC. We need aerial memorabilia of the old Air Transport Command, Naval Air Transport Service, tactical airlift, and Military Airlift Command. And those of you who served operationally in rescue, weather, photomapping, and AAVS probably have lots of old pictures, patches, et cetera, lying around. We can use them.

If you've got anything at all that will help us tell the "MAC Story," get it to us. At your request, we'll return items after we go to press. Contact.

Lt. Col. Orlen L. Brownfield
Editor, *The MAC Flyer*
Hq. MAC/IGFE
Scott AFB, Ill. 62225

History of the 401st BG

Many former members of the 401st Bombardment Group, stationed in England in WW II, have asked about obtaining copies of the Group's history. The book is out of print. However, the original publisher has agreed to republish the book at $30 per copy provided 100 orders are obtained. Further information from

Charles Utter
Happy Valley Rd.
Westerly, R. I. 02891

22d TFS History

The 22d Tactical Fighter Squadron, Bitburg Air Base, Germany, is currently researching its history to fill in details lost over the years.

The squadron was originally named the 22d Aero Pursuit Squadron while serving in France during World War I. The squadron flew in the European Theater during World War II and has also been located at Howard Field, Canal Zone, and Fürstenfeldbruck Air Base, Germany.

Anyone with any information that may be pertinent to the history of the 22d TFS please write to

Lt. Branford J. McAllister
22d Tactical Fighter Sqdn.
PSC Box 899
APO New York 09132

UNIT REUNIONS

DSPA

The Desert Sportsman Pilots Association will hold their 12th annual benefit air show on April 2, 1978, at Falcon Field, Mesa, Ariz., 1:00 p.m. Proceeds to support the American Aerobatic Team. Further information from

Jim Bursey, M. D.
5116 E. Butler Dr.
Paradise Valley, Ariz. 85253

Night Fighters

The Night Fighters of WW II, officers and enlisted men, will meet in Dayton, Ohio, June 30–July 2, at Stouffer's Dayton Plaza Hotel and at the Air Force Museum. Write

The Night Fighters of WW II
Aviation History Project
Archives, University Library
Wright State University
Dayton, Ohio 45435

7th Troop Carrier Sqdn.

In anticipation of a future reunion, would like to contact all personnel who served with the 7th Troop Carrier Squadron.

Luke Rogers
3306 Cayuga Ave.
Altoona, Pa. 16602
or
Chuck (Flak) Hartney
4701 Gay St.
Wichita Falls, Tex. 76306

28th ARS Boom Operators

The 2d annual reunion of the 28th ARS Boom Operators will be held the weekend of June 16–18, at the Bernie Berg ranchette near Sturgis, S. D. Any boom operator, active duty or retired, who has ever been stationed at Ellsworth AFB, S. D., or participated in any Young Tiger operation with the Ellsworth Boomers is invited. Further information from

Robert L. Powers
2321 E. 27th St.
Rapid City, S. D. 57701
Phone: (605) 343-2428

58th Bomb Wing Association

The 22d annual reunion of the 58th Bomb Wing, 20th AF, will be held July 26–30, at the Holiday Inn, Downtown, 1313 Nicollet Ave., Minneapolis, Minn. Chairman

Raymond Tolzmann
6472 N. Shore Trail N.
Forest Lake, Minn. 55025

63d Station Complement Sqdn.

The 63d Station Complement Sqdn. (SP), 9th AF, WW II, is having its 6th biennial reunion June 23–25, at the Velda Rose Tower, Hot Springs, Ark. Members, families, and friends are cordially invited. Contact

W. Dan Kreeger
7908 Harmon Dr.
Little Rock, Ark. 72207
or
Lt. Col. J. T. Gilmore, USAF (Ret.)
24 Wedge Way
Littleton, Colo. 80123
Phone: (303) 795-7743

73d Bomb Wing

A reunion of the 73d Bomb Wing (Superfort Groups 497, 498, 499, and 500, plus assigned and attached units on Saipan during WW II) will be held May 18–21, 1978, at the Ramada Inn in Bellevue, Neb. (near Omaha). For registration form write

73d Bomb Wing Association
105 Circle Dr.
Universal City, Tex. 78148
or
"Herm" Hermanson
2657 Sewell St.
Lincoln, Neb. 68502

444th Bomb Group

The 444th Bomb Group (676th, 677th, 678th, and 679th Bomb Squadrons) will hold a reunion at the Holiday Inn, 1313 Nicollet Ave., Minneapolis, Minn., July 26–30. Contact

John A. Kavulich
143 N. 5th St.
Indiana, Pa. 15701

447th Bomb Group

Seeking former members of the 447th Bomb Group, WW II, Rattlesden, England. Please contact me for information about newly formed 447th BG Memorial Association.

Francis X. Schuster
1610 Erskine St.
Adelphi, Md. 20783

Tomorrow's victor is here today. The F-14/Phoenix system.

Recent exercises have dramatized an undeniable trend: the victors in future air combat will be agile, high-performance fighters equipped with long-range radar and multishot, long-range, launch-and-leave missiles.

Only today's F-14/Phoenix system has the proven capabilities to be tomorrow's victor. It can knock out any six threats at once—cruise missiles, fighters, bombers—from over 100 miles out and while in an ECM environment.

What's more, today's F-14/Phoenix system is the only modern fighter with a swing-wing design, providing tremendous maneuverability and performance.

The answer to future air combat victory, close-in or long-range, is here now. The F-14/Phoenix system.

GRUMMAN AEROSPACE CORPORATION

Focus On...

NATO/Pact Balance

By Edgar Ulsamer, SENIOR EDITOR

Washington, D. C., Jan. 9

Disregarding the formidable potential for escalating to global nuclear war, any Warsaw Pact/NATO conflict is likely to fit one of three basic scenarios: A Pact attack with conventional weapons, while NATO holds its response to nonnuclear measures; a Pact attack confined initially to conventional weapons *only* in which, because of impending catastrophe, NATO is forced to escalate to theater nuclear war; or the Pact's use of nuclear and/or chemical weapons at the outset or upon finding its conventional attack stymied. The latter contingency, no doubt, represents NATO's "worst-case" scenario. It also may be the most probable since US/NATO forces, as a prominent congressional staff expert puts it, seem to be determined to entice the Pact to nuclear preemption by providing them an array of high-value targets unprecedented since the US Navy lined up the Pacific Fleet for slaughter at Pearl Harbor in 1941.

NATO's chances for coping with the first two categories of conflict are probably better, but still far from good. Most experts this reporter interviewed recently in Europe doubt that any of the scenarios is really winnable—at least not without the occupation or destruction of the European heartland. They turn instead to the precept that "the only sure way to win in Europe is to deter successfully."

But the leverage that accrued to NATO in the past from US superiority in strategic and TNF (theater nuclear forces) is gone. Moreover, the transformation of the Pact's posture, force structure, and capabilities is pervasive and ominous. At its root are the systematic changes in the Soviet/Pact forces from limited to full mobility, and from essentially defensive to predominantly offensive qualities; the Pact's growing ability to attack from a standing start, without the dead giveaway of a preceding manpower and logistics buildup; its ability to sustain combat over protracted periods, well beyond the initial blitzkrieg phase; and the mounting offensive capabilities of the Pact's nonnuclear forces—from sophisticated precision-guided weapons to fuel air explosives (FAEs)—that seem to signal Moscow's commitment to match NATO's concept of flexible options.

Few factors have been more effective in awakening NATO—in terms of manpower and industrial resources a giant, albeit a sleeping one, compared to the Warsaw Pact—than last year's grim, in-depth report on "NATO and the Soviet Threat," prepared for the Senate's Committee on Armed Services by Sens. Sam Nunn and Dewey F. Bartlett. Its central thesis is that the "viability of current NATO force posture in Europe and perhaps even NATO's strategy of flexible response and forward defense [are] questionable."

The Nunn-Bartlett report applauds NATO's policy of forward defense—predicated on a three-phased process of, first slowing the pace of the invasion with an armored "covering" force that trades space for time, then halting the enemy's thrust once US and other reinforcements are in place, and, finally, launching a counterattack to purge the invaders from NATO territory. But the report warns that because of inadequate forward-deployed "covering" forces, this posture could lead to "withdrawal from rather than major defense of Germany east of the Ruhr."

The Senators also raised an issue that seemingly neither civilian analysts nor military strategists can agree on readily—the advisability of relying on first use of theater nuclear forces if defeat in a conventionally fought NATO war appears imminent. Large-scale deployment of the 3,000-mile MIRVed SS-20 Soviet IRBMs (intermediate-range ballistic missile), coupled with the advent of new Backfire bombers and across-the-board growth in other nuclear-capable weapons, adds further weight to the report. "During the past several years the Soviets have expanded their theater nuclear forces in Europe where they may now credibly deter a NATO first use of tactical nuclear weapons. The bulk of Soviet tactical nuclear weapons are more destructive and longer-ranged than NATO's. They could be used against most large European cities. Moreover, the Soviets have, to a much greater extent than NATO, organized and equipped their conventional forces to continue to operate and fight on a nuclear battlefield," according to the Nunn-Bartlett report. In sharp contrast, the report points out, "the comparatively short reach and low yield of most of NATO's tactical nuclear weapons would restrict their employment primarily to NATO territory, particularly if NATO's conventional forces had been driven deep into the rear of Germany."

NATO's Supreme Allied Commander Europe (SACEUR), Gen. Alexander M. Haig, Jr., recently told this column that "definitizing" in public, and to an exhaustive degree, how and when NATO might plan on the first-use of nuclear weapons is not in the interest of the West because deterrence must be built on uncertainty "as to what our response might be." He agreed, however, that the West's option of a "demonstrative" first use of nuclear weapons against selective targets to show resolve has "become more questionable" because of the Soviet's recent growth in TNF capability. General Haig, nevertheless, warns against treating first-use as a "technological fix with which to purchase deterrence on the cheap," for

ABOUT "FOCUS ON . . ."

With Claude Witze's passing, we hereby retire "Airpower in the News," the title of his monthly column. Henceforth, a new column, "Focus On . . ." by Edgar Ulsamer, will appear in the space that "Airpower" occupied for so many years.

—THE EDITORS

a number of reasons. Overreliance on TNFs tends to gloss over the uncertainty of using nuclear weapons against an adversary who is comparably armed; it tends to leave NATO with only the alternatives of nuclear war or surrender, thereby threatening to erode the credibility of "our determination to resist any aggression, however limited"; and it creates an alibi for not upgrading NATO's conventional capabilities as required.

Nevertheless, General Haig asserts, "the West must do what's necessary to protect its vital interests." While the SACEUR did not say so, this might include the first use of nuclear weapons in a preemptive fashion, although such a strategy is not easily reconcilable with the defensive character of the Alliance. Article V of the North Atlantic Treaty suggests that the NATO military apparatus can be activated only in response to an armed attack on one or more of its members. The feeling is mounting on both sides of the Atlantic, however, that NATO must shore up its declining credibility by adopting a strategy that deters Pact aggression through the prospect of a preemptive use of NATO's TNFs *before* the first Soviet tank has rolled across the West German border. It is perhaps possible to square such a posture with the spirit of Article V on grounds that deterrence is achieved once the Soviets consider such an act a realistic possibility, even though NATO's commitment to such a drastic step may in actuality be less than firm.

Another option for more effective "posturing" of the Alliance's TNFs revolves around a Pact attack triggering an instant nuclear response in order to intercept the Soviet armored thrust while it is still massed. Conceivably, such a strategy could be linked to wide use of atomic demolition munitions (ADMs—essentially nuclear mines) that seem to awe Soviet military writers. In general, US and NATO military leaders and planners interviewed by this writer believe that, other uncertainties notwithstanding, the rapid use of tactical nuclear weapons while the attacking forces are still massed will favor the defense, "simply because of the destructiveness of these weapons and because the attacker will not have the same kind of lucrative concentrations on our side."

Some commanders see evidence, however, of new Soviet doctrines that seek to minimize the need for massing forces. Labeled the "daring thrust" maneuver by a recent study carried out by BDM Corp., this new trend in Soviet tactics involving both ground and air forces diffuses the classical massed breakthrough into multiple thrusts—probably at the regimental level—over wide areas. The defense's problem of target acquisition, quick response, and command and control, obviously, would be exacerbated manyfold because friend and foe would be interspersed from the outset.

Another factor that weighs in on the side of early use of theater nuclear weapons by the Alliance, as the Nunn-Bartlett report points out, is their limited range. More than two-thirds of NATO's nuclear weapons involve delivery systems with a range of less than 100 miles. Use of such systems, once the enemy has penetrated deep into Western Germany, could have devastating effects on the civilian population. This condition is directly linked to the availability of the enhanced radiation weapons (popularly misnamed "neutron"), whose fate at present is in political limbo.

Considerable relief from the current handicap imposed by NATO's limited-range TNFs could be attained from future nuclear-armed ground-launched cruise missiles (GLCMs). But these weapons, too, are embroiled in political maneuvering, especially the current round of SALT. *(See "The Equal Sign in the SALT II Equation," January '78 issue, p. 27.)*

If GLCM, an Air Force adaptation of the US Navy's Tomahawk cruise missile, is indeed held to a range of 600 kilometers under the seemingly imminent SALT II accord, its military value is essentially negated, according to most experts. As one commander told this writer, "Just a glance at the map of Europe shows that such a limited range weapon is of practically no value. In order to assure reasonable survivability, these weapons must be kept at considerable distance behind the lines. At the same time, they need to be able to reach the Pact's second echelon. Neither one of these objectives can be met with a 600-kilometer-range limit."

General Haig declined to comment to this writer on SALT-imposed range limits for cruise missiles, but did point out that the cruise missile family of weapons, whether ground-launched from sites in Europe, submarine-based, or air-launched, must be viewed in the context of the West's "continuum of forces." As NATO "observes" the deployment of the SS-20 MIRVed IRBM, interest among NATO's European members in the cruise missile as a counter to that new Soviet weapon "is increasing." It must be remembered, SACEUR said, that the Western Europeans in the 1960s considered developing a mobile intermediate-range missile of their own but decided against it. "I suppose the US had a heavy hand in that decision," General Haig remarked.

There is consensus among US technical experts that singly or as a consortium the European allies could build a cruise missile comparable to that under preliminary development by the Air Force. But in an operational sense, the efficacy of the weapon's design, per se, is far less important than an external factor: Access to the digitized mapping data by the missile in flying its preassigned route and finding its target with uncanny accuracy. The ability to "digitize the world," either from satellites or with the help of specialized aircraft, is, for the moment, a US exclusive, unmatched even by the Soviet Union. If the US agrees, therefore, under SALT II and its attendant protocol, to withhold digitized mapping information from its NATO allies, independent European development of cruise missiles would seem to be thwarted.

GLCM's importance, from both the US and NATO points of view, gains from broad advances in Soviet ASW (antisubmarine warfare) capabilities. These developments—under certain conditions—put at risk NATO's only indigenous strategic ballistic missile force, the Poseidon ballistic missile submarine fleet operating out of Rota in Spain and patrolling the Mediterranean Sea. In a full-blown nuclear theater conflict, that fleet's ability to counter land-based Soviet IRBMs is now rated as questionable. But a 1,000-mile-plus GLCM, most experts agree, could restore the balance in TNFs between NATO and the Warsaw Pact.

While the case for first use of nuclear weapons by NATO against

a Pact attack is formidable, countervailing factors may be at least as telling. A preemptive Soviet nuclear strike, obviously, would make the issue academic. The predominant evidence suggests that the Soviet Union continues to hold fast to the belief that nuclear escalation is inevitable in case of a NATO-Pact war, even though it no longer treats such a conflict as the automatic trigger of strategic war with the United States.

The incentive to preempt NATO's nuclear capabilities, in the view of such experts as Dr. Jeffrey Record of Senator Nunn's staff, may be close to irresistible. Most of the Alliance's more than 7,000 tactical nuclear warheads are concentrated in a handful of sites. Moreover, it is possible to argue that most of the delivery systems capable of reaching deep into Pact territory—including the western reaches of the Soviet Union—are either immobile or dependent on a few large airfields. As a fringe benefit, critics of NATO's present readiness level point out, about one-half of all the Alliance's conventional ordnance is located in one site, providing not only an unprecedentedly lucrative target for Soviet tactical nuclear weapons but possibly also for conventionally armed, precision-guided weapons. A similar high degree of vulnerability, some critics charge, exists also in regard to NATO's command and control apparatus, with the structural hardening of the best new major command centers held to below 400 psi (pounds of pressure per square inch). By comparison, the newest Soviet C^3 centers ringing Moscow and some modern Soviet ICBM silos are thought to be hardened to about 3,000 psi.

Senior military officials interviewed by this writer in Europe and the US take a far less pessimistic view. They point out that redundancy of the C^3 system, coupled with the high survivability of USEUCOM's airborne command post and a massive modernization program including the judicious use of space-based systems, is leading to across-the-board improvements. USEUCOM experts also question the claim of excessive vulnerability of nuclear warheads and other munitions storage facilities. As a senior US official told this writer, "We take every precaution we can to protect the nuclear storage sites, from direct attack as well as from sabotage by the army of agents we know to exist. On balance, we believe these things are well protected, but nothing is totally safe if the other side undertakes a big enough effort."

One school of thought holds that almost any attack would be, at least in part, economically motivated and, therefore, would seek to minimize the destruction of Western European industry. Such an objective is attained best if no nuclear weapons are used by either side, the adherents of this theory argue.

The obviously formidable potential of nuclear escalation notwithstanding, there is a modicum of confidence, therefore, among both political and military experts that a NATO/Pact war could be confined to nonnuclear weapons, and thus deterred at that level. Such an assumption is tempting to any Western planner because its resurrects the classical maxim that a successful offense requires about three to five times the forces of the defense, especially if the latter has warning. US and allied military experts are confident that, as a senior commander put it, "two days' warning is the very worst condition we can envision. If they want to fight they have to do a number of things—such as coming out of their *Kasernen* [barracks]—that we can see and that warn us."

The intelligence capabilities of NATO, especially of USEUCOM, generally are rated highly and include, in addition to the traditional means, advanced technology systems. USEUCOM's own SR-71, operating out of England, and other air- and space-based warning mechanisms back up these capabilities. This type of warning, it must be remembered, will support only the military judgment that the other side *may* be moving toward readiness to undertake major aggression within a specified amount of time. How long it might take the NATO political infrastructure to authorize action in response to military intelligence clearly is moot.

Whenever the three- or five-to-one force-level ratio for a successful Pact war against NATO is invoked by military experts, it is done on the basis of rough equivalence, man for man, and weapon for weapon. Senator Nunn and others see grounds for self-delusion. "What confronts NATO across the inter-German border is not 935,000 Pact troops, but 935,000 Pact troops organized, deployed, trained, and equipped for blitzkrieg, and governed by a doctrine based on surprise and a postulated rate of advance of seventy miles per day. Firepower, mobility, and organization—these are the goddesses of the modern battlefield, not manpower." No military expert is apt to argue seriously against the latter tenet.

What, then, is the bottom line concerning the often-questioned viability of NATO? It's easier to say what it isn't than what it is. It isn't hand-wringing defeatism, tempting as that might be. It isn't taking solace in the potential unreliability of the Soviet Union's Warsaw Pact allies, even though under certain conditions Soviet hegemony may be less than total. And it isn't the atmospherics of a political accord that would be neither verifiable nor given the teeth to create the illusion of balance where reality is steepening the precipice of imbalance.

In recent congressional testimony, Ambassador R. W. Komer, Advisor to the Secretary of Defense for NATO Affairs, said that "an adequate conventional defense capability for NATO, as part of its overall defense capability, is within the Alliance reach, if we all work hard at it. . . . We need not match the enemy man for man, weapon for weapon. Taking advantage of new techniques for target acquisition, delivery systems, and precision guidance should make our task of defense even easier. We can meet adequately the threat of short-warning attack. We can retain our qualitative edge. But in order to do this at a cost the Alliance can readily afford, we must all pull together more effectively than before—our separate national efforts must mesh with an agreed Alliance program which makes NATO defense truly a coalition effort."

In addition, one can argue, it will take greater readiness of all NATO forces, a more streamlined mechanism for getting US reinforcements to Europe faster, and, most of all, a strengthening of this nation's will to maintain the umbrella of strategic deterrence, without which theater deterrence is neither credible nor feasible. ■

WHO'S ON FIRST...IN SPACE?

There are hundreds of military satellites in orbit and more on the way. It's vital to our defense to know which types are where at all times... particularly those that may be maneuverable.

To detect and track satellites beyond radar range, the Air Force is now developing GEODSS, which stands for "Ground based Electro-Optical Deep Space Surveillance System". It uses astronomical telescopes with electronics that enhance the light from objects far below the threshold of unaided vision.

As a leader in systems engineering in general and space technology in particular TRW has formed a team of high-technology companies to develop the overall system. Our computer specialists have worked out an ingenious solution for the most difficult problem of all: that of rapidly sorting out, from all the millions of points of light, those anomalous sources that need to be more carefully analyzed. The work is done by high-speed minicomputers and the crucial technology is in their programming. TRW's Moving Target Indicator (MTI) software, developed under contract to the Air Force Systems Command's Electronic Systems Division, almost immediately recognizes and eliminates the natural light sources and zeroes in on the ones that need analysis.

This is one of many areas of space defense in which TRW is active. We're also building military satellites and global communications systems as well as the complex, realtime software that's needed for defense against intercontinental ballistic missiles. We support the Air Force with systems engineering for the Minuteman and Space Transportation System programs... and our electronics people are developing advanced components and systems for digital communications. If you want to know more about our space defense capabilities, please contact Herb Greenbaum, TRW Defense and Space Systems Group, One Space Park, Redondo Beach, CA 90278.

SPACE DEFENSE TECHNOLOGY

from a company called **TRW**

Both the U.S. Air Force and U.S. Army have now chosen Twin Otters.

For many good reasons.

The United States Air Force Academy has chosen two de Havilland Twin Otters for training cadets in parachute drops in its airmanship program.

Designated UV-18B, these are the first Twin Otters to be used by the U.S.A.F., while the Twin Otter UV-18A's are serving the specific requirements of the U.S. Army.

The performance characteristic of the Twin Otter which most attracted the Academy is the airplane's single-engine capability, which is an absolute must at Colorado Springs, where they operate from small strips located at altitudes above 6,000 ft.

With the aircraft they currently operate, the Academy is able to train about 300 cadets annually, *replacement with these new Twin Otter UV-18B airplanes will accommodate approximately 750 cadets each year.*

Not only will the UV-18B substantially reduce costs, but at the same time it will be much quieter than the aircraft presently in use; an important feature since noise pollution has become a matter of great concern in the vicinity of the Academy's operating area.

It has been almost 30 years since the first de Havilland aircraft, the Beaver, was accepted by the U.S.A.F. The U.S. Army also chose the Beaver, then the Otter, the Caribou and the Twin Otter—a total of more than 1,300 de Havilland aircraft in all.

This confidence in de Havilland performance speaks for itself.

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Twin Otter: the recognized standard of dependability and versatility around the world.

de Havilland

A Tribute to Claude Witze

'30 on the Night Report'

—FABIAN BACHRACH

IN mid-November, Claude Witze was writing what was scheduled to be his last "Airpower in the News" column for us before his retirement, then set for January 1. Here is how it began:

"Now that nostalgia is the thing, and a thing pressed upon this reporter by the passing of time, it is proper to explain that forty-five years ago regional wire news services closed the day's business with '30 on the night report.'

"For an old-timer, this simply has to be 30. It winds up a career that started with a $12-a-week job as a cub reporter and ends up after twenty years at this desk. AIR FORCE Magazine is granting me retirement privileges beginning with the New Year. The association has been warm, the work frequently exciting, and at all times interesting. . . ."

The old typewriter clicked out a few more lines, including a gracious and typically brief tribute to his editor. It stopped in mid-sentence. Mortally ill—and by then he knew it—Claude Witze had missed a deadline for the first, last, and only time.

Within three weeks, he was dead of cancer at his home in Bethesda, Md., on December 7, 1977. He was sixty-eight.

For the twenty years he mentioned, he had been my colleague, my mentor, and above all my friend. It all started when Jim Straubel decided AIR FORCE Magazine should find and hire the best military reporter in town. He asked me who that was and, without hesitating, I said, "Claude Witze, *Aviation Week*." In the intervening two decades, I edited 237 Witze columns. The very first one, in March 1958, contained this trenchant phrase:

"Half the watchdogs in the Pentagon should be sent to the pound."

That set the tone for almost a million words of pithy, often caustic, comment on the Washington scene. To be a good reporter, he thought, was the noblest calling a man could have, a craft and not a profession he often pointed out, saying, "If journalism is a profession, then the customers should be able to sue reporters, and editors, and publishers for malpractice."

He found many instances of malpractice among his peers and exposed them without fear, favor, or mercy. His "Wayward Press" comments were the best-read section of the magazine—read with approbation by many, with rage by others. Claude loved the approbation. He welcomed the rage.

In a speech to the International Press Institute in London some years ago, he summed up his own job description like this:

"The work is arduous; the problems are innumerable; the sources unreliable and always unattributable."

Claude cultivated a crusty, misanthropic façade. It was all a sham. Inside he was soft as butter, one of the kindest, most sentimental men I ever knew. His true anger flamed out only at mediocrity, hypocrisy, or shoddy reporting.

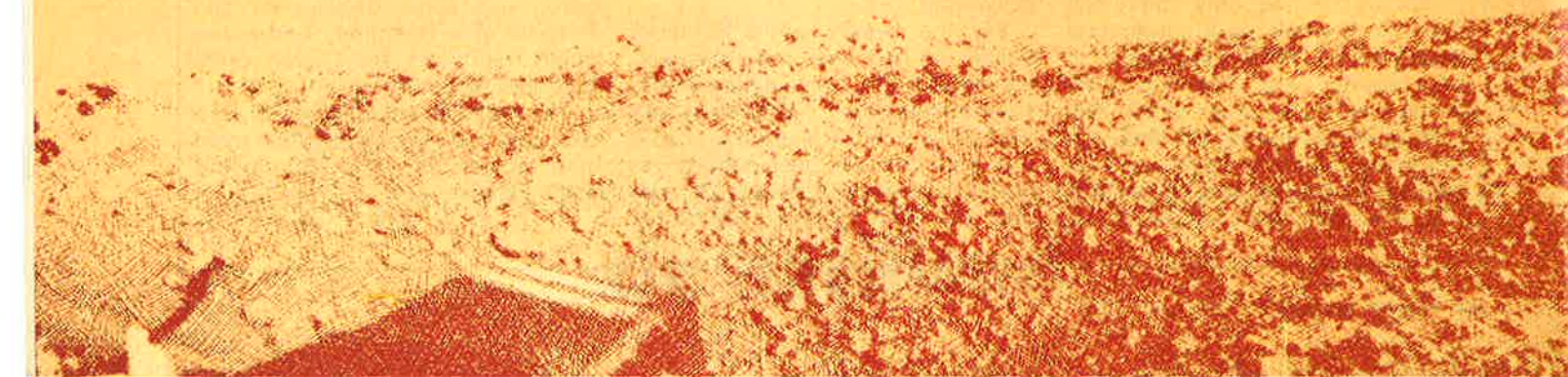
He is survived by his wife, Margaret, two sons, Christopher and Peter, and a daughter, Andrea—a family he loved with fierce pride and deep devotion.

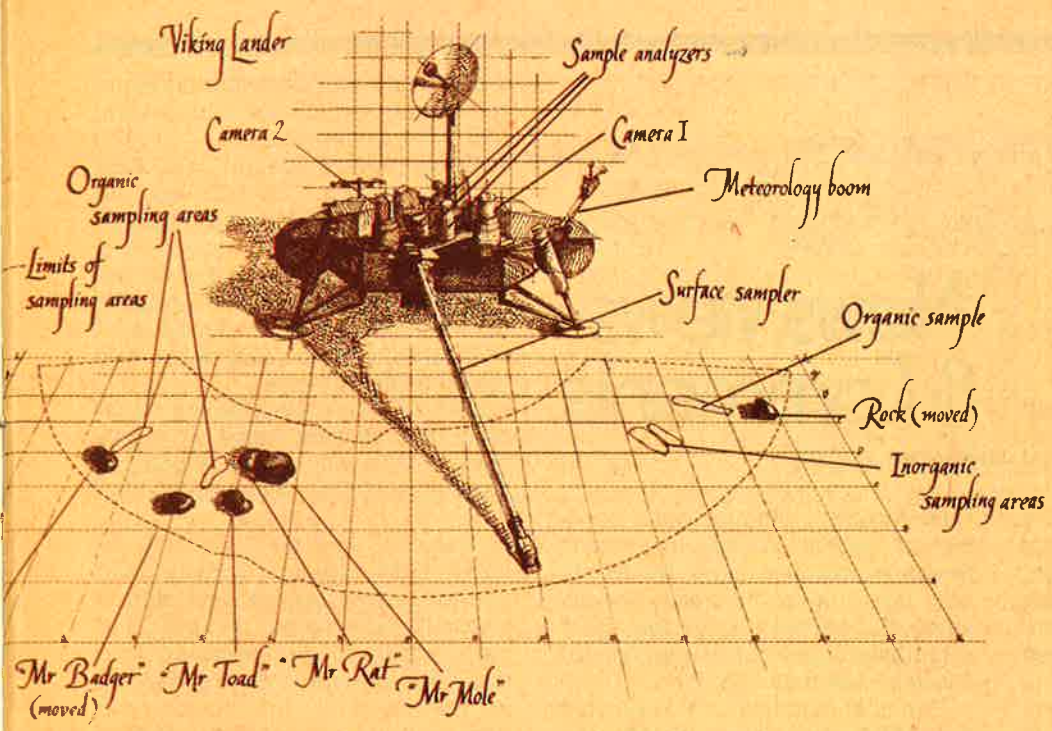
The work is arduous, as Claude said, and his passing makes it even more so, as we write "30 on the night report."

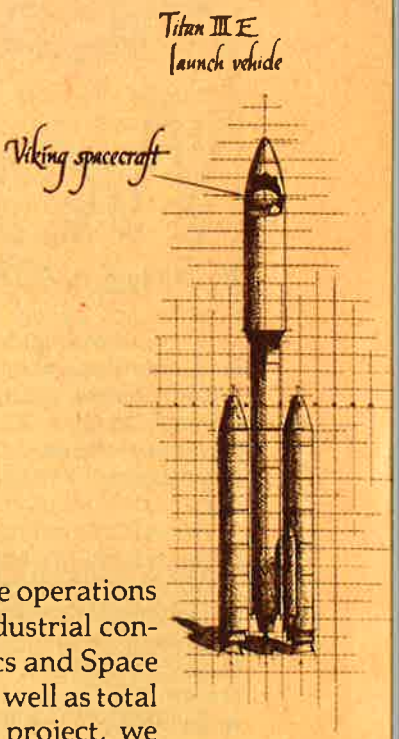
—JOHN F. LOOSBROCK

What does it take to put an exploratory system out there?

An extraordinary system down here.







Every day for the last year two incredible scientific laboratories have been taking the full measure of our celestial neighbor—the planet Mars—some 240 million miles from earth.

These wonderful, durable and hard-working Vikings have been on their own for nearly two years—first, on an 11-month, 480 million mile voyage around the Sun to a perfect, pinpoint landing on the hostile surface of Mars, then delivering a steady stream of scientific data back to Earth. So precise was the design and construction of the Viking landers and their instruments that their planned 90-day life on Mars is now into the second year.

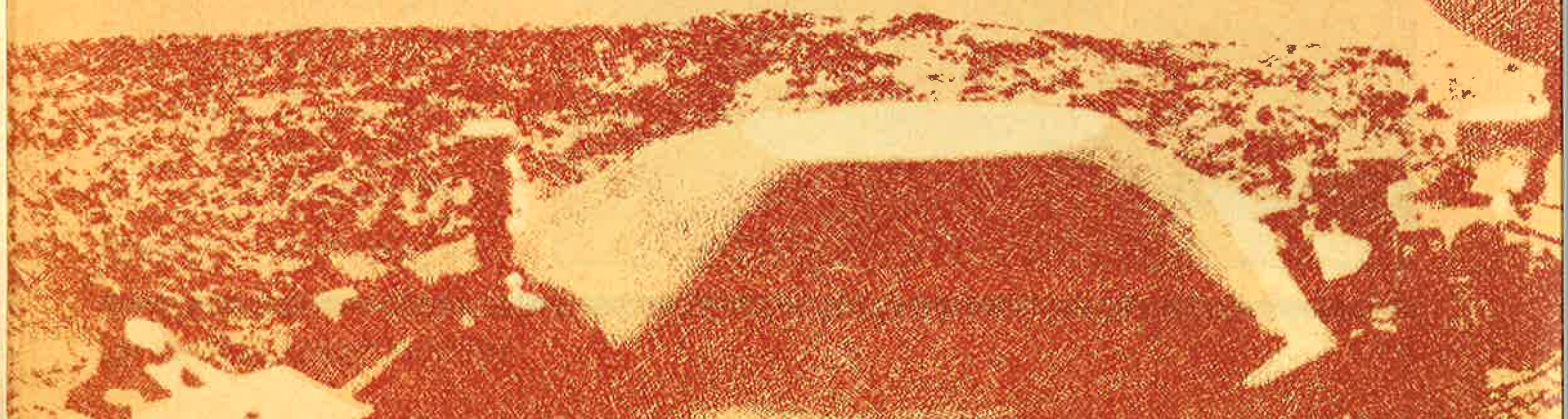
Seventy samples of Mars soil and rock—five pints of material—have been examined by the Viking instruments. The cameras have returned 2,239 photos in color, black and white, infrared and stereoscope. Weather recordings and seismological data have been gathered daily. And the list of scientific discoveries is not yet ended.

The success of the Viking landers was achieved by an extraordinary management system that was responsible for the design, the engineering, the production and the operations of the Vikings. As the principal industrial contractor to the National Aeronautics and Space Administration for the landers, as well as total systems integrator on the overall project, we had but one objective in mind: to land two automated, scientific laboratories on the planet Mars and to return the valuable information asked for by the team of 70 scientists.

Today on Mars the Vikings are fulfilling a centuries-old dream of man to explore another planet. Here on Earth, Martin Marietta Aerospace has the success and experience to assist our country in its future development of large systems for space exploration and national defense.

MARTIN MARIETTA

Martin Marietta Aerospace
6801 Rockledge Drive, Bethesda, Maryland 20034



Aerospace World News, Views & Comments

By William P. Schlitz, ASSISTANT MANAGING EDITOR

Washington, D. C., Jan. 6

★ In mid-December, the Air Force announced the selection of the McDonnell Douglas DC-10 as the new Advanced Tanker Cargo Aircraft. The Boeing 747 also had been under consideration.

The ATCA's primary mission will be to provide increased mobility of US forces in contingency operations by refueling fighters and carrying their support equipment and personnel on deployments abroad. The planes will also have the job of refueling such airlifters as the C-5 and C-141 during overseas missions, and strategic offensive and reconnaissance aircraft during long-range conventional operations. The ATCAs will augment the cargo fleet "on a selected basis," officials said.

USAF plans to purchase about twenty of the aircraft over the next five years, depending on funding. Each will cost some $34 million.

According to USAF, in most instances the ATCA force will be able to conduct its missions without forward basing and without depleting critical fuel supplies in the theater of operations.

The ATCA will be powered by three GE CF6-50CI high-bypass-ratio turbofan engines, each capable of 52,500 pounds of takeoff thrust. A proven veteran, the DC-10 has been in commercial service since mid-1971. It is 182 feet (55.4 m) in length and has a wingspan of 165 feet 4 inches (50.42 m).

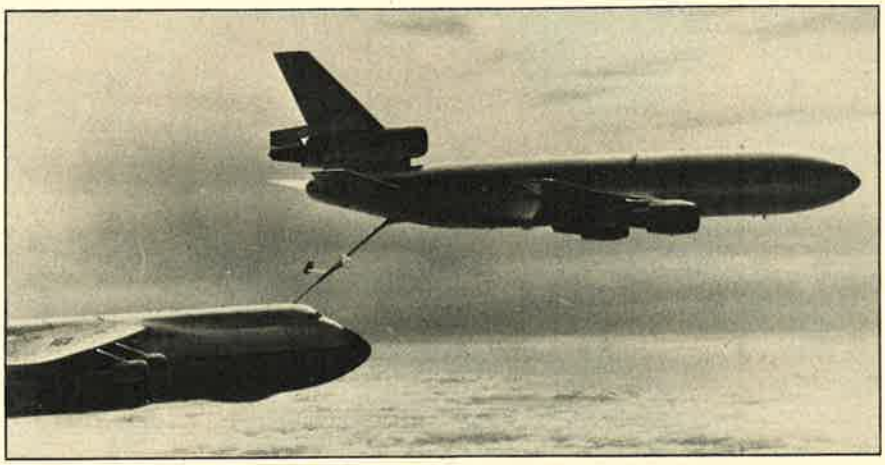
Principal modifications to provide the ATCA capabilities include the addition of body bladder fuel cells in the lower cargo compartments; a boom operator's station; an aerial refueling boom; a hose and drogue; and military avionics.

Gross takeoff weight will total 590,000 pounds (267,622 kg), including a 350,000-pound (158,760 kg) fuel load.

The ATCA will be able to deliver to a receiver 200,000 pounds (90,719 kg) of fuel a distance of 2,200 statute miles (3,539.8 km) and return to home base.

With ATCA aerial-refueling capability, the nonstop range of a fully loaded C-5 will nearly double to more than 10,000 miles (16,000 km).

★ Recently, and for the first time, USAF E-3A airborne warning and control system aircraft were able to transmit radarscope pictures and data directly to ground-based Tactical Air Control Systems (TACS) in Europe. This information can then also be shared with NATO's Air Defense Ground Environment (NADGE) System.



Artist's conceptions of the Air Force's new Advanced Tanker Cargo Aircraft—the McDonnell Douglas DC-10—refueling an F-15 (above) and C-5A (left). See item.

The E-3A operates at altitudes up to 30,000 feet (9,144 m), and thus its radar can monitor a much larger area than ground-based radars limited by curvature of the earth. This capability will give tactical commanders greater control over more terrain and hence increase the effectiveness of weapons and aircraft.

For a discussion of the integration

Old and New Faces in Old and New Places

During the past ten years, AFA's membership has increased about seventy-five percent, with a corresponding growth in all operations and support activities but little expansion of the national headquarters staff.

To provide more time for his management of AFA's varied activities, Executive Director James H. Straubel has relinquished one of his several responsibilities—that of AIR FORCE Magazine's Publisher—a task he has shouldered for more than thirty years.

John F. Loosbrock, Deputy Executive Director, Assistant Publisher, and, since 1957, Editor of the magazine, succeeds Straubel as Publisher. Concurrently, Loosbrock was named Editor in Chief of AIR FORCE Magazine, turning day-to-day magazine editorial responsibilities over to John L. Frisbee, Executive Editor since 1972, who has been named Editor. Richard M. Skinner, the magazine's Managing Editor for the past twenty years, remains in that position and retains his related post as Associate Publisher.

Along with these shifts in duties, Bonner Day has joined the magazine staff as a Senior Editor. He comes to us from a ten-year stint as a military affairs reporter for *US News & World Report.* Before joining that publication, he was an editor with the Central Intelligence Agency, and earlier had been a reporter and editor on several California newspapers. Prior to entering California State University in Los Angeles, from which he graduated in 1962, Day served for three years in the US Army, with duty in South Korea.

Finally, William Farrell has been appointed AIR FORCE Magazine's Advertising Sales Manager for the central US, with offices in Chicago. A 1962 graduate of the University of Minnesota, Farrell has been Midwest advertising manager for several publications during the past ten years.

Loosbrock

Frisbee

Day

Farrell

of tactical ground and air firepower in the event of an outbreak of hostilities in Europe, see p. 56.

★ After a series of frustrating failures for the Soviet manned space program, two cosmonauts successfully joined their Soyuz-26 spacecraft to the long-orbiting Salyut-6 space station on December 11.

A previous attempt in October was aborted, dashing Soviet hopes of a triumph in space to underline the sixtieth anniversary of the Bolshevik Revolution and the twentieth year of space activity.

Soviet news agency Tass said that spacecraft commander Soviet Air Force Lt. Col. Yuri Romanenko and flight engineer Georgi Grechko entered the orbiting habitation from its instrument section side, the opposite side from the space station's transfer section, the usual point of entry.

Tass said that the two docking stations are "important for replacing crews, carrying out rescue operations, and delivering foodstuffs and equipment" to the orbiting laboratory.

Work to be done aboard Salyut-6 includes a study of physical processes and phenomena in outer space, exploration of the earth's surface and atmosphere for data that might be of economic importance, tests of human adaptation to weightlessness, and proving out the space lab's systems, Tass said.

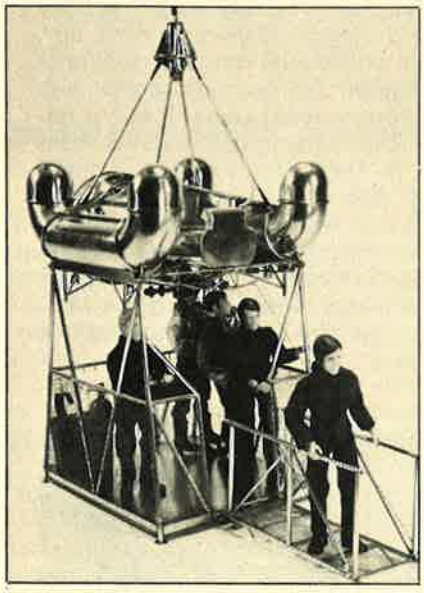
And at press time, on January 10, the Soviets accomplished an unprecedented feat by docking a second spacecraft—Soyuz-27—and putting two more cosmonauts aboard the spacelab. More on that next month.

★ With the Space Shuttle development program on track, NASA has already begun booking orbital experiments from industry, educational institutions, and a variety of other organizations.

According to the National Space Institute, seventy-two payloads have thus far been sold aboard the first twenty-three regular flights to follow the first six test flights. Among customers are Ford Motor Co., Dow Chemical Corp., University of Utah, Johnson & Johnson, Battelle Memorial Institute, and the Alabama Space and Rocket Center.

Prices range from $3,000 to $10,000 for self-contained "specials" on a space-available basis and up to $21 million for the exclusive use of the entire Orbiter by a non-government customer. (Payload space and facilities can be sublet, and

Aerospace World



Model of the Suspended Maneuvering System for high-rise rescues. See details in item below.

there will be a number of extra-cost options available.)

The space agency has prepared a looseleaf notebook, *Space Transportation System Users Handbook,* which specifies all the conditions and acquaints the uninitiated public with space-age terminology: "orbital inclination range"; "orbital maneuvering subsystem delta-V reserves"; "free-drift Orbiter mode"; "drag coefficients"; etc.

The first Shuttle orbital mission, to evaluate performance and determine the environmental effect on immediately surrounding space, is to take place in 1979.

★ According to one survey, there are about 600 serious fires in high-rise buildings throughout the US each year. That statistic brings to mind the plight of those trapped on the upper stories of the skyscraper in the film "Towering Inferno"—far above the reach of fire ladders. All too often in the past, that danger has been real.

Encouraged by national fire and rescue officials, McDonnell Douglas Corp. is currently designing a vehicle that can carry fire fighters and emergency help to high rises and other inaccessible places.

While helicopter-borne by cable, the vehicle—called the Suspended Maneuvering System (SMS)—moves on its own via four nozzles mounted on its top corners. The nozzles, which discharge air produced by a 210-hp conventional aircraft engine, allow the SMS to fly 250 feet (76 m) in any direction under the hovering helicopter.

A prototype of the vehicle, basically a seven- by eight-foot (2.1 by 2.4 m) platform, is to be flight-tested this coming summer. Officials said the SMS will be able to transport up to eight fully equipped firemen or paramedics. It will be able to rescue up to sixteen people, and will have a communications system between the platform and helicopter.

Fire/rescue officials from around the country, who were surveyed for advice on design of the SMS, see many other uses for the vehicle, among them assistance to ships at sea, rescue of flood or earthquake victims, deployment of medical teams, and rescue from oil rigs at sea.

★ During the race, a camel and rider on the ground will track each balloon; as they land, the balloons' pilots will hop on their camels for the race back to the starting line.

First prize: a baby elephant.

Second prize: two camels.

Third prize: three crocodiles.

Cost of the event: more than $500,000.

A spectacular staged by an oil-rich sheikh to commemorate a special event? Exactly.

A while back, the Sheikh Sultan Bin Mohammed Al-Qasimi, ruler of Sharjah in the United Arab Emirates, contacted Colorado balloonist Chauncy Dunn to organize the special event for next December's dedication of a new international airport on the Persian Gulf.

Shown airborne and on the runway is the Fantrainer, a two-seat training aircraft developed by Rhein-Flugzeugbau, a subsidiary of VFW-Fokker. Chief flight characteristic of the new plane is its novel integrated fan propulsion system provided by two rotary engines that produce a total of 300 hp. Designated the AB-2, the aircraft allows flight training at minimum cost.

Mr. Dunn has arranged for twenty US balloonists to participate. Besides a crack at the prizes, they'll receive an expense-paid trip and some other treats.

★ For the first time, large wing sections made of advanced composite materials will be flight-tested in production numbers.

The outer wing panels, about fifty-six feet square (5.2 m^2) and made of graphite and boron fibers supported in an epoxy resin material, will be flown aboard eight ANG A-7D aircraft. The in-service test-flight program will span three years.

The panels, developed by Air Force Materials Lab, Wright-Patterson AFB, Ohio, are to undergo trials for moisture effects, delamination, internal and external damage, and deterioration of fastening devices.

The ANG units involved are the 150th Tactical Fighter Group, Kirtland AFB, N. M., and the 169th TFG, McEntire ANGB, S. C. Each will fly four of the A-7Ds, whose left outer wing panels are the test subjects; the right wings are conventional aluminum.

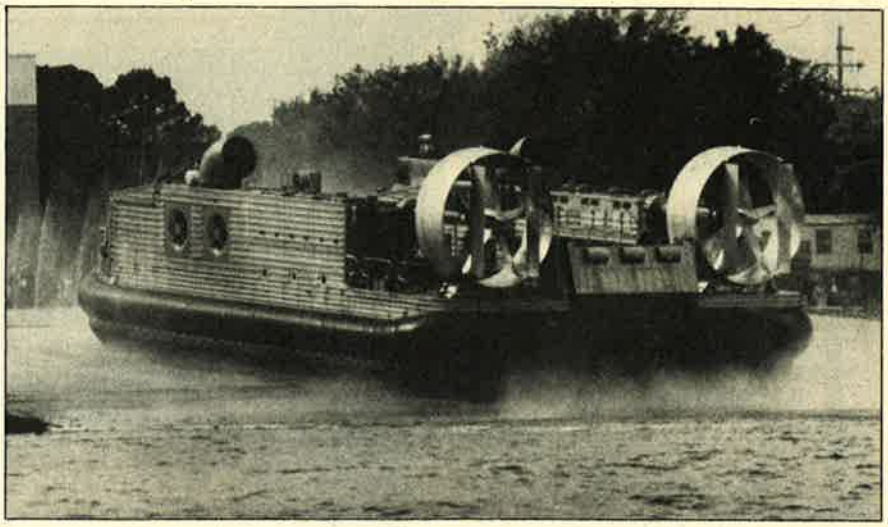
First flight-tested in January 1976, the composite material was fabricated by Vought Corp., Dallas, Tex., and engineers view data derived from the coming program as particularly significant because "the wing is a high-performance, highly loaded structure" subject to considerable stress.

★ An Air Force U-2 bound for a reconnaissance mission over the Sinai crashed on takeoff from the British airbase at Akrotiri, Cyprus, on December 7.

The aircraft hit the base's operations control center, killing the pilot and four others and injuring seven.

Air Force U-2s have been on duty at Akrotiri since the 1973 Mideast War. They fly daily missions over Egyptian and Israeli lines to ascertain compliance with the cease fire.

The day before, on December 6, an F-15 fighter engaged in Dissimilar Air Combat Training over the Nellis AFB, Nev., range crashed. Both crewmen—Nellis AFB Hospital Commander and flight surgeon Col. W. H. Walter III and 433d FWS Commander Lt. Col. D. A. Jacobsen—were killed. At Vandenberg AFB, Calif., on December 20, Base Commander Col. J. G. Turner, Jr., was among those killed in a 10,000-acre brush fire.



The Navy's new Amphibious Assault Landing Craft LC JEFF(B) completed its first overwater tests a month ahead of schedule in mid-December 1977. The craft is designed to maneuver on its air cushion from the well decks of amphibious assault ships. Built by Bell Aerospace Textron, JEFF(B) will be capable of operation on water, in surf, and on beaches.

★ This coming summer, Air Force Systems Command's Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio, will pick either a McDonnell Douglas F-15 or General Dynamics F-16 to be modified as the permanent testbed for its Advanced Fighter Technology Integration (AFTI) program. (*See June '77 issue, pp. 54–58.*)

The plane chosen will begin test flights in 1980 to prove out some of the "way-out" performance characteristics that the lab hopes to incorporate in the design of tactical fighters of the future.

For example, among these new technologies will be "direct force control and weapon line pointing," meaning that a pilot would be able to "slue" his aircraft to aim his weapons at an angle to the plane's flight path.

Intelligence Briefing...A Roundup

According to *Foreign Report,* published by London's *Economist:*

- America's trade deficit with black Africa increased from $2.7 billion in 1975 to $4.8 billion last year, largely because of the huge oil imports from Nigeria. Nigeria supplies America with 1,200,000 barrels of low-sulfur oil daily—about a quarter of our total imports. . . . This makes Nigeria the second largest supplier of oil to America after Saudi Arabia. But Nigeria's importance as an oil supplier reaches further: in the event of a future Arab oil boycott, it might remain a secure source of fuel.
- The spectacular success of the West German government's tough line toward the Baader-Meinhof hijackers—in which commandos, aided by British intelligence experts, executed what has been described as "the first successful German feat of arms since the last World War"—is no certain deterrent to the international terrorists. The Israelis describe Beirut, Algiers, and Aden, where the Palestinian "Rejection Front" and its Japanese and western auxiliaries enjoy a safe haven, as the "triangle of terror." The Japanese Red Army terrorists have made Beirut their headquarters for operations in Europe and the Middle East, and are said to be able to make use of the PLO's sophisticated communications center. Further evidence is surfacing about the role of the Soviet bloc in promoting international terrorism. The group that kidnapped [and subsequently murdered German businessman] Mr. Schleyer is said to have entered West Germany via East Berlin.

Aerospace World

Again, improvements in aerodynamic/structural aircraft design would allow pilots flying in air-to-ground combat modes to quickly change via cockpit controls flight characteristics for air-to-air combat.

In the redesigned High Acceleration Cockpit itself, equipped with reclining seat, a pilot would be able to pull higher Gs, while advanced controls and displays would take over a greater share of the work load. In combat, the aircraft's integrated fire and flight control system would translate into greater effectiveness in weapons firing.

Another phase of the AFTI program has to do with the development of a "mission adaptive wing" for test flight aboard a modified testbed F-111. Boeing, General Dynamics, and Grumman are in predesign competition on this project.

AFTI is jointly sponsored by USAF and NASA, and pilots from both organizations will participate in the test-flight program.

★ Lockheed-Georgia Co. has begun a worldwide drive to market its newly designed L-400 Twin-Hercules transport.

The L-400 is a two-engine derivative of the company's family of medium-size cargo and transport aircraft and features the C-130's fuselage structure.

According to Lockheed-Georgia, the L-400 is designed to carry a 22,500-pound (10,212 kg) payload 550 miles (885 km) and operate from unpaved runways. It is powered by two 4,910-shp Allison 501-D22A engines, and can be flown with a crew of two. The company stresses the L-400's parts and other commonalities with its progenitor C-130.

Lockheed anticipates a potential world market of more than 250 L-400s and has projected first deliveries in 1981.

★ The 32d Tactical Fighter Squadron, Camp New Amsterdam, the Netherlands, has been named as the second unit in Europe to transition to the F-15 Eagle.

Pilot training in the all-weather fighter is to commence this coming spring at Luke AFB, Ariz., and will lead to the eventual assignment of eighteen F-15s to the squadron by January 1979. The 32d's current complement of F-4E Phantoms is to be reassigned to other USAFE units, officials said.

The first F-15 unit stationed in Europe, the 36th Tactical Fighter Wing, Bitburg AB, Germany, recently completed its transition to the Mach 2.5, single-seat fighter.

Other operational Eagle units are now in place in Virginia, New Mexico, and Arizona, with a previously announced wing to be located in Florida.

★ The Kitty Hawk "Sands of Time Awards," sponsored by the Los Angeles Area Chamber of Commerce and honoring those who have contributed significantly to the nation's advancement in aviation, were presented early in December. The recipients:

- The military award to Air Force Chief of Staff **Gen. David C. Jones,** in recognition of his outstanding military aviation career.
- The civilian award to **J. Leland Atwood,** Rockwell International Corp. executive whose contributions to aerospace span five decades.
- A special joint award to **Dr. Paul B. MacCready, Jr.,** and **Bryan Allen,** designer and pilot, respectively, of the human-powered Gossamer Condor aircraft whose flight last August won the £50,000 prize offered by British industrialist Henry Kremer.
- The youth award to **Mark R. Kingman,** Washburn University AFROTC cadet and Arnold Air Society Commander, who has earned his commercial aircraft license, flight instructor, ground instructor, and instrument ratings.

★ Clark University, Worcester, Mass., has commissioned artist

ED MACK MILLER
1922–1978

Ed Mack Miller, a retired United Airlines 747 training captain, veteran Air National Guardsman, and prolific free-lance writer, died January 9 in Denver, Colo., after a heart attack. He was fifty-six. As an Air Force officer, he taught instrument flying during World War II. The author of six books and some 1,900 articles or columns, he most recently wrote for us the article "Wings Over Windmills" in last month's issue.

Index to Advertisers

David von Schlegell to create a sculpture as a memorial to native son and Clark professor Dr. Robert H. Goddard, "father of the space age."

The sculpture, financed by a NASA grant, is expected to be finished by mid-year and in place on the campus at Clark, where Dr. Goddard taught for twenty-eight years and conducted early rocket research.

★ **NEWS NOTES**—The Navy successfully conducted the ninth test launch from a land pad of its new long-range **Trident ICBM** in early December. Twenty to twenty-five such shots are planned, followed by five to ten from a converted Poseidon submarine, before the **first launch from a Trident sub** expected in mid-1980.

Retired, as of February 1, is **Gen. Daniel "Chappie" James, Jr.,** former ADCOM CINC and the first black in US military history to achieve four-star rank. General James was to have retired after a career spanning thirty-five years this coming summer, but worsening health problems intervened.

The last of the **World War II Air Force chaplains—Col. Harold D. Shoemaker**—retired from active duty as Command Chaplain with AFLC, Wright-Patterson AFB, Ohio, on November 27, ending a career begun in 1942.

Lt. Gen. Alton D. Slay, DCS/R&D, Hq. USAF, has been awarded the **1977 Eugene M. Zuckert Management Award** for "leadership in restructuring R&D planning to ensure development of high-quality, cost-effective weapon systems for the Air Force of the future." The award recognizes outstanding management achievements by an Air Force general officer or equivalent-level civilian.

Ann Whitaker, a NASA physicist, has been named as a candidate for a post aboard Spacelab, the joint US/European venture that is to orbit in a Space Shuttle in 1980. Thus, she could be the **first American woman** to fly in space. The USSR orbited a woman cosmonaut in 1963.

Died: Brig. Gen. S. L. A. Marshall, USA (Ret.), military writer and historian and sometime contributor to this magazine who wrote more than thirty books, of a heart attack in El Paso, Tex., on December 17. He was seventy-seven. ■

Perspective
Comment & Opinion

Capt. Donald Bishop's article, "Leadership, Followership, and Unit Spirit," in the December 1977 issue of this magazine examined several elements of successful military leadership, and the prevalent emphasis on management skills. Two of our readers offer their perspectives on leadership and management, in response to Captain Bishop's article.

THE LEADER: INSPIRER OR PRETENDER?

By Lt. Col. Robert W. Hunter, USAF, DEPUTY DIRECTOR OF INFORMATION, USAF ACADEMY

Captain Bishop's perceptions reinforce my own belief that the armed forces have been beguiled into overemphasizing management theory and technique at the expense of building better leaders. There are several reasons I see as instrumental. Social scientists have never been able to articulate the qualities of effective leadership except in the most general terms. Psychologists, for example, have not agreed on the profile of traits necessary in a good leader. Sociologists have focused on "situational" leadership, seeking to marry individuals to the moment and analyze the dynamics that occur. This fuzzy pedagogy does not lend itself to the formulation of theory or principle upon which one may act.

It is that need for action that has led military educators and decision-makers to focus on management. "Scientific" management theory is replete with models of style and statistical means to quantify productivity. It is in command of the tools of technology that entice a "sophisticated" approach to decision-making. It offers people something to hang their hats on.

Management theory has taken a different orientation than leadership theory. According to a report by the American Management Association, an overwhelming majority of 200 managers surveyed agreed that the most important skill of an executive is his or her ability to "get along with people." I suppose this skill is like motherhood and apple pie. *But* it was rated more vital than intelligence, decisiveness, knowledge, or job skills! One might wonder how long a military organization could survive with that priority. Nonetheless, this ability to get along with people has become the thrust of what little training we offer in leadership. Getting along with people is important, but the pseudo-psychological toys we have become enamored of (transactional analysis, etc.) have led us to the dangerous point of over-accommodation.

A leader whom I think highly of said he worked at being loved, respected, and feared. Many of us work only at being loved or "understood." Respect is a gratuity, if achieved, and fear is old-fashioned.

The substitution of managers for leaders has other consequences. We have weakened the chain of command by establishing bureaucratic procedures that bypass middle- and lower-level leaders. We have escalated authority and responsibility to ever higher levels.

This "authority creep" is a natural outgrowth of modern management realities. Data flows upward and is accrued at succeedingly higher levels until enough has been obtained to formulate a decision. As the armed forces become more and more involved in technology with its accompanying high costs and congressional scrutiny, the level of decision-making escalates. One result is that there is little breeding ground for leaders, little opportunity to practice. Everyone is, it seems, a staff officer or NCO. Even commanders have become "resource managers." A look at the language in regulations and inspection reports will tell you where the emphasis is placed.

There are other considerations. Psychologically, management is less personal. The decision process tends to be removed from individual judgments for which one person may be held accountable. Decisions are made in a corporate sense, based on data and staff work, that rely on bureaucratic procedures. If poor management results, the individual is less accountable. One may argue the data was bad, the analytical model faulty, or the PERT chart badly prepared. When a leader errs, however, the responsibility is his alone. Need I suggest which is the more attractive *modus operandi,* which offers the less personal threat?

I am not sure if it is possible to pinpoint and teach traits of good leadership, but one fact is clear: When a person is functioning as a leader, he is the actor on center stage, the one whose judgment is on the line, the one who must reveal himself. Both his strength and his foibles are on display for followers to judge. His decisions are personal, not corporate. That takes courage and conviction, and a reward and punishment system different than we now see operating.

In our society, the armed forces are not alone in desiring to be on the leading edge of new thinking. For years educational theorists beguiled teachers, administrators, and parents with avant-garde thinking about what was best for students. Only now is the academic community waking up to the realization that more "sophistication" does not necessarily lead to more scholars. The "back to basics" rallying cry in educational circles today may well carry a message to others. I would not suggest that we abandon

HOW TO SHARE YOUR PERSPECTIVE

The purpose of this department is to encourage the presentation of novel ideas and constructive criticism pertinent to any phase of Air Force activity or to national security in general. Submissions should not exceed 1,000 words. AIR FORCE Magazine reserves the right to do minor editing for clarity, and will pay an honorarium to the author of each contribution accepted for publication.

management techniques. I do suggest that we can ill afford to have managers who are not leaders first and foremost.

A plaque in my office says, "Fighting men are pulled along by leaders, not pushed along by pretenders." My hope is that we will find the insight to develop leaders who are willing to stand on center stage, to show us a vision of what can be, and to pull us along toward greatness. We can begin by listening to men like Captain Bishop.

THE FOLLOWER: TEAM MEMBER OR INDIVIDUAL?

By Capt. Richard M. Williams, USAFR

Supposedly, the custom of trooping the colors arose out of a need to let the mercenaries in the force see what standard they were fighting under that day. While Air Force jobs may be much the same from place to place, personnel reassignment practices in today's Air Force make it ludicrous to expect anything like unit spirit to develop.

The country that gave the world interchangeable mechanical parts makes a grave error in applying the principle blindly to human beings, especially in a situation where spirit is as critical a factor as it is in combat. Mechanics know that when they replace piston rings or bearings, the engine needs to be broken in again as though it were new. Yet, reassignment practices make little allowance for permitting the far more complex human relationships to develop properly before putting them under stress.

The psychologists who produced the monumental *American Soldier* studies after World War II credited the tenacity with which the retreating Germans fought, in part, to the fact that units were pulled out of the line when they were to receive replacements. This allowed the new men to gain a sense of belonging to the unit and the veterans to come to know and trust the newcomers. American forces, in contrast, put individual replacements into units already engaged in combat without giving this sense of comradeship a chance to develop. This is undoubtedly related to some extent to the numerous documented instances of positions being overrun, by counterattacking Germans, without firing a shot. While the men were willing to die for their country, they were unwilling to kill either for country or for the "comrades" they hardly knew.

The Air Force's ignorance of what goes to make up unit spirit is perhaps best typified by its distressing practice of redesignating units with the number of some long-deactivated organization and telling the troops that all of a sudden they are supposed to be proud of the past exploits of a group of strangers who once had the same number. The combat support group I was assigned with until recently during twelve years of active and Reserve duty had four different numbers during that period. As far as I could tell, none of the changes meant a thing to anybody except the inconvenience of having to change signs and letterheads. Small wonder that Air Force people will say they were *at* such and such a place, seldom even remembering what unit they were in. There is none of the spine-tingling thrill that makes one eager to give his all for the Coldstream Guards, or even the Muddyhole Fusiliers.

If flying units develop unit spirit in wartime, it is more by accident than by design. The suitability of a certain aircraft for a mission results in whole UPT classes being assigned to fly it. The group may remain more or less intact, under different unit designations and different instructors and commanders, from training to combat. The typical dispersal of those who trained together is delayed until the first rotation back to the CONUS, but from then on it is as inexorable for flyers as it is for support troops. The Air Force seems to regard this "batch approach" to manning as abnormal and to avoid it wherever possible.

The existing system may claim to give more consideration to the talents and preferences of individuals, but it largely ignores the fact that the world's work, and the Air Force's, is not done by individuals, but by members of groups. Even the great leaders and heroes of history have been effective only through groups. The Air Force today has neither leaders nor the led. It has individuals assigned to positions. While they may be professionals who take pride in performing their individual functions well, global struggles are not won by people who are only doing a job, however well they do it. ■

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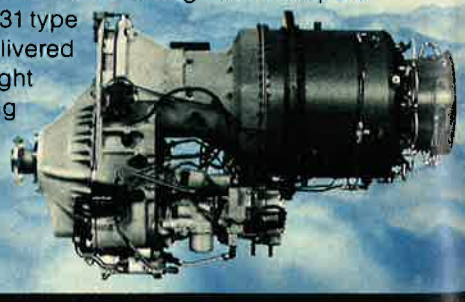

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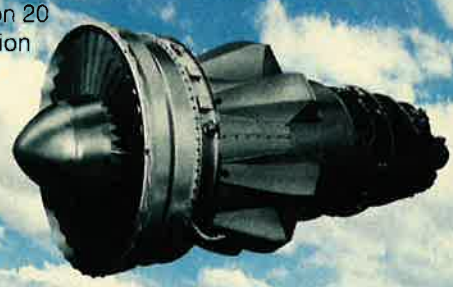

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AIR FORCE MAGAZINE ● FEBRUARY 1978

Preparing for a Warsaw Pact attack on Western Europe in order to deter it confronts the Air Force with a variety of tough challenges, probed by USAF and NASA executives at a recent AFA national symposium on "Theater Deterrence for the '80s." Here is the second and final AIR FORCE Magazine report on that meeting.

Streamlining Airpower for Theater Warfare

BY EDGAR ULSAMER, SENIOR EDITOR

The A-10 close air support aircraft, shown here during a European deployment exercise, is tailored to blunt the Warsaw Pact's armored thrust. USAF plans to procure 733 of these aircraft.

USAF's AND NATO's "number one priority," overshadowing all others in potential payoff, is "better utilization of the forces we have." That priority extends beyond force interoperability to encompass greater readiness, better training, improved tactics, and more efficient force application, USAF Chief of Staff Gen. David C. Jones told AFA's Symposium on "Theater Deterrence for the '80s," held in Los Angeles, Calif., October 27–28, 1977. (*See also p. 50, January '78 issue.*)

To make the most effective use of its tactical forces, USAF seeks to raise their readiness to the Strategic Air Command's high level, General Jones said. "We have been looking at [general-purpose force] readiness with binoculars. . . . We ought to use bifocals," he explained. The result has been inadequate funding and distorted priorities that are now being corrected, according to General Jones. Key emphasis is on higher sortie rates, and accelerating and honing force projection, especially to Europe. "An aircraft on the ground is vulnerable and is of no use to the soldier in the front lines," he pointed out, adding that recent surge tests have led to threefold and fourfold increases in the sortie rate. Backing up that achievement, he said, is USAF's increasing ability to move tactical air forces to Europe—and elsewhere—"within twenty-four hours, ready to go" into combat and able to operate either from USAF or allied bases.

One of the developments most beneficial to NATO's airpower was the establishment, in 1974, of Allied Air Forces Central Europe, followed by the creation of the Borfink hardened Command and Control Center near Ramstein Air Base in Germany. The facility is now operational and serves as the headquarters for the air and land battle in NATO's Central Region. Rejecting the notion that Borfink represented a return to a Maginot Line concept of World War II, General Jones said "we try not to have an Achilles heel" in NATO's command and control structure by providing for redundancies and fallback positions. Further, the Borfink C^3 bunker's site was chosen so that an attacker would have to overrun almost all of Germany before he could get to the facility.

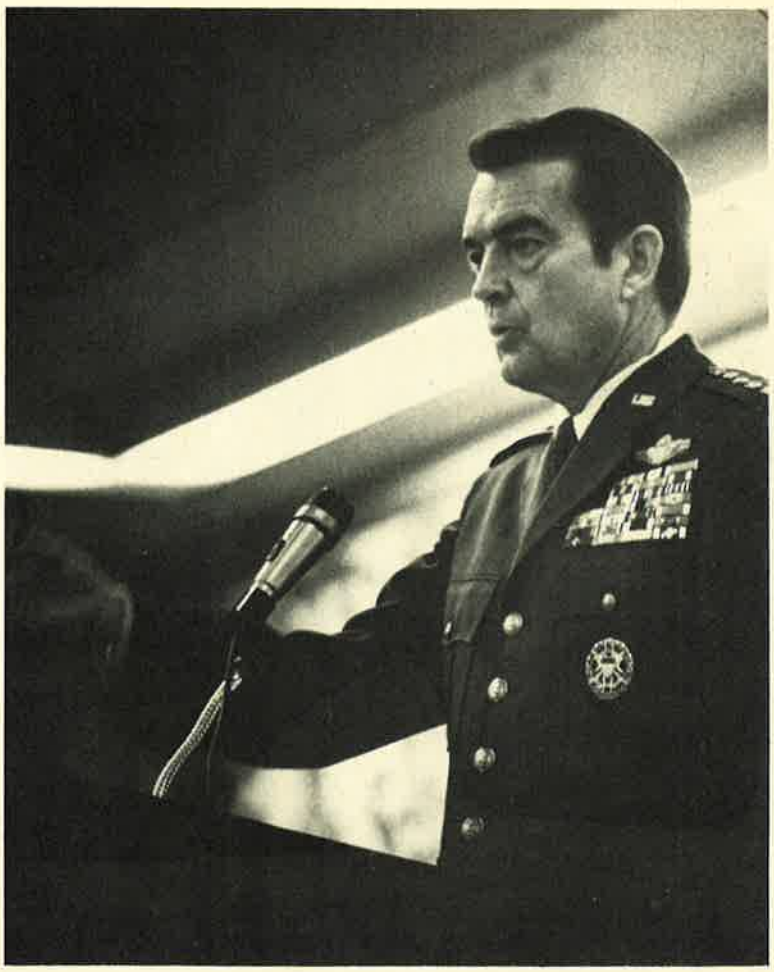
One of the central challenges to NATO in both force application and command and control, General Jones warned, is to avoid stereotype postures where a single setback could cause a total unraveling of the system: "We need to be able to call audibles at the line of scrimmage." The E-3A AWACS, he stressed, will go a long way toward providing requisite C^3 flexibility, not only in air control but for all senior NATO joint commanders.

While applauding recent progress among NATO forces toward cross-servicing and cross-loading of munitions, General Jones called for larger munitions stocks: "It's of little use to be able to land an airplane on a base when that base has run out of munitions. And we all need more, particularly our allies. In an emergency, they would run out of munitions in just a few days."

Technological advances in guided or "smart" air-to-ground weapons don't obviate the need for so-called wide-area munitions that can provide for multiple kills in a single pass, General Jones said. Both types are essential. High-value point targets require weapons with a near-zero CEP (circular error probable) accuracy and great firepower, while attacks on deployed ground forces and other area targets are more effective with wide-area munitions. One of the most promising developments in the latter category, he said, is JP-233, a British design program supported by USAF. (This weapon, whose details are closely held, reportedly is optimized for attacks on runways.)

Standardization and Coproduction

USAF's interest in standardization and coproduction of weapon systems within the alliance, General Jones said, has led to Project Seekpace, headed by Brig. Gen. Robert M. Bond of Hq. USAF's R&D Deputate. Seekpace calls for a systematic dialogue with other NATO nations during the early phases of weapon system concept formulation to optimize specifications from the standpoint of standardization and coproduction. More than fifty systems are being reviewed to assure an "alliance approach" to development that is complementary rather than competitive, General Jones said.



USAF Chief of Staff Gen. David C. Jones stressed the need for wide area munitions, such as the British JP-233 system.

Other points made by General Jones in response to audience questions included:

- In spite of an intensive civil defense program, the Soviet Union "as yet" does not have the ability to survive nuclear war. This situation may change, however, if the present program is continued.
- Probably the most cost-effective way to counter modernization of the Soviet intermediate- and medium-

range ballistic missile force—particularly the new SS-20 weapon—is through deployment of the Ground Launched Cruise Missile, which could perform a "significant role," especially during the early phase of theater nuclear war in Europe. Coproduction of that weapon system with other NATO allies appears likely.

- There are plans to use B-52s in Europe as necessary to offset the theater capabilities of the new Soviet Backfire strategic bomber.
- The effectiveness of the Soviet ASAT satellite killer weapon is quite limited "both in terms of the number of ASATs they can launch and the types of US satellites they can go against." Nevertheless, ASAT is of concern because of intensive, perhaps excessive, US reliance on military communications satellites. Several developments are under way in the "defensive arena" and in US antisatellite capabilities, he said.

The Administration's decision not to enter the B-1 into production—after the Air Force presented its case in behalf of that weapon system—should not blur what "from the Air Force's point of view is the more fundamental issue, [the] continuing need for a manned penetrating bomber." Even though the B-1 was the preferred system, General Jones said, there are alternatives. The FB-111H, a stretched aircraft using the B-1's engine, appears to be "a very good airplane" that "eventually" might receive congressional funding to retain a long-term penetrating bomber option. General Jones emphasized that the Air Force does not "want to be in a position where the decision on a single weapon system means life or death."

TAC and Theater Deterrence

"Warsaw Pact forces already greatly outnumber NATO forces, almost three to one in armor, over two to one in tactical aircraft, and approximately 1.3 to one in active army personnel, which could escalate as high as five to one depending on the scenario. . . . [Even more ominous is evidence that] Pact production through 1979 [would be adequate to] replace, on a one-for-one basis, all the US tactical air fighter force, plus those in the NATO central region fighter inventory."

Gen. Lew Allen, Jr., Commander of Air Force Systems Command (left), told the AFA Symposium that the Alliance's air forces can be presumed to retain a qualitative edge over the Pact. Above: More than 600 attended the AFA Symposium.

As a result, Lt. Gen. James D. Hughes, Commander of TAC's Twelfth Air Force, told the AFA Symposium, tactical airpower's job of stopping the Warsaw Pact threat is "tremendous." While the problem is "tough," it is "not insurmountable by any measure." The solution hinges on a number of factors. Primary is tactical airpower's ability to survive the enemy's blitzkrieg strikes with sufficient forces and resources to fly high sortie rates over protracted periods, General Hughes said. Sound battlefield management, the judicious allocation of forces and resources to competing tasks—from close air support and counterair to interdiction of the attacker's second echelon—is quintessential if "tactical airpower is to be the equalizer against overwhelming numbers," General Hughes pointed out.

Other battle management aspects of fundamental importance to the US/NATO air arm, according to General Hughes, include the ability to operate in a command control and communications environment severely degraded by hostile action, and the capacity to mobilize rapidly in the face of decreased warning time. Finally, the efficacy of tactical airpower in Europe will be influenced strongly by the ability to operate under adverse weather conditions since it must be assumed that a potential attacker would launch his offensive under cover of bad weather.

The tight intertwining of air and ground forces in almost any NATO war scenario mandates a corresponding meshing of USAF and US Army doctrines. Recent initiatives to advance coordination by TAC and the US Army Training and Doctrine Command (TRADOC)—and their counterparts in Europe, USAFE and USAREUR—include the creation of the Air-Land Forces Application Agency (ALFA) and the Air-Land Programs Office (ALPO). These new, permanent organizations, General Hughes explained, are manned by staffers from both services working side by side; in the case of ALFA, to "develop concepts, tactics, and procedures for joint application of firepower, and [in the case of the ALPOs] to implement "these ideas and recommendations." The European counterpart is the Directorate of Air-Land Forces Applications, whose central goal is to foster the interoperability of air and ground forces, as well as US and other NATO forces, he said.

The Conversion Problem

USAF's weapon system modernization program in the tactical arena—from F-15, F-16, and A-10 to the E-3A and EF-111—represents a significant upgrading of tactical airpower. Less obvious, General Hughes explained, is the management problem brought on by converting to the new equipment: "From 1974 until the present, ten percent of the tactical air forces' active aircraft and twenty-six percent of Reserve aircraft were upgraded to newer and more effective weapon systems. By 1985, fifty-four percent of the active and seventy-four percent of the Reserve forces are programmed to modernize. This will result in the upgrading of sixty-four percent of the active tactical fighter force and 100 percent of the Reserve. This modernization will generate more than eighty unit conversions," and involve more than 1,500 new fighter aircraft.

A number of new techniques, including projects Ready Switch and Ready Eagle, have been developed by the Air Force to permit combat units to convert to new equipment or transfer to other theaters without standing down, General Hughes reported.

Five Flags Over TAC

USAF's commitment to "readiness now," in a combat and support context, pivots on new, highly realistic readiness training. Major training objectives are lumped together under various "Flag" programs, Red Flag, Gold Flag, Blue Flag, Black Flag, and Green Flag.

Red Flag, at Nellis AFB, Nev., General Hughes said, has trained more than 6,000 crews, flying some 23,000 sorties in an integrated air-to-air and air-to-ground threat environment during the past year. General Jones added that German, British, and Canadian aircraft and crews are now participating in Red Flag.

Gold Flag, General Hughes explained, concentrates on "less experienced pilots" and allocates a proportionately greater share of TAC's limited flying hours to them.

Black Flag prepares maintenance forces for high wartime surge capability. Instead of evenly scheduling a unit's allocated number of weekly sorties, two "surge" days are scheduled during which all wing activities are concentrated on "aircraft generation and turnaround capability [to] keep both experienced and inexperienced maintenance personnel ready and able to function as a team, under combat surge conditions."

Blue Flag is "a series of exercises which provides decision-making and battle-management training for the personnel most likely to fill key staff positions in a real contingency. These quarterly exercises are conducted at Eglin AFB, Fla., in a fully integrated tactical air con-

Above: Effective C³ begins with the forward air controller (FAC), who functions as an integral part of Army/USAF combined operations. Below: USAF's F-111s provide vital all-weather and night interdiction of the Pact's second echelon.

trol system environment, using real world plans and orders of battle, logistics, and intelligence data. While the primary focus is on training, a vital corollary of Blue Flag is the assessment and validation of new concepts, procedures, and equipment developed to enhance the battlefield management process," according to General Hughes.

Green Flag is a program to acquaint operational commanders and crews with the actual environment of overseas theaters where they are likely to fight. Readiness and combat capability both gain "by the aircrews' careful study of and exposure to the geographic and operational aspects of" potential combat sites, General Hughes told the AFA Symposium.

NATO's Technological Requirements

In terms of airpower, the US and its NATO allies retain a significant qualitative edge over the Warsaw Pact forces, and it is likely to continue if current USAF modernization programs are carried out, Gen. Lew Allen, Jr., the Commander of Air Force Systems Command, told the AFA meeting. But even under the best of circumstances, NATO's lead will diminish and in some areas, such as electronic warfare, the Soviets are already ahead of the US, he explained. What's more, they seem determined to exploit their lead in EW capabilities through coupling the massive deployment of sophisticated systems to refined operational doctrines, General Allen said. In addition, Soviet vulnerability in the command control and communications sector intrinsically is well below that of the US and NATO "because of the rigidity of their system and the redundancy of their communications." The US/NATO deficiency in EW will be alleviated somewhat when the EF-111A tactical jamming system, currently undergoing testing in the US, becomes operational, he predicted.

From left: Dr. James J. Kramer, NASA's Associate Administrator for Aeronautics and Space Technology; AFLC Commander Gen. F. M. Rogers, and SAC Commander in Chief Gen. Richard H. Ellis were attentive listeners.

Further relief can be expected from US weapon systems that can suppress electronic emitters, with the RF-4C's TEREC (tactical electronic reconnaissance) system linked to sidelooking radar and the F-4G Wild Weasel showing great potential, according to the AFSC Commander. Later on, he added, USAF's EW capabilities can be expected to advance decisively through the Precision Location Strike System (PLSS). Using airborne receivers in a triangular fashion, PLSS's time-of-arrival electronic measurement techniques establish the coordinates of emitting targets with high precision and transmit that information in real time to the strike force.

General Allen envisioned evolutionary refinement of PLSS through links with MTI (Moving Target Indicating) radars. Complementing this system will be new low-visibility target-acquisition systems linked electronically to ground processor nets.

USAF's ground-support capabilities already have taken a major step forward with the A-10 equipped with the GAU-8 antiarmor gun and the electro-optically guided Maverick missile. Further antiarmor capabilities will be realized with the advent of a laser-guided Maverick in a few months, and IIR—imaging infrared—guidance for that weapon later on, according to General Allen. AFSC has an intensive program under way to provide the Air Force with a multiple high-kill capability against massed armor and similar target concentrations. These wide-area antiarmor munitions, he said, will permit attacks over areas of a few square miles, with the prospect of killing a substantial number of tanks—perhaps five or six—per pass. The underlying technologies may vary and include individually homing warheads guided by heat or sound-seekers as well as microwave active or passive guidance.

The sizable range of the GBU-15 modular glide bomb, either in cruciform or planar wing configuration, will provide a home-on-jam capability from substantial standoff distances, General Allen predicted. Other promising defense suppression and standoff systems tailored to the dense air defense environment of central Europe include low-cost mini-RPVs applied in large numbers, and the ground-launched cruise missile, to be used in nuclear scenarios, the AFSC Commander said.

Possibly the greatest technological advance applicable to theater war may come from the Global Positioning

NAVSTAR System, General Allen said. While still in early development, NAVSTAR gives every indication of being able to furnish all-weather location and navigation data throughout the European theater, with the promise of transferring and exchanging strike information in real time and with high precision. As yet not solved is the "question of security," meaning safeguards to keep the Soviets from plugging into the same system and using its vast information potential against the US and NATO, General Allen conceded.

Warning intelligence remains one of the toughest challenges confronting NATO. While in the aggregate, NATO's warning capability, "in a historical sense," is good, it has remained largely a national responsibility. "But in case of major response we will need a consensus of sorts" even though the warning information is ambiguous. The prospects are good, however, that through

Underscoring the eventual need for a next-generation fighter, General Allen said that the system's timetable is sufficiently flexible to permit a "joint-formulation approach" with other NATO powers.

Charged particle beam weapons, alleged by some to be on the verge of operational status in the Soviet Union, "have been studied by us for about twenty years," General Allen said. "We have, however, not been able to convince ourselves that such a weapon is feasible. Some other people have hypothesized that certain puzzling information from the Soviet Union suggests that they are building such a weapon."

Supercruisers and Vectored Thrust

Dr. James J. Kramer, NASA's Associate Administrator for Aeronautics and Space Technology, in a long look at the future of aviation, predicted major advances

A Military Airlift Command C-5 Galaxy dwarfs C-141 StarLifters on the ramp of USAFE's Rhein-Main AB, Germany. Strategic airlift is the key to NATO's reinforcement capability.

better data *fusion*, advanced data management technologies can "help the alliance in reaching common understandings of impending threats and in dealing more effectively with ambiguous information," General Allen said.

Another area requiring technological improvement is air-to-air missilery: "We need a launch-and-leave capability—like that of Sidewinder—but over longer ranges. At Nellis AFB we recently ran tests and evaluations of AIM-7 and AIM-9 [air-to-air missiles], using both radar and IR guidance that are giving us the key to how we might get the needed K_p [probability of kill]."

in aircraft maneuverability, cruise speed, and fuel efficiency, culminating in the so-called "supercruiser." That joint NASA/USAF concept, he said, should lead to a vehicle far more agile than today's best fighters, yet capable of sustained, high-speed cruise over considerable distances. An incremental step toward the supercruiser, according to the NASA official, is the current Hi-MAT (highly maneuverable aircraft technology) program being carried out by Rockwell International for NASA and USAF. Using an RPV to hold down costs, this project grafts a number of advanced technologies, such as variable camber, supercritical wing shapes, and aeroelastic wing surfaces, on the research vehicle in modular fashion. Hi-MAT, which is scheduled to begin flight testing late

in 1978, is "expected to complete a full turn in about the time it takes the F-4 to perform a quarter turn, which means, of course, greatly enhanced maneuverability," according to Dr. Kramer.

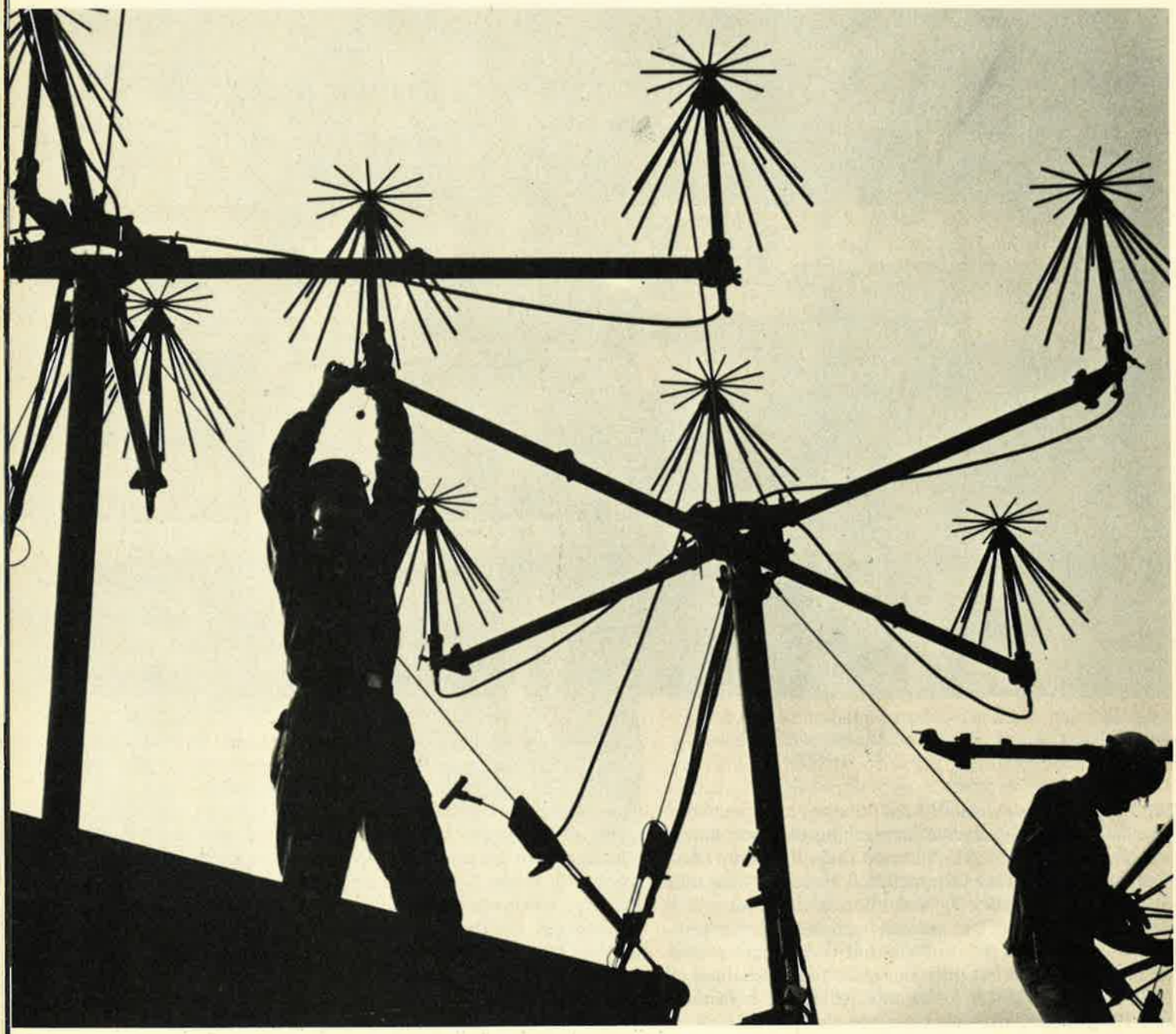
Other significant gains in aircraft maneuverability can be realized from modern nozzle designs, leading to both vectored and reversible thrust, Dr. Kramer said. Projects of this type are being carried out jointly with USAF and the US Navy. Side benefits of this technology, the NASA official said, could be a dramatic reduction in engine weight, complexity, and radar cross section.

Aeronautical advances, being pursued by NASA's 5,000-member aeronautics research staff to the tune of about $500 million annually, also point the way to significant improvements in military airlifters, he said. A potentially promising technology here is the "wing-loader concept," which envisions large transport aircraft with their cargo located in the wings as a means to neutralize wing-bending moments.

Significant gains in engine efficiency, especially through reduced fuel consumption, are being demonstrated in advanced, variable-cycle powerplants involving pressure ratios as high as forty to one, better combustion, and higher turbine inlet temperatures. A decrease in fuel consumption of between twelve and sixteen percent appears feasible, he said.

In the 1990s, the venerable turboprop transport can be expected to stage a major comeback, according to Dr. Kramer, with even better cruise efficiency in the high subsonic regime—about 0.8 Mach at 35,000 feet—through improved disk loading and propeller efficiency.

Other NASA aeronautical research programs, carried out by Boeing, Lockheed, and McDonnell Douglas, point the way toward sizable airframe weight reductions—



Radar maintenance crew of USAFE's 601st Tactical Control Wing work on FM transmitting antennas during a field deployment.

in the order of twenty-five percent—through advanced composite materials, the NASA official told the AFA Symposium.

Still further ahead are military and civilian transports using laminar-flow control techniques to delay separation of the airflow from the wing surface. These transports could have a range of about 10,000 nautical miles with a payload of some 300,000 pounds, Dr. Kramer said. The payoff would be a ten percent improvement in USAF's sixty-day airlift surge capability.

NASA's research in the V/STOL field does not support the notion that this technology is as yet ready for operational use. Much more work is required, he said.

The Logistics Challenge

"We would be unusually naïve to ignore the fact that the Soviets have specific plans to attack—besides the obvious tactical targets—ammunition storage areas, aircraft and electronics maintenance centers, and other logistical targets. In addition, we can be fairly sure that an early electromagnetic pulse (EMP) attack on logistical communications and automatic data processing equipment is highly probable," Gen. F. Michael Rogers, then the Commander of Air Force Logistics Command, told the AFA Symposium. Hardening logistics support facilities, such as POL storage sites and ammo dumps, and moving them further to the rear are now high-priority issues for NATO, he added. The former AFLC Commander was less concerned, however, about potential attacks by Soviet Intermediate-Range Ballistic Missiles such as the SS-20 on Western European port facilities, since in the case of nuclear theater war (by its nature relatively short-lived), the importance of sealift can be assumed negligible compared to airlift.

Logistical readiness of NATO's airpower must be improved in the areas of "War Readiness Materials and Peacetime Spares Support to provide sufficient wartime support to accommodate the increased surge expected under the NATO flexible response posture. Examining our air-to-air missile shortage, we find that with increased funding we may establish a limited exchangeable concept for missile spare motors and guidance systems," according to General Rogers.

Key steps toward improved logistics in Europe are the new AFLC liaison office in USAFE and an increase in third-echelon, depot-level maintenance performed in Europe, according to the former AFLC Commander. Conversely, he added, "we shall be doing more field-level, second-echelon maintenance in the depots, thereby extending operational availability by reducing field-level maintenance down-time."

Increased local depot overhaul of engines and aircraft becomes especially compelling, General Rogers said, because of the growing number of F100 engines in Europe, "both in USAFE's F-15s and F-16s as well as in F-16s belonging to the . . . European Participating Governments [EPG]. Consequently, we will probably find ourselves overhauling USAF engines in European facilities. . . . The likelihood of a USAF F-16 getting its Danish engine overhauled at Fabrique Nationale in Belgium is quite good." Over the long term, it also is probable that USAF depots will be maintaining European NATO aircraft, he said.

Predicting that the F-16—a "daring adventure in common defense"—will challenge USAF's management capabilities in a major way, he said, "When the first F-16s become operational in 1979, we shall incur a simultaneous demand on our support equipment and logistical capabilities from the Air Force, the EPG, and third-country customers. In fact, in the first eighteen months of operation we plan to deliver 220 aircraft to seven bases in six countries. Future third-country sales will compound that demand."

In anticipation of these heavy demands, "we already have a five-nation team at General Dynamics [the primary builder of the aircraft] in Fort Worth, Tex., provisioning spares and support equipment" on an equitable basis. Further, the five nations coproducing the F-16 (US, Denmark, Belgium, Netherlands, and Norway), are participating in a "multinational configuration control board to assure that all our systems stay alike over the lifespan of the F-16," according to General Rogers. F-16 spares will be offered for competitive procurement, with the "Buy American Act" waived "to allow European companies to compete for spares contracts, and EPG-based companies [urged to] compete on an equal basis with American firms for follow-on spares."

Top: OV-10, shown here at Sembach AB in Germany, is USAFE's principal FAC aircraft. Above: TAC's ability to reinforce USAFE is being exercised regularly, and includes deployment of A-7s.

These steps toward unifying alliance logistics, like other moves toward NATO standardization in operations and R&D, would seem in consonance with what emerged as the central mandate of the AFA Symposium: "Think NATO, don't think national." ■

ARMS CONTROL AND GRAY-AREA SYSTEMS

BY JACK H. HARRIS AND WILLIAM D. BAJUSZ

In arms control negotiations, gray-area systems should not be treated as small versions of SALT's central strategic weapons. Terms of reference need to be broadened and verification criteria modified, the authors believe.

READERS of AIR FORCE Magazine by now are familiar with the problems that cruise missiles, SS-20 ballistic missiles, and other "gray-area systems" have created for SALT negotiators. More than merely complicating SALT, the growing importance of these weapon systems seems to have paralyzed the strategic arms reduction process. This article suggests some reasons for their paralytic effect, some choices that must be made before real progress can resume, and a few reconsiderations that might be profitable during the hiatus.

There is nothing precise in the term "gray-area systems." The label has been applied under a wide variety of definitions. They are variously defined as noncentral systems that are strategically significant; theater systems that fill theater-strategic, rather than theater-tactical, roles; systems that have utility in both strategic and theater warfare; and those not included in SALT, but whose proliferation effectively would undermine SALT.

Whatever the definition, the same systems top everyone's gray-area list: the cruise missile, the SS-20 ballistic missile, and the Backfire and FB-111 bombers. These are by no means the only ones that fit the common definitions, but they dominate every gray-area discussion.

Others have argued that these systems, along with the next generation of their class, will revolutionize both strategic and theater warfare. That may be true. The authors would readily concede that these systems at least have added revolutionary elements to familiar concepts of warfare. But more interesting still is the way in which they may revolutionize arms control.

While there has been something of an *avant garde* aura associated with arms control, the fact is that our conceptual approach to the issue is deeply rooted in the most traditional principles of warfare. These principles, as we argue below, have been overturned by the emergence of gray-area systems.

The fact is that gray-area systems have some special properties. They are not just small versions of SALT's central systems, and to approach them as such is virtually to guarantee the kind of confusion that now surrounds SALT. They are different in many ways, each with its own compelling arguments for reconsidering our approach to arms control before limiting these systems according to the principles that have governed SALT.

The complexity of gray-area systems is such that all the dimensions of the problem cannot be treated in a short article. While we are aware of issues arising from the ease with which other nations can acquire these systems and the likelihood this will cloud future bilateral negotiations, we do not discuss them or other related issues here.

Instead, we have chosen to focus on two dimensions likely to bear importantly on arms control, irrespective of the forums in which gray-area systems are negotiated. Whether it be in SALT, MBFR, or a new TALT (Tactical Arms Limitation Talks) forum, *verification* and *measuring each side's capability* are likely to present special challenges. In both cases, continuation of some principles that have underlain SALT is likely to have adverse effects in negotiating worthwhile arms control agreements.

New Weapons and Fundamental Questions of Verification

US philosophy regarding verification may be thought of as the answers—explicit or implicit—to three fundamental questions:

- Must we possess the means to verify *before* we enter into an agreement?
- How confident must we be that we have verified compliance?
- What exactly shall we verify?

Over the past few years, these questions have occasionally been addressed explicitly, but the more important answers are the implicit ones embodied in actual performance—which has not always coincided with stated US policy.

1. Shall verification lead or lag?

Should we adhere to the principle that any arms control agreement must be thoroughly verifiable *before* we enter into it, or might we consider an agreement for

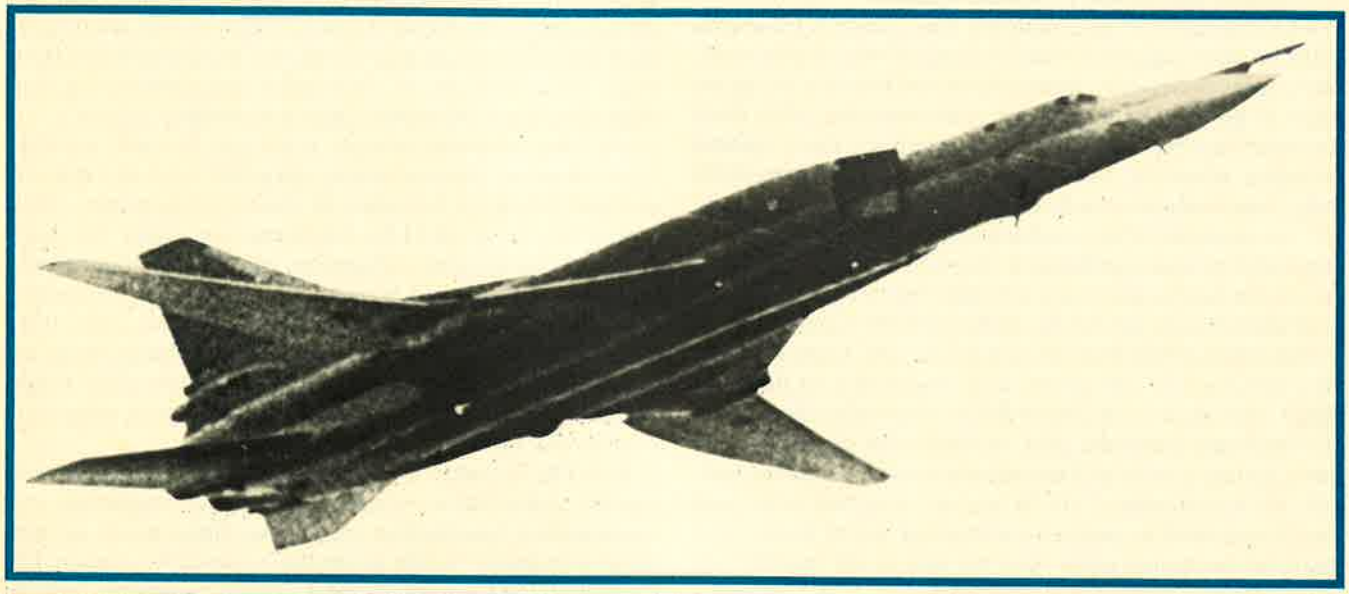
which we had no technical means of verification? SALT was forcefully shaped—and continues to be shaped—by our rigid adherence to the principle that verification must lead, that only unequivocally verifiable phenomena shall be used as the basis for negotiated controls.

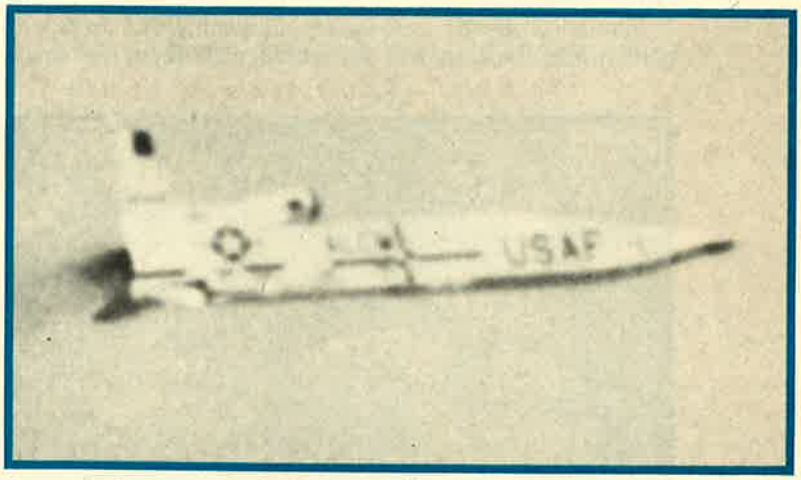
But the special nature of the gray-area systems, particularly the cruise missile, guarantees that if a SALT agreement incorporating these systems is reached, it will be concluded *without* the same provision for verification that has characterized our previous SALT agreements. There is not yet available the technical means to verify confidently the important characteristics of a cruise missile force; "verification," at least as we have known it, would have to lag behind an agreement.

The concealability and modular construction of the cruise missile defy confident measurement or enumeration, or even the verification of a given system's existence. Recent discussion has suggested that the US is considering two kinds of limitations on cruise missiles: range limitations, and limits on the number of missile-carrying platforms. In neither case could existing technical means of verification be relied upon. Similarly, given the fact that cruise missiles operate below the threshold for infrared sensors, we could not verify the testing of a new cruise missile. At least, we could not verify such things with the same level of confidence that we can count ICBM silos; but is that necessary?

2. What level of confidence constitutes "verification"?

In SALT, only the highest level of confidence has been accepted as verification. This has meant clear visual evidence, buttressed by reliable collateral sources of information. However, largely because of our choice of *what* to verify, this confidence is somewhat misplaced. If our goal in SALT is to limit Moscow's capacity to destroy us, then the things that we verify—*e.g.,* the number of launchers, or the types of missiles that have been tested with MIRV—are only the roughest approxi-





Three of the principal gray-area systems are the Soviet supersonic Tu-26 Backfire bomber (top); the US FB-111 bomber (left); and cruise missiles, the air-launched version of which is shown above, shortly after being launched from a B-52.

mators of the thing we wish to limit. What about system reliability, operationally ready rates, accuracy, and all the other variables that determine the actual capability of strategic forces? We simply don't treat those in our process of verification, and confidently verify something that only crudely approximates what we want to know.

The point here is not to criticize SALT's verification procedures, but rather to suggest that the lower standards of confidence which would attend gray-area verification are not necessarily much lower than SALT's standards, when the latter are viewed broadly. If we are committed to negotiated controls on these concealable, movable, mass-producible systems—with "verification"—then we must at least *consider* sources other than "national technical means" as our primary means of verification. The question we must answer is: Are we willing to rely on human-source intelligence, or signal intelligence, or even gentlemen's agreements to verify compliance with a cruise missile agreement?

3. What, specifically, shall be verified?

The essence of this question was alluded to above, when it was suggested that the things we verify—*e.g.,* silo counts—are only indirectly related to the thing we want to protect: our security. The selection of a basis for controls, be it number of weapons or their volume or other elements, represents concern with something truly fundamental—such as our adversary's ability to kill us—tempered by concessions to the problems of negotiability and verifiability. In other words, we have no choice but to settle upon some objective, empirically verifiable feature as the basis for negotiated controls.

But what shall that feature be in the case of gray-area systems? In one sense, it is reasonable to limit the range of a system and the number that might be thrown at you at any one time. But we could not possibly verify these features. A 2,000-km missile could be smaller than a 1,000-km missile, if the latter had a conventional and the former had a nuclear warhead of equal yield. And there is no conceivable way to count the number of cruise missiles inside a wide-body jet.

Similar problems attend the mobile ballistic missile: neither the location nor the number of these systems, nor any other important feature, except perhaps its tested range, could be verified. Of course, these discouraging comments are based upon the assumption of very high standards of confidence for verification. To the extent that standards are lowered, we may "verify" almost any of these now-elusive features.

Our present concepts regarding verification are incompatible with the idea of arms control measures for gray-area systems. We must either revise our principles of verification, or abandon the idea of negotiated, verified controls—at least for the cruise missile, if not for other gray-area systems. To the extent that we treat gray-area systems as little central systems, we will perpetuate the confusion and paralysis that this error has already brought to SALT.

Evaluating Gray-Area Systems for Arms Control

It is time to reevaluate the long-standing technical basis for arms negotiation. If we are to negotiate gray-area systems in a way that reinforces US deterrence and defense policy, thorough evaluation of their military uses is essential. Arms control measures that encompass gray-area systems must incorporate an explicit and thorough understanding of their roles and missions, a consideration that previously has not seemed critical.

As long as arms control remained focused on strategic weapons, there was little apparent need to explicitly evaluate weapons in terms of their employments, roles, and missions. In SALT, the focus was upon the attributes of the systems themselves, not on how they would be employed. US and Soviet differences in throw-weight, number of MIRVed launchers, and so on were deemed important because systems' attributes were assumed to be a reasonable indicator of how they would be employed. Capabilities and characteristics were surrogates for functions.

But the introduction of gray-area systems into arms control deliberations demands that we reappraise our fundamental assumption about the importance of systems' attributes. While attributes undeniably remain important, our examination must extend to greater consideration of roles and missions. At minimum we confront the uncertainty of whether the systems will be used in

The USSR has more and different theater systems than the US, including this Scaleboard missile with a 450-mile range.

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strategic or theater roles. While probably designed for theater use, Backfire, on a one-way mission, could strike the continental US. US nuclear-capable Forward-Based Systems (FBS), such as the F-111 fighter-bomber, have sufficient range to attack targets in the Soviet homeland.

But even if we have satisfied ourselves that either the SS-20 or the Backfire is really a theater system, we must probe deeper to determine how these systems will be used in the theater. In so doing, the assumption that a system's form equates with its function may prove invalid. US and Soviet theater force postures include quite different systems, implying that similar missions may be performed by different systems and similar systems need not perform the same missions.

There is a variety of possible applications of gray-area systems in the European theater. Small, discrete nuclear devices delivered by a gray-area system could be used at the Forward Edge of the Battle Area (FEBA) to blunt a Soviet combined arms offensive or break NATO's defense posture. High-yield weapons could be effective against deep rear-area targets located more than 100 kilometers from the FEBA. These can be mobile or fixed and include nuclear storage sites, airfields, command control and communications centers, major headquarters, nuclear delivery vehicles, and troops held in reserve.

US and Soviet nuclear weapons that could be used against these targets differ. On the US side, nuclear-capable artillery and short-range missiles provide a capability against targets near the FEBA. Tactical aircraft on Quick Reaction Alert (QRA) bear the brunt of both fixed and mobile rear-area target engagement. Only the longer-range Pershing ballistic missile and the SLBMs can augment tactical aircraft.

Though Soviet weapons also include Frontal Aviation's (FA) nuclear-capable fighter-bombers, similar to those in US and NATO forces, there are more and different systems augmenting FA than are available to US and NATO forces. Soviet Long Range Aviation (LRA), for example, composed of medium bombers such as the Badger and Blinder, could be used in the European theater. The same can be said about Soviet tactical surface-to-surface ballistic missiles, Scaleboard and Scud, and the Soviet M/IRBM force of SS-4s and SS-5s that will be modernized with the introduction of the mobile SS-20.

Soviet military writings suggest that the USSR indeed envisions employing its nuclear weapons in the theater quite differently from the US. While US tactical airpower is tasked against both mobile and fixed rear-area targets, Soviet writings state that FA and LRA aircraft will be used preponderately against mobile targets. The extensive array of ballistic missiles, including the M/IRBM gray-area systems, will be used against NATO fixed targets such as airfields and major headquarters. Tactical aircraft, bombers, and ballistic missiles will be used in an integrated operation—the Soviet combined arms offensive. While it might be argued that these Soviet military writings are propaganda intended for Western consumption, the consequences of merely imputing our values to the Soviets caution against arms control initiatives that do not consider possible US-Soviet differences in employing weapon systems as well as differences in force structure.

The reduction of physically similar systems may not reduce equally each side's capabilities. Is there any guarantee, for example, that reduction in US nuclear-capable fighter-bombers and Soviet FA aircraft will limit both sides' capabilities equally? Asymmetries in force postures coupled with doctrinal differences suggest not. While the US would lose a broad capability against fixed and mobile targets, the Soviet Union would lose a mobile target capability that would probably be redressed by reallocating existing LRA aircraft.

This suggests that gray-area systems be negotiated on the basis of their roles and missions in each side's force posture, not merely on the basis of similar physical attributes. To negotiate arms control measures that limit both sides' theater capabilities equally may require negotiating dissimilar systems that fulfill similar missions. Thus, US FBS might be traded for a Soviet gray-area system or systems that would reduce Soviet force capability in a similar way and by a similar amount.

Further, because of their unique capabilities, gray-area systems stand as a bridge between strategic and theater nuclear forces. Hence, their successful negotiation may also require a reexamination of the relationship between US strategic and theater nuclear forces.

Since the inception of the North Atlantic Treaty Organization, US policymakers have asserted that the US strategic forces provide a nuclear umbrella guaranteeing European security against Soviet aggression. Yet this concept of a "coupling" of strategic and theater forces was forged in an era of US strategic superiority and amended in a period of US nuclear "sufficiency." The implications of emerging strategic parity between the US and the Soviet Union may force a reexamination of the US strategic guarantee to Europe.

The role of gray-area systems in this coupling of forces is unclear. On the one hand, Soviet superiority in theater nuclear forces, enhanced by the introduction of the SS-20, may, combined with strategic parity, cast doubt on the continued viability of the US strategic guarantee.

Attempts to redress theater imbalances through the addition of more US gray-area systems might signal, perhaps falsely, that decoupling of strategic and theater forces has occurred in American deterrence policy. On the other hand, failure to redress the imbalance might weaken the US deterrent to Soviet attempts at political influence in Europe. The reactions of the West Europeans to a perceived decoupling of American forces or imbalance in US and Soviet forces further complicate the situation, creating strains in the Atlantic Alliance. Clearly, the issue of coupling in American deterrence policy may have an important bearing on the negotiations of US and Soviet gray-area systems. ■

The air defense function of Aerospace Defense Command has shrunk to a fraction of its once great capability. Some fundamental questions need to be answered as once again we find . . .

Air Defense at a Crossroads

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

BACK in the late 1950s, the air defense business was booming. There were, in 1958, sixty-two Air Force interceptor squadrons in the Air Defense Command, augmented by another forty-one in the Air National Guard. That same year Canada, with nine squadrons, joined us in forming the North American Air Defense Command—NORAD—an arrangement that has been carried on through a series of agreements. The present pact runs out in 1980 when, presumably, the two nations will once again renew it, but not, perhaps, perfunctorily. There may be some interesting discussions taking place beforehand in Ottawa, Colorado Springs, and Washington, for the air defense business is once more at a crossroads, as it was when ICBMs appeared.

Cheyenne Mountain looms over the golf courses of Colorado Springs's Broadmoor Hotel. The Will Rogers Memorial sits on a promontory of that mountain. Deep inside the mountain is NORAD's operational headquarters. It is an impressive and efficient place, with shock-resistant buildings resting on giant springs, instant communications to almost anywhere, and an unmistakable air of being ready for the worst. They keep track, in that mountain, of everything in space. Soviet missile shots are duly noted. Any missile launched toward North America would be picked up seconds after liftoff and the warning flashed to key points. It is all very reassuring to the throngs of tourists who are escorted through the tunnel maze, and so it should be. A few minutes' advance notice would give us time to get our retaliation under way, and that, after all, is the main idea of strategic deterrence.

The tourists also undoubtedly go away with the feeling that the skies are being watched and guarded against intrusion by unfriendly airplanes. Well, there is some watching, and some guarding, but it could be a pretty easy ride for any Soviet bomber crew whose curiosity about the United States prompted them to come in low for a look around. The military radars are down to a tiny fraction of the number we had in the 1950s, and the FAA radars are occupied with their own business. There are now only seven Air (or "Aerospace," as it's now called) Defense Command fighter squadrons, ten Air National Guard squadrons, and three Canadian. True, the Tactical Air Command does stand alert here and there, as in Florida, and it could quickly augment ADCOM in a pinch, always provided, of course, it were not otherwise engaged. And so, almost unnoticed, the great interceptor force of the 1950s has dwindled down close to the vanishing point. The question is, where does air defense go from here?

One obvious answer is to reorganize and give the interceptor job to Tactical Air Command. Offhand, that seems to make sense. After all, TAC has most of the fighter airplanes, and they can do the intercept job very nicely. The trouble with that arrangement is that it does not really solve anything; it just shifts the problem. Unless there is some determination made as to how much air defense coverage we want, or must have, then a reorganization would simply obscure things, or so it seems to me. Tactical forces will, under those conditions, remain first of all tactical forces, with the air defense job clearly secondary or worse.

Maybe it should be secondary. There is, after all, a limit to what we can afford, and providing the sort of air defense forces that we had in the '50s would be well outside any conceivable budget. Beyond that, there is still the argument, long a standby of the Office of the Secretary of Defense, that says it makes no sense to worry about defense against bombers if you cannot defend against the greater threat, the ICBMs. Yet it would be difficult for any responsible official, military or civilian, openly to write off the sovereignty of our airspace as too costly to defend.

Just to complicate things a little further, there would appear to be once more, if not still, a bomber threat as the Soviets steadily add swingwing Backfires to their force of Bears and Bisons. No one can guess with any certainty why the Soviets feel they need a new bomber, but it does, as we like to say of our own bombers, give them an option. As things stand now, it could be a fairly tempting option, if only to drop leaflets.

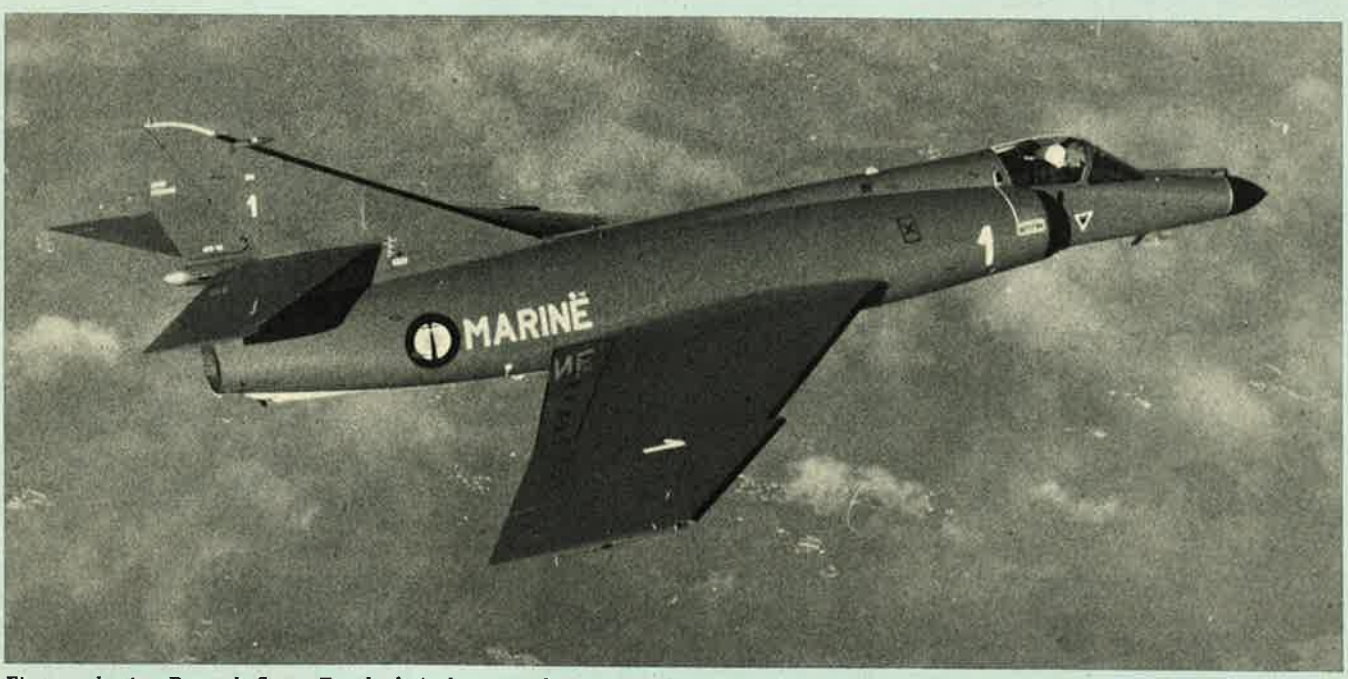
Interceptor flying, like any other military flying, takes skill and practice. Even the language used in intercepts, a curious mixture of nautical jargon and Battle of Britain expressions, takes a little learning. While modern fighters, like F-4s, F-15s, F-14s, and the still first-line F-106s, make the job easier than it was in the days of the F-86D, it is still no cinch to make a night identification run in bad weather. All of which is a roundabout way of saying that whoever has the job of air defense must train for it.

However, that agreed, we have yet to deal with the real problem, which is to determine how much policing of our own airspace we want to do. If that can be determined, the size of our active air defense forces—no squadrons, six squadrons, or some other number—can be determined on a logical basis, not, as has been the case for a long time, on simply a defense of what little is left.

Meanwhile, the Canadians are watching our next moves with deep interest. After years of floundering through unification of their armed forces, government indifference to defense, and inadequate budgets, Canada has finally taken a positive step. Their new fighter purchase is aimed at revitalizing Canada's role in both NORAD and NATO. They would like to be reassured that the senior partner in this continental air defense mission is still interested in denying any stranger a free ride. ■

JANE'S

ALL THE WORLD'S AIRCRAFT SUPPLEMENT



First production Dassault Super Etendard single-seat multi-mission fighter for the Aéronavale

DASSAULT-BREGUET

AVIONS MARCEL DASSAULT/BREGUET AVIATION; Head Office: 27 rue du Professeur Victor Pauchet, 92420-Vaucresson, France

To meet a French Navy requirement, Dassault is developing, and has begun series production of, an updated version of its Etendard IV-M carrier-based fighter which has served with the Navy's operational squadrons since 1962, and was last described in the 1965–66 *Jane's*. The airframe and equipment of the new version, known as the Super Etendard, were expected to be 90% common with those of the Etendard IV-M. In fact, the installation of a more powerful turbojet engine and equipment of enhanced capability, together with the adoption of improved aerodynamic features and modern manufacturing techniques, has made the Super Etendard 90% new.

DASSAULT SUPER ETENDARD

The Super Etendard is a transonic single-seat strike fighter, for low and medium altitude operations from ships in the class of the French Navy's *Clémenceau* and *Foch*. Its equipment includes a highly sophisticated and accurate nav/attack integrated electronic system. Inherent long range is increased by flight refuelling capability, and it is able to operate as a tanker for other aircraft.

The Atar 8K-50 turbojet engine is a non-afterburning version of the Atar 9K-50 used in the Mirage F1 multi-mission fighter and attack aircraft. It has a lower specific fuel consumption than the Atar 8 fitted in the Etendard IV-M. The thrust increase of about 10% allows a significant increase in gross weight for catapulting and, hence, permits an increased fuel load.

Two prototypes were produced by conversion of standard IV-M airframes. The first of these flew for the first time on 28 October 1974, and had logged a total of 620 flying hours in 520 flights by November 1977. Its programme has included engine development, to be followed this year by tests of the Super Etendard's external load-carrying capability, and firing trials of the Exocet AM39 air-to-surface anti-shipping missile.

The second prototype, which flew for the first time on 25 March 1975, has logged 420 hours in 390 flights, including tests of the Super Etendard's navigation system and bombing capabilities. Its future tasks will include shipboard operation under open-sea

conditions in waters other than the Mediterranean, where trials have taken place to date.

It was intended originally to build 75 production aircraft, but the number has been reduced to 71 in order to conform with budget limitations. The first aircraft came off the production line in November 1977 and flew on 24 November. Dassault expects to deliver 13 Super Etendards by the end of this year, another 22 in 1979, and all 71 by the Summer of 1981. The first aircraft will replace Etendard IV-Ms in current service with flottille 11F, based at Landivisiau. In 1979, the F-8E(FN) Crusaders of flottille 14F will be replaced at the same base, followed by flottille 17F, currently flying Etendard IV-Ms from Hyères.

TYPE: Single-seat transonic carrier-based strike fighter.

WINGS: Cantilever mid-wing monoplane. Anhedral 3° 30′. Sweepback at quarter-chord 45°. All-metal two-spar torsion-box structure; stressed skin of machined panels with integral stiffeners. Tips fold upward for carrier stowage. Inset ailerons, hydraulically-powered by Dassault irreversible dual circuits with artificial feel. Spoiler on top surface of each wing, ahead of special double-slotted flap with second slot in form of an integral 'gutter'. Powered drooping leading-edges, with extended chord on outer panels. No droop on leading-edge of folding tips.

FUSELAGE: All-metal semi-monocoque structure, 'waisted' in accordance with area rule. Perforated airbrake under each side of centre-fuselage.

TAIL UNIT: Cantilever all-metal structure, with tailplane mid-set on fin. All surfaces swept. All-moving tailplane and rudder are powered in same way as ailerons.

LANDING GEAR: Retractable tricycle type, with single wheel on each unit, manufactured by Messier-Hispano. Nosewheel retracts rearward, main units inward into fuselage. Messier-Hispano oleo-pneumatic shock-absorbers and disc brakes. Brake-chute in fairing at junction of fin and tailplane trailing-edges.

POWER PLANT: One SNECMA Atar 8K-50 non-afterburning turbojet, rated at 49 kN (11,025 lb st). Fuel in integral tanks in wings and fuselage, with total capacity of 3,900 litres (858 Imp gallons; 1,030 US gallons). Provision for an external tank of 1,100 litres (242 Imp gallons; 290 US gallons) under each wing, and a 600 litre (132 Imp gallon; 158 US gallon) centre-line tank under the fuselage. Retractable flight refuelling probe in front of windscreen.

ACCOMMODATION: Pilot only, on Hispano-built Martin-Baker lightweight ejection seat in pressurised and air-conditioned cockpit. Extensively armoured.

SYSTEMS: Duplicated hydraulic circuits for flying controls, landing gear, brakes, and wing leading-edge droop.

ELECTRONICS AND EQUIPMENT: SAGEM ETNA inertial navigation and attack system; Thomson-CSF/EMD Agave lightweight search/track/designation/telemetry/navigation radar; Thomson-CSF VE.120 head-up display; Crouzet Type 97 navigation display, armament control panel and selector box, and Type 66 air data computer; TRT radio altimeter; SFIM three-axis attitude indicator; and LMT Tacan.

ARMAMENT: Two DEFA 30 mm guns, each with 250 rds, in bottom of engine air intake trunks. Four underwing attachments for 400 kg bombs, Magic air-to-air missiles or rocket pods. Provision for carrying one Exocet AM39 air-to-surface missile under the starboard wing, and one external fuel tank under the port wing.

DIMENSIONS, EXTERNAL:

Wing span	9.60 m (31 ft 6 in)
Width, wings folded	7.80 m (25 ft 7 in)
Wing aspect ratio	3.23
Length overall	14.31 m (46 ft 11½ in)
Height overall	3.86 m (12 ft 8 in)
Wheel track	3.50 m (11 ft 6 in)
Wheelbase	4.80 m (15 ft 9 in)

AREA:

Wings, gross	28.5 m² (306.8 sq ft)

WEIGHTS:

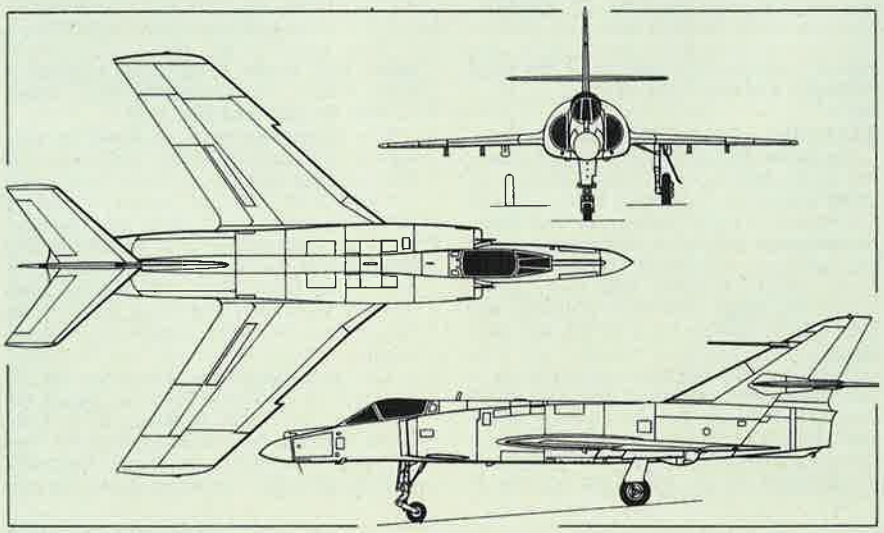
Weight empty	6,450 kg (14,220 lb)
Mission T-O weight	9,200–11,500 kg (20,280–25,350 lb)

PERFORMANCE (estimated):

Max level speed at height	approx Mach 1
Max level speed at low altitude	637 knots (1,180 km/h; 733 mph)
Approach speed for shipboard landing	135 knots (250 km/h; 155 mph)
Service ceiling	13,700 m (45,000 ft)
Radius of action, hi-lo-hi, with AM39 missile	350 nm (650 km; 403 miles)

Dassault Super Etendard prototype, photographed during deck landing trials

Dassault Super Etendard naval fighter (SNECMA Atar 8K-50 turbojet engine) (Pilot Press)



SSVV

SEZIONE SPERIMENTALE VOLO A VELA; Address: Viale delle Rimembranze 22, 20068 Linate Paese (Peschiera Borromeo), Italy

SSVV STINSON L-5 235 HP

During 1942–45, well over 3,000 L-5 Sentinel liaison aircraft were built in the USA by the Stinson Division of Consolidated Vultee Aircraft Corporation. Twenty years later, there were 81 L-5s registered in Europe, of which 75 were in Italy, and the L-5 is still used extensively in that country in the role of glider tug. In the early 1970s, SSVV was asked by the Aero Club Valle d'Aosta to produce a modified version of the Sentinel suitable for use at its airfield (which is situated in the Alps some 500 m; 1,640 ft above sea level) and capable of towing a 1,000 kg (2,205 lb) sailplane to an altitude of 1,000 m (3,280 ft).

The first 'Super Stinson' conversion was flown in the Spring of 1972, and trials with Blanik and suitably ballasted Calif A-21 sailplanes demonstrated a performance well in excess of that requested. This included the ability to climb at a rate of more than 120 m (394 ft)/min with a 1,000 kg glider

in tow, compared with the 60 m (197 ft)/min required by US regulation AC 43.13–2 CHG 5–Chapter 8, Section 1.

This reduction in aero-tow time, and corresponding reduction in fuel consumption (notwithstanding the higher-powered engine), led to requests by several other Italian gliding clubs for similar conversions, and by October 1977 a total of 10 such conversions had been flown. SSVV expects that, owing to the difficulty of obtaining spares for the L-5's original Lycoming O-435 engine, most of the remaining airworthy L-5s in Italy will eventually be converted to the new standard.

The basic modification involved in the Stinson L-5 235 hp conversion is replacement of the original 138 kW (185 hp) Lycoming O-435 engine with a 175 kW (235 hp) Lycoming O-540-B1A5 flat-six engine, driving a fixed-pitch propeller. The engine is supported on a new dynafocal mounting, and is enclosed by a new, fire-resistant glassfibre cowling fitted with a large controllable cooling gill. The fuel, lubrication, and electrical systems have been completely reworked, the fuel system to allow for uninterrupted flow in extreme attitudes, since the original gravity-feed system is no longer adequate at the steeper climbing angles of which the new version is capable.

TYPE: Two-seat glider towing and touring aircraft.

WINGS: High-wing braced monoplane. NACA 4412 wing section. Incidence 2°. Structure consists of spruce spars and ribs, steel tube compression struts, and internal wire bracing, with fabric covering. Leading-edge slots. Ailerons and slotted flaps on trailing-edges. Vee-type steel tube bracing strut on each side.

FUSELAGE: Welded steel tube structure with fabric covering.

TAIL UNIT: Cantilever unit. Framework of steel tube and wood, with fabric covering. Fin built integrally with fuselage. Fixed-incidence tailplane. Horn-balanced control surfaces, with trim tab in port elevator.

LANDING GEAR: Non-retractable cantilever type, with long-stroke oleo spring shock-absorbers on main units. Hydraulically operated main-wheel brakes. Castoring tailwheel, with leaf spring shock-absorber and self-centering damper.

POWER PLANT: One 175 kW (235 hp) Lycoming O-540-B1A5 flat-six engine, driving a Hoffmann two-blade fixed-pitch wooden propeller. (Use of a constant-speed propeller under study in late 1977, to improve cross-country and ferry performance.) Spinner optional. Fuel tank in each wing root.

ACCOMMODATION: Enclosed cabin seating two persons in tandem, with dual controls. Entire roof of cabin glazed. Two doors on starboard side. External rear-view mirror.

EQUIPMENT: SSVV aero-tow hook in tail-cone, stressed for max load of 2,000 kg (4,409 lb).

DIMENSIONS, EXTERNAL:

Wing span	10.36 m (34 ft 0 in)
Length:	
with spinner	7.49 m (24 ft 7 in)
without spinner	7.21 m (23 ft 7¾ in)
Height overall	2.16 m (7 ft 1 in)
Propeller diameter	2.20 m (7 ft 2½ in)

AREA:

Wings, gross	14.40 m² (155.0 sq ft)

WEIGHTS:

Weight empty	714 kg (1,574 lb)
Fuel	100 kg (220 lb)
Max T-O weight	1,021 kg (2,250 lb)

PERFORMANCE (at max T-O weight):

Max level speed at S/L
113 knots (209 km/h; 130 mph)

Stinson L-5 glider tug, re-engined by SSVV with a 175 kW (235 hp) Lycoming O-540

Max rate of climb at S/L
510 m (1,673 ft)/min

Rate of climb at 1,000 m (3,280 ft) with 520 kg (1,146 lb) glider
204 m (669 ft)/min

FMA

FÁBRICA MILITAR DE AVIONES (AREA DE MATERIAL CÓRDOBA); Address: Avenida Fuerza Aérea Argentina Km 5½, Córdoba, Argentine Republic

FMA IA 58 PUCARA

Design of this twin-turboprop counter-insurgency aircraft, to meet an Argentine Air Force requirement, began in August 1966. Known originally as the Delfin (Dolphin), it was later renamed Pucará after a type of stone fortress built by the early South American Indians. An unpowered aerodynamic prototype, which first flew on 26 December 1967, was described in the 1968–69 *Jane's*. The first powered prototype, designated A-X2, flew for the first time on 20 August 1969 with 674 kW (904 ehp) AiResearch TPE 331-U-303 turboprop engines, and was described in the 1971–72 *Jane's*. It was later redesignated AX-01.

A second prototype, designated AX-02, flew for the first time on 6 September 1970, powered by 761 kW (1,022 ehp) Turboméca Astazou XVI G turboprops. This power plant was adopted as standard for the production version, for which the prototype was the similarly-powered AX-03, first flown in mid-1973; the AX-01 also was re-engined with Astazou XVI Gs.

An initial order for 30 Pucarás was placed by the Argentine Air Force, and the first of these (A-501) flew for the first time on 8 November 1974. Ten Pucarás had been delivered by December 1977, and are now in service with the II Escuadron de Exploration y Ataque at Reconquista air base, with which the Pucará was deployed operationally in late 1976 against terrorist groups in north-western Argentina.

A further 15 Pucarás were ordered by the Argentine Air Force in 1977, and at the end of that year output was at the rate of one per month, with plans to increase this to one and a half per month in early 1978. The Argentine Air Force expects to have two squadrons fully equipped with the Pucará by the end of 1978, and has an eventual requirement for 100 of these aircraft. The purchase of a small number (reportedly three) was under consideration in late 1977 by the Mauritanian Islamic Air Force.

TYPE: Twin-turboprop counter-insurgency aircraft.

WINGS: Cantilever low-wing monoplane. Wing section NACA 64_2A215 at root, NACA 64_1A212 at tip. Dihedral 7° on outer panels. Incidence 2°. No sweepback.

IA 58 Pucará for the Argentine Air Force, carrying underwing and underfuselage weapons

Conventional semi-monocoque fail-safe structure of duralumin. Frise-type fabric-covered duralumin ailerons, and all-dural slotted trailing-edge flaps, actuated by pushrods. No slats. Balance tab in starboard aileron; electrically-operated trim tab in port aileron. Kléber-Colombes pneumatic de-icing boots on leading-edges.

FUSELAGE: Conventional semi-monocoque fail-safe structure, with duralumin frames and stringers.

TAIL UNIT: Cantilever semi-monocoque structure of duralumin. Fixed-incidence tailplane and elevators mounted near top of fin. Rudder and elevators actuated by pushrods, and each fitted with inset trim tab. Kléber-Colombes pneumatic de-icing boots on leading-edges.

LANDING GEAR: Retractable tricycle type. All units retract forward hydraulically, steerable nose unit into fuselage, main units into engine nacelles. Shock-absorbers of Kronprinz Ring-Feder type, designed by Vicecomodoro Ruiz. Single wheel on nose unit, twin wheels on main units, all with Dunlop tubeless Type III tyres size 7.50-10. Tyre pressures: 2.82 bars (41 lb/sq in) on main units, 2.41 bars (35 lb/sq in) on nose unit. Dunlop hydraulic disc brakes on main units. No anti-skid units.

POWER PLANT: Two 761 kW (1,022 ehp) Turboméca Astazou XVI G turboprop engines, each driving a Hamilton Standard 23LF/1015-0 three-blade metal propeller with spinner. Fuel in two fuselage tanks (total 800 litres; 176 Imp gallons) and one 230 litre (50.5 Imp gallon) self-sealing tank in each wing, giving overall internal capacity of 1,260 litres (277 Imp gallons). Refuelling point on top of fuselage aft of cockpit. Fuel system includes provision for up to 30 sec of inverted flight. A long-range auxiliary tank, capacity 1,130 litres (248.5 Imp gallons), can be attached to the fuselage centreline pylon, and a 300 litre (66 Imp gallon) auxiliary tank on each underwing pylon. Max internal and external fuel load 2,990 litres (657.5 Imp gallons). Oil capacity 11.75 litres (2.6 Imp gallons).

ACCOMMODATION: Pilot and co-pilot in tandem, on Martin-Baker Mk AP06A zero-zero ejection seats, beneath transparent moulded canopy which is hinged at rear and opens upwards. Rear seat elevated 25 cm (9.8 in) above front seat. Bulletproof windscreen, with wiper. Dual controls standard.

SYSTEMS: Hydraulic system, pressure 207 bars (3,000 lb/sq in), supplied by two engine-driven pumps, actuates landing gear, flaps, and wheel brakes. Wing and tail unit de-icing by engine bleed air. Electrical system includes two 28V 300A starter/generators for DC power and three 500/750VA static inverters for 115/200V AC power. One 24V 36Ah SAFT Voltabloc 4006 battery. No APU. Liquid oxygen bottle.

ELECTRONICS AND EQUIPMENT: Blind-flying instrumentation standard. Electronics include Bendix DFA-73A-1 ADF, Bendix RTA-42A VHF com, Bendix RNA-2bc VHF nav, Northern N-420 HF/SSB com, amplifier, and audio-selector system with AS-A-31 panel. Optional electronics include weather radar, IFF, and VHF/FM tactical communications system. Landing/taxying light in leading-edge of each underwing pylon.

ARMAMENT AND OPERATIONAL EQUIPMENT: Two 20 mm Hispano HS-804 cannon, each with 270 rds, in underside of forward fuselage; and four 7.62 mm FN-Browning machine-guns, each with 900 rds, in sides of fuselage abreast of cockpit. Aero 7A-1 pylon on centreline beneath fuselage, capacity 1,000 kg (2,205 lb). Aero 20A-1 pylon, capacity 500 kg (1,102 lb), beneath each wing outboard of engine nacelle. Total external stores load 1,620 kg (3,571 lb), including gun and rocket pods, bombs, or auxiliary fuel tanks. Matra 83-4-3 reflector gunsight and AN/AWE-1 programmer.

Production prototype of the FMA IA 58 Pucará landing after its demonstration at the 1977 Paris Air Show (Martin Fricke)

DIMENSIONS, EXTERNAL:

Wing span	14.50 m (47 ft 6¾ in)
Wing chord at root	2.24 m (7 ft 4¼ in)
Wing chord at tip	1.60 m (5 ft 3 in)
Wing aspect ratio	6.95
Length overall	14.25 m (46 ft 9 in)
Length of fuselage	13.32m (43 ft 8½ in)
Fuselage: Max width	1.24 m (4 ft 0¾ in)
Height overall	5.36 m (17 ft 7 in)
Tailplane span	4.70 m (15 ft 5 in)
Wheel track (c/l of shock-absorbers)	4.20 m (13 ft 9¼ in)
Wheelbase	3.48 m (11 ft 5 in)
Propeller diameter	2.59 m (8 ft 6 in)

DIMENSIONS, INTERNAL:

Cabin: Floor area	2.90 m² (31.2 sq ft)
Volume	2.74 m³ (96.8 cu ft)

AREAS:

Wings, gross	30.30 m² (326.1 sq ft)
Ailerons (total)	3.29 m² (35.41 sq ft)
Trailing-edge flaps (total)	3.58 m² (38.53 sq ft)
Fin	3.465 m² (37.30 sq ft)
Rudder, incl tab	1.565 m² (16.84 sq ft)
Tailplane	4.60 m² (49.51 sq ft)
Elevators, incl tabs	2.612 m² (28.11 sq ft)

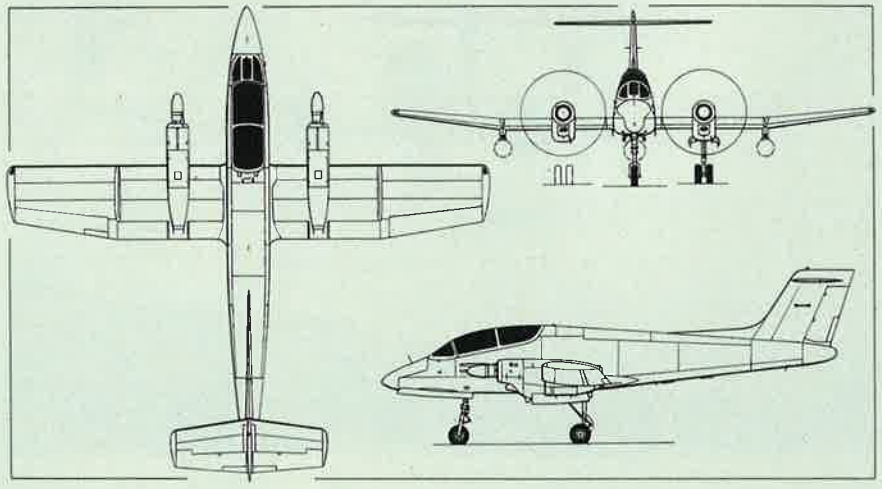
WEIGHTS AND LOADINGS:

Weight empty, equipped	4,037 kg (8,900 lb)
Max T-O weight	6,800 kg (14,991 lb)
Max landing weight	5,806 kg (12,800 lb)
Max wing loading	224.4 kg/m² (46 lb/sq ft)
Max power loading	4.46 kg/kW (7.3 lb/ehp)

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

Never-exceed speed	404 knots (750 km/h; 466 mph)
Max level speed at 3,000 m (9,845 ft)	270 knots (500 km/h; 310 mph)
Max cruising speed at 6,000 m (19,685 ft)	259 knots (480 km/h; 298 mph)
Econ cruising speed	232 knots (430 km/h; 267 mph)
Stalling speed, flaps and landing gear up	68 knots (125 km/h; 78 mph)
Stalling speed, flaps and landing gear down, at 4,790 kg (10,560 lb) gross weight	77.5 knots (142.5 km/h; 89 mph)
Max rate of climb at S/L	1,080 m (3,543 ft)/min
Service ceiling	10,000 m (32,810 ft)
Service ceiling, one engine out	6,000 m (19,685 ft)
T-O run	300 m (985 ft)

FMA IA 58 Pucará twin-turboprop counter-insurgency aircraft (Pilot Press)



T-O to 15 m (50 ft) 705 m (2,313 ft)
Landing from 15 m (50 ft) at 5,100 kg (11,243 lb) gross weight 603 m (1,978 ft)
Landing run at 5,100 kg (11,243 lb) gross weight 200 m (656 ft)
Range with max fuel at 5,000 m (16,400 ft) 1,641 nm (3,042 km; 1,890 miles)
g limits +6; −3

SILVERCRAFT

SILVERCRAFT SpA; Head Office and Works: Strada del Sempione 114, Casella Postale 37, 21018 Sesto Calende (Varese), Italy

SILVERCRAFT SH-200

The SH-200 is a two-seat light helicopter suitable for pilot training, utility, agricultural, survey, police, ambulance, liaison, and observation duties. It was developed to supersede the SH-4 (1976–77 *Jane's*), and construction of the first of three prototypes began in September 1976. This aircraft (I-SILD) flew for the first time on 12 April 1977; it is hoped to obtain certification by June 1978.

TYPE: Two-seat light helicopter.

ROTOR SYSTEM: Two-blade semi-rigid main and tail rotors. Blades of both rotors are of glassfibre-reinforced plastics; those of main rotor are non-folding. No rotor brake fitted.

ROTOR DRIVE: Rotors driven by Synchroflex timing belt through main gearbox and tail gearbox of bevel gear type. Main rotor/engine rpm ratio 418:2,950. Tail rotor/engine rpm ratio 2,650:2,950.

FUSELAGE: Fail-safe structure of aluminium honeycomb panels and glassfibre nose section.

TAIL UNIT: Fixed-incidence tailplane of glassfibre and Nomex honeycomb.

LANDING GEAR: Tubular skid type.

POWER PLANT: One 153 kW (205 hp) Lycoming LHIO-360-C1A flat-four engine. Fuel in two aluminium alloy tanks, with total capacity of 130 litres (28.6 Imp gallons). Refuelling point on each side of fuselage. Oil capacity 8 litres (1.75 Imp gallons).

ACCOMMODATION: Seats for pilot and one passenger side by side. Baggage compartment. Cabin heated and ventilated.

SYSTEMS: 12V electrical system includes alternator and 37Ah battery.

OPTIONAL EQUIPMENT: Narco Com 11A radio.

DIMENSIONS, EXTERNAL:
Diameter of main rotor 9.03 m (29 ft 7½ in)
Diameter of tail rotor 1.39 m (4 ft 6¾ in)
Length overall, main rotor fore and aft 10.47 m (34 ft 4¼ in)

DIMENSIONS, INTERNAL:
Cabin:
Length 1.72 m (5 ft 7½ in)
Max width 1.39 m (4 ft 6½ in)
Max height 1.20 m (3 ft 11¼ in)

AREAS:
Main rotor blades (each) 1.17 m² (12.61 sq ft)
Tail rotor blades (each) 0.09 m² (0.97 sq ft)
Main rotor disc 64.04 m² (689.32 sq ft)
Tail rotor disc 1.52 m² (16.32 sq ft)

WEIGHTS:
Weight empty 495 kg (1,091 lb)
Max payload 250 kg (551 lb)
Max T-O weight (Normal) 862 kg (1,900 lb)

PERFORMANCE (estimated, at max T-O weight):
Max level speed at S/L 87 knots (161 km/h; 100 mph)

Silvercraft SH-200 two-seat light helicopter (Lycoming LHIO-360 engine)

Max cruising speed at S/L 54 knots (100 km/h; 62 mph)
Econ cruising speed at S/L 42 knots (78 km/h; 48.5 mph)
Max rate of climb at S/L 360 m (1,180 ft)/min
Service ceiling 4,265 m (14,000 ft)
Hovering ceiling out of ground effect 2,255 m (7,400 ft)
Range with max fuel 191 nm (354 km; 220 miles)

IAI

ISRAEL AIRCRAFT INDUSTRIES LTD; Head Office and Works: Ben-Gurion International Airport, Lydda (Lod), Israel

IAI ARAVA

The Arava was designed to fulfil the need for a light transport with STOL performance and rough-field landing capabilities. Design started in 1966, and construction of a prototype began towards the end of the same year. This airframe was used for structural testing; it was followed by a flying prototype (4X-IAI), which made its first flight on 27 November 1969. A second Arava (4X-IAA) began flight trials on 8 May 1971.

The following versions have been announced:

IAI 101. Civil transport version, certificated by FAA in April 1972.

IAI 102. Civil transport version, based on original IAI 101, certificated by Israel Civil Aviation Administration in April 1976. This version can accommodate 20 passengers in airline-standard four-abreast configuration, or 18 passengers with toilet. It is available also in a VIP configuration for up to 12 passengers, as a medical clinic for flying doctor services, and in versions for mapping, mining research, rainmaking, and bridge construction, as flying laboratories for agriculture and health ministries, and for supplying oil prospecting units.

IAI 201. Military transport version, based upon the original IAI 101. A prototype (4X-IAB) began its flight tests on 7 March 1972, and this version is now in full production. The standard equipment available for the IAI 201 enables a wide variety of missions to be undertaken, and in 1977 IAI announced a version suitable for maritime surveillance duties, fitted with either an AD-9 modification to extend the range and detection capability of the standard search/weather radar, or a more advanced detection system.

IAI 202. Modified version, flight tested between mid-1976 and Spring 1977. The prototype (4X-IAO) had then flown some 75 hours and had demonstrated a 20% reduction in induced drag for only a very small trim drag penalty. It differs from the other Arava versions principally in having a fully 'wet' wing, containing approx 726 kg (1,600 lb) more fuel, fitted with endplate surfaces ('winglets') of Whitcomb profile at the wingtips and a boundary layer fence just inboard of each tip. Other features include 559 kW (750 shp) Pratt & Whitney Aircraft of Canada PT6A-36 turboprop engines, and a single-point pressure refuelling system. Performance has proved to be generally equal to that of the standard Arava, but at a max T-O weight nearly 907 kg (2,000 lb) heavier, and certification at a max T-O weight of approx 7,643 kg (16,850 lb) is anticipated. The winglet modification (but not the increased fuel capacity) is available as a retrofit modification of existing Aravas.

Prior to the October 1973 war 15 military Aravas had been ordered, 14 of them for export. During that conflict three Aravas were lease-operated by the Israeli Air Force.

Sales of the Arava had reached more than 60 by late 1977, of which more than 50 had been delivered. Customers include the Israeli Air Force (14), Bolivian Air Force (6), Ecuadorean Army (6) and Navy (3), Guatemalan Air Force (10), Honduran Air Force (3), Mexican Air Force (more than 10), Nicaraguan Air Force (2), and Salvadorean Air Force (5). Production of the Arava continued during 1977 at the rate of two to three per month.

The following description applies to the IAI 201, except where indicated otherwise:

TYPE: Twin-turboprop STOL light military transport.

WINGS: Braced high-wing monoplane, with single streamline-section bracing strut each side. Wing section NACA 63(215)A 417. Dihedral 1° 30′. Incidence 0° 27′. No sweepback. Light alloy two-spar torsion-box structure. Frise-type light alloy ailerons. Electrically-operated double-slotted light alloy flaps. Scoop-type light alloy spoilers, for lateral control, above wing at 71% chord. Electrically-actuated trim tab in port aileron.

FUSELAGE: Conventional semi-monocoque light alloy structure of stringers, frames, and single-skin panels.

TAIL UNIT: Cantilever light alloy structure, with twin fins and rudders, carried on twin booms extending rearward from engine nacelles. Fixed-incidence tailplane. Geared tab and electrically-actuated trim tab in elevator and geared trim tab in each rudder. Tailbooms are built by RAMTA.

LANDING GEAR: Non-retractable tricycle type, of Electro-Hydraulics manufacture, with single main wheels and single steerable nosewheel. Main wheels carried on twin struts, incorporating oleo-pneumatic shock-absorbers. Main wheels size 11.00-12, tyre pressure 3.31 bars (48 lb/sq in); nosewheel size 9.00-6, tyre pressure 2.90 bars (42 lb/sq in). Disc brakes on main units.

POWER PLANT: Two 559 kW (750 shp) Pratt & Whitney Aircraft of Canada PT6A-34 turboprop engines (PT6A-36 in IAI 202), each driving a Hartzell HC-B3TN three-blade hydraulically-actuated fully-feathering reversible-pitch metal propeller. Electrical de-icing of propellers optional. Two integral fuel tanks in each wing, with total usable capacity (except IAI 202) of 1,663 litres (366 Imp gallons). Four overwing refuelling points.

LEFT ABOVE: IAI 201 military version of the Arava, with fuselage-side gun packs and pylons for rocket launchers (Brian M. Service)
RIGHT ABOVE: Prototype IAI 202 Arava, with auxiliary winglets and PT6A-36 engines

Optional pressure refuelling point (standard on IAI 202) in fuselage/strut fairing. Two cabin-mounted tanks, each of 1,022 litres (225 Imp gallons), are available optionally for self-ferry flights.

ACCOMMODATION: Crew of one or two on flight deck, with door on starboard side. Main cabin of IAI 101 has folding inward-facing metal-framed fabric seats along each side, and can accommodate 20 civilian passengers. IAI 201 has similar seating for 24 fully-equipped troops or 17 paratroops and a dispatcher. IAI 102 has airline-type seating for up to 20 passengers. Outward-opening door at rear of cabin, opposite which, at floor level, is an emergency exit door/cargo door on the starboard side. Rear doors are built by RAMTA. Aft section of fuselage is hinged to swing sideways through more than 90° to provide unrestricted access to main cabin. Alternative interior configurations available for ambulance role (12 stretchers, and two sitting patients or medical attendants); as all-freight transport carrying (typically) a Jeep-mounted recoil-less rifle and its four-man crew; or as a maritime patrol aircraft fitted with search radar and other special equipment.

SYSTEMS: Hydraulic system (pressure 172 bars; 2,500 lb/sq in) for brakes and nose-wheel steering only. Electrical system includes two 28V 170A DC engine-driven starter/generators, a 28V 40Ah nickel-cadmium battery, and two 250VA 115/26V 400Hz static inverters.

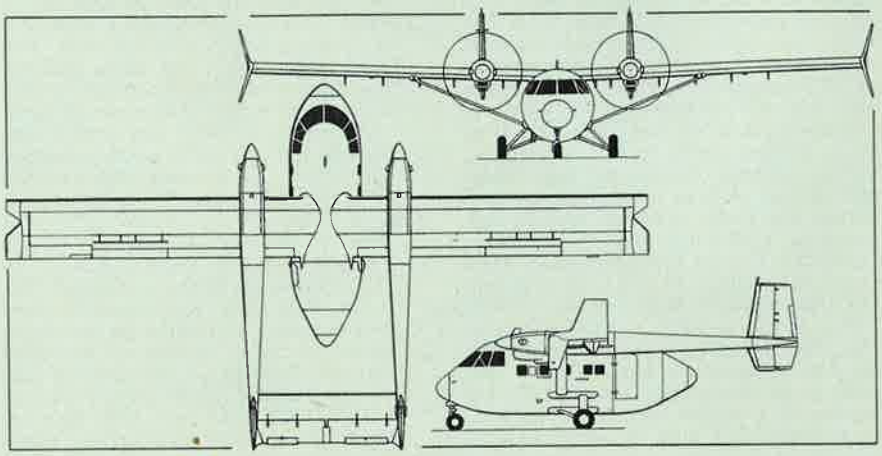
ELECTRONICS AND EQUIPMENT: Blind-flying instrumentation standard. Optional electronics include VHF, VOR/ILS, ADF, marker beacon, and PA system.

ARMAMENT: Optional 0.50 in Browning machine-gun pack on each side of fuselage, above a pylon for a pod containing six 82 mm rockets. Provision for an aft-firing machine-gun. Librascope gunsight.

DIMENSIONS, EXTERNAL:

Wing span	20.96 m (68 ft 9 in)
Wing chord (constant)	2.09 m (6 ft 10½ in)
Wing aspect ratio	10
Length overall	13.03 m (42 ft 9 in)
Length of fuselage pod	9.33 m (30 ft 7 in)
Diameter of fuselage	2.50 m (8 ft 2 in)
Height overall	5.21 m (17 ft 1 in)
Tailplane (c/l of tailbooms)	5.21 m (17 ft 1 in)
Wheel track	4.01 m (13 ft 2 in)
Wheelbase	4.62 m (15 ft 2 in)
Propeller diameter	2.59 m (8 ft 6 in)
Propeller ground clearance	1.75 m (5 ft 9 in)
Crew door (fwd, stbd):	
Height	0.93 m (3 ft 0½ in)
Width	0.48 m (1 ft 7 in)
Passenger door (rear, port):	
Height	1.57 m (5 ft 2 in)
Width	0.62 m (2 ft 0½ in)
Cargo drop door (rear, port):	
Height	1.75 m (5 ft 9 in)
Width	2.33 m (7 ft 8 in)
Emergency/baggage door (rear, stbd):	
Height	1.12 m (3 ft 8 in)
Width	0.61 m (2 ft 0 in)
Emergency window exits (each):	
Height	0.66 m (2 ft 2 in)
Width	0.48 m (1 ft 7 in)

IAI 202 Arava twin-turboprop STOL light transport (Pilot Press)



DIMENSIONS, INTERNAL:

Cabin, excl flight deck and hinged tailcone:	
Length	3.87 m (12 ft 8 in)
Max width	2.33 m (7 ft 8 in)
Max height	1.75 m (5 ft 9 in)
Floor area	7.16 m² (77.0 sq ft)
Volume	12.7 m³ (449.2 cu ft)
Baggage compartment volume	2.60 m³ (91.8 cu ft)
Cargo door volume	3.20 m³ (113.0 cu ft)

AREAS:

Wings, gross	43.68 m² (470.2 sq ft)
Ailerons (total)	1.75 m² (18.84 sq ft)
Trailing-edge flaps (total)	8.80 m² (94.72 sq ft)
Spoilers (total)	0.85 m² (9.20 sq ft)
Fins (total)	4.86 m² (52.31 sq ft)
Rudders (total incl tabs)	3.44 m² (37.03 sq ft)
Tailplane	9.36 m² (100.75 sq ft)
Elevator, incl tabs	2.79 m² (30.03 sq ft)

WEIGHTS AND LOADINGS:

Basic operating weight	3,999 kg (8,816 lb)
Max payload	2,351 kg (5,184 lb)
Max T-O and landing weight	6,803 kg (15,000 lb)
Max zero-fuel weight	6,350 kg (14,000 lb)
Max wing loading	153.5 kg/m² (31.44 lb/sq ft)
Max power loading	6.08 kg/kW (10.00 lb/shp)

PERFORMANCE (at max T-O weight):

Never-exceed speed	215 knots (397 km/h; 247 mph)
Max level speed at 3,050 m (10,000 ft)	176 knots (326 km/h; 203 mph)
Max cruising speed at 3,050 m (10,000 ft)	172 knots (319 km/h; 198 mph)
Econ cruising speed at 3,050 m (10,000 ft)	168 knots (311 km/h; 193 mph)
Stalling speed, flaps up	75 knots (140 km/h; 87 mph)
Stalling speed, 54° flap	62 knots (115 km/h; 71.5 mph)
Max rate of climb at S/L	393 m (1,290 ft)/min
Rate of climb at S/L, one engine out	55 m (180 ft)/min
Service ceiling	7,620 m (25,000 ft)
Service ceiling, one engine out	2,375 m (7,800 ft)
STOL T-O run	293 m (960 ft)
STOL T-O to 15 m (50 ft)	463 m (1,520 ft)
STOL landing from 15 m (50 ft)	469 m (1,540 ft)
STOL landing run	250 m (820 ft)
Range with max payload, 45 min reserves	151 nm (280 km; 174 miles)
Range with max fuel, 45 min reserves	705 nm (1,306 km; 812 miles)

PERFORMANCE (IAI 202 at max T-O weight):
Range with max payload of 2,449 kg (5,400 lb) 430 nm (797 km; 495 miles)
Range with payload of 1,587 kg (3,500 lb) 900 nm (1,668 km; 1,036 miles)
Max endurance 9 hr

PIPER

PIPER AIRCRAFT CORPORATION; Head Office and Works: Lock Haven, Pennsylvania 17745, USA

PIPER PA-38 TOMAHAWK

Piper's new PA-38 Tomahawk two-seat trainer, announced on 15 October 1977, is claimed to embody the opinions and suggestions of more than 10,000 flying instructors who were asked to describe "the ideal trainer". First aircraft in its class to meet all requirements of the FAA's FAR 23, Amendment 16, it is approved in both Normal and Utility categories, and for aerobatic spins, with no change in gross weight or CG envelope.

The Tomahawk has a T-tail configuration to enhance stability, with minimal pitch change at any speed, and to provide more positive rudder control as a result of the tailplane's endplate effect. The cantilever wing utilises an adaptation of NASA's Whitcomb aerofoil, providing substantial improvements in lift/drag coefficient compared with traditional sections, as well as reliable stall characteristics. A bubble canopy offers full 360° visibility from the side-by-side seats. Maintenance is simplified by removable fuselage side panels which give access to the instruments, radios, and control systems; use of interchangeable components such as port and starboard main landing gears, main and nose wheels, and port and starboard elevators; an engine cowling which can be detached completely without need to remove the propeller; and the use of factory-installed electronics packages which have a two-year or 2,000-hour warranty.

TYPE: Two-seat primary training aircraft.

WINGS: Cantilever low-wing monoplane. Modified NASA Whitcomb wing section. Conventional light alloy structure of constant chord, with constant section from root to tip. Plain ailerons. Three-position manually-actuated trailing-edge flaps, with max deflection of 30°.

FUSELAGE: Light alloy structure, with conventional semi-monocoque rear fuselage.

TAIL UNIT: Cantilever T-tail of light alloy construction, with swept vertical surfaces. Elevators interchangeable. Elevator trim system. Ground-adjustable rudder trim tab.

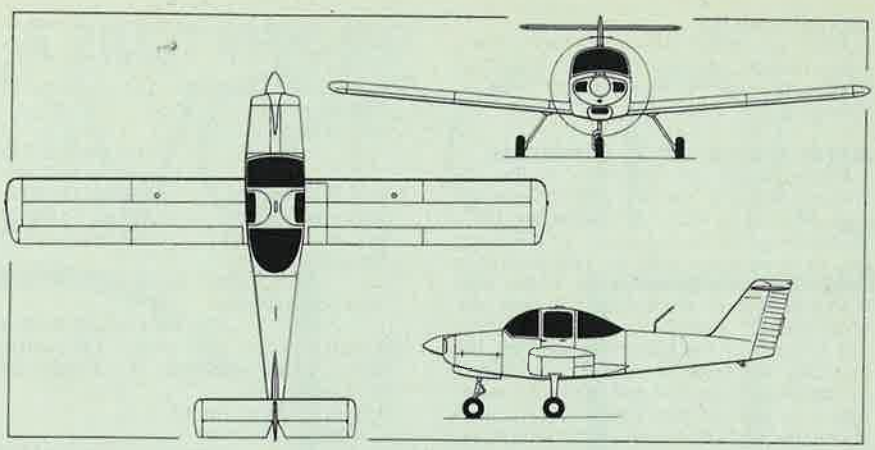
LANDING GEAR: Non-retractable tricycle type. Main wheels carried on spring steel cantilever legs which are interchangeable. Castoring nosewheel unit, with oleo-pneumatic shock-absorber. Nosewheel and main wheels interchangeable, each with 5.00-5 4-ply tyre. Combination handbrake/parking brake. Optional dual toe-operated hydraulic brakes.

POWER PLANT: One 83.5 kW (112 hp) Lycoming O-235-L2C flat-four engine, driving a Sensenich two-blade metal fixed-pitch propeller with metal spinner. Integral fuel tank in each wing; total fuel capacity 121 litres (32 US gallons), of which 113.5 litres (30 US gallons) are usable. Refuelling point in upper surface of each wing. Oil capacity 5.7 litres (1.5 US gallons).

ACCOMMODATION: Two seats side by side in enclosed cabin, with dual controls. Seats are adjustable fore and aft, and vertically, on inclined track. Safety belts and shoulder harness standard. High-strength roll-over structure. Seatbacks fold forward for access to baggage area, capacity 45 kg (100 lb). Door each side. Cabin heated and ventilated. Windscreen defroster.

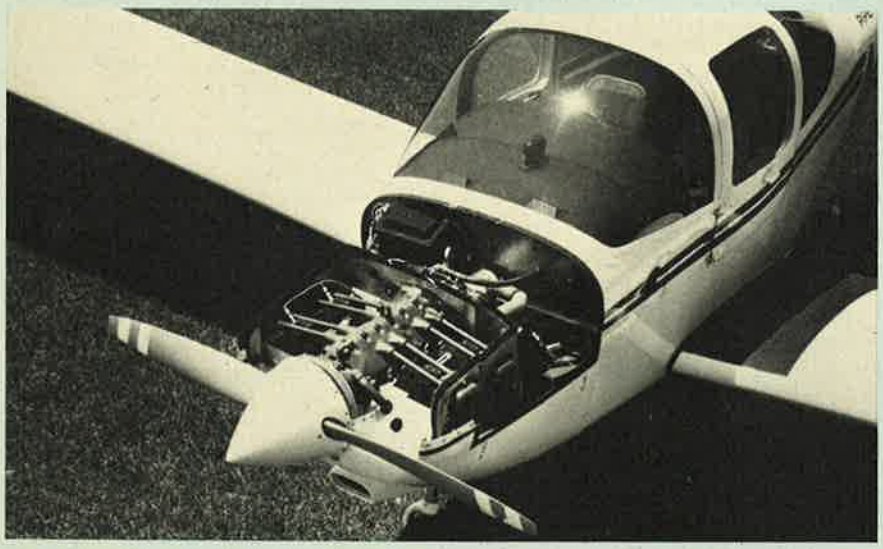
SYSTEM: Electrical system includes 12V 60A alternator and 12V 25Ah battery.

ELECTRONICS AND EQUIPMENT: Optional items include nine factory-installed electronics packages by Collins, King, and Narco, ranging from basic nav/com to full IFR equipment, and automatic locator beacon. Standard equipment includes electric starter, full-flow oil filter, quick oil drain, sensitive altimeter, audible stall warning device, alternator warning light, instrument panel glareshield, tinted rear window, interior soundproofing, carpeted floor, baggage tie-down straps, and wing and tail tie-down rings. Optional equipment includes rearview mirror, tinted windscreen and side windows, sun visors, variable-intensity panel lights, overhead floodlight, cabin dome light, navigation lights, wingtip strobe lights, landing light, and cabin steps.



Piper PA-38 Tomahawk two-seat primary trainer (Pilot Press)

The Tomahawk's engine cowling is designed to detach with the propeller in place



DIMENSIONS, EXTERNAL:

Wing span	10.36 m (34 ft 0 in)
Length overall	7.04 m (23 ft 1¼ in)
Height overall	2.63 m (8 ft 7½ in)
Wheel track	3.05 m (10 ft 0 in)
Wheelbase	1.40 m (4 ft 7 in)
Propeller diameter	1.83 m (6 ft 0 in)

DIMENSIONS, INTERNAL:

Cabin: Length	1.74 m (5 ft 8½ in)
Max width	1.07 m (3 ft 6 in)
Max height	1.28 m (4 ft 2½ in)
Baggage volume	0.57 m³ (20 cu ft)

AREA:

Wings, gross	11.61 m² (125 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	483 kg (1,064 lb)
Max T-O weight	757 kg (1,670 lb)

Max wing loading
65.2 kg/m² (13.36 lb/sq ft)
Max power loading
9.07 kg/kW (14.91 lb/hp)

PERFORMANCE (at max T-O weight):
Max level speed at S/L
113 knots (209 km/h; 130 mph)
Cruising speed, 75% power at 2,680 m (8,800 ft)
109 knots (202 km/h; 125.5 mph)
Cruising speed, 65% power at 3,505 m (11,500 ft)
102 knots (189 km/h; 117.5 mph)
Stalling speed, flaps up
48 knots (88.5 km/h; 55 mph)
Stalling speed, flaps down
46 knots (85.5 km/h; 53 mph)
Max rate of climb at S/L
213 m (700 ft)/min

Service ceiling	3,915 m (12,850 ft)
Absolute ceiling	4,570 m (15,000 ft)
T-O run	288 m (945 ft)
T-O to 15 m (50 ft)	427 m (1,400 ft)
Landing from 15 m (50 ft)	419 m (1,374 ft)
Landing run	196 m (642 ft)

Range with max fuel, allowances for taxi, T-O, climb, cruise, descent, and 45 min reserve:
75% power at 2,680 m (8,800 ft)
402 nm (745 km; 463 miles)
65% power at 3,505 m (11,500 ft)
436 nm (808 km; 502 miles)

GATES LEARJET

GATES LEARJET CORPORATION; Corporate Offices, Aircraft Division: Mid-Continent Airport, PO Box 7707, Wichita, Kansas, 67277, USA

GATES LEARJET 28/29 LONGHORN

Displayed for the first time at the US National Business Aircraft Association's annual convention, on 27–29 September 1977, the prototype of the Learjet 28/29 Longhorn has, by comparison with the Learjet 25D, a wing of much increased span. Fitted with NASA-developed supercritical winglets, the wing has 13° sweepback at quarter-chord. The winglets of the Longhorn, used for the first time in a business aircraft, are unusual in extending above but not below the wingtips. It is claimed that these winglets, used in conjunction with a high aspect ratio wing, reduce induced drag and provide increased lift which permits reduced approach speeds and the ability to operate from shorter runways.

The Learjet 28 has a total usable fuel capacity of 2,638 litres (697 US gallons), the Learjet 29 a total usable fuel capacity of 2,975 litres (786 US gallons). The former can accommodate a crew of two and ten passengers; the longer-range Learjet 29 has a crew of two and up to eight passengers. Both are powered by two 13.8 kN (3,100 lb st) General Electric CJ610-8A turbojet engines, and are generally similar to the Learjet 25D, itself derived from the Learjet 24E/F, as described in detail in the 1977–78 *Jane's*. The cabin pressurisation system, however, has a maximum differential of 0.64 bars (9.4 lb/sq in) to provide a 2,440 m (8,000 ft) cabin altitude at the aircraft's max operating height of 15,545 m (51,000 ft). The first deliveries of production Learjet 28/29 aircraft are scheduled during 1978.

The specification and performance details which follow are subject to confirmation on completion of the certification flight test programme:

DIMENSIONS, EXTERNAL:
- Wing span: 13.33 m (43 ft 9 in)
- Length overall: 14.50 m (47 ft 7 in)
- Height overall: 3.73 m (12 ft 3 in)

DIMENSIONS, INTERNAL (A: Learjet 28; B: Learjet 29):
- Cabin: Length:
  - A: 3.68 m (12 ft 1 in)
  - B: 3.02 m (9 ft 11 in)
- Max width:
  - A, B: 1.50 m (4 ft 11 in)
- Max height:
  - A, B: 1.32 m (4 ft 4 in)
- Baggage compartment:
  - A: 1.13 m³ (40 cu ft)
  - B: 0.76 m³ (27 cu ft)

AREA:
- Wings, gross: 24.57 m² (264.5 sq ft)

WEIGHTS AND LOADINGS (A: Learjet 28; B: Learjet 29):
- Weight empty:
  - A: 3,581 kg (7,895 lb)
  - B: 3,549 kg (7,824 lb)
- Max T-O-weight: 6,804 kg (15,000 lb)
- Max ramp weight: 7,031 kg (15,500 lb)
- Max landing weight: 6,033 kg (13,300 lb)
- Max wing loading: 276.92 kg/m² (56.71 lb/sq ft)
- Max power loading: 246.5 kg/kN (2.42 lb/lb st)

PERFORMANCE (at max range T-O weight, unless stated otherwise; A: Learjet 28; B: Learjet 29):
- Max level speed, from S/L to 4,265 m (14,000 ft): 300 knots (555 km/h; 345 mph) IAS
- Max level speed, from 4,265 m (14,000 ft) to 7,315 m (24,000 ft): 350 knots (649 km/h; 403 mph) IAS
- Max level speed, above 7,315 m (24,000 ft): Mach 0.81
- Stalling speed, full flaps, at typical landing weight: 79 knots (146 km/h; 91 mph)
- Max rate of climb at S/L:
  - A: 1,935 m (6,350 ft)/min
  - B: 1,862 m (6,110 ft)/min
- Max certificated ceiling: 15,545 m (51,000 ft)
- Balanced field length:
  - A: 768 m (2,520 ft)
  - B: 823 m (2,700 ft)
- Landing distance, at typical landing weight:
  - A, B: 671 m (2,200 ft)
- Range with payload of 544 kg (1,200 lb):
  - A: 1,370 nm (2,540 km; 1,578 miles)
  - B: 1,580 nm (2,927 km; 1,819 miles)
- Max range, no payload:
  - A: 1,525 nm (2,826 km; 1,756 miles)
  - B: 1,780 nm (3,299 km; 2,050 miles)

GATES LEARJET 54/55/56 LONGHORN

Announced also at the 1977 NBAA convention at Houston, Texas, and exhibited in mockup form, the new Learjet 54/55/56 Longhorns will feature a 'stand-up' cabin, accommodation for up to 10 passengers, and a range of up to 3,180 nm (5,893 km; 3,662 miles) with a 363 kg (800 lb) payload in the long-range Model 56. All three variants will have the same high aspect ratio wing with supercritical winglets, an aft lavatory, an aft baggage area with exterior door, and unpressurised nose and rear baggage compartments. Cabin pressurisation is the same as for the Learjet 28/29.

Power plant of the Learjet 54/55/56 Longhorns will comprise two Garrett AiResearch TFE731-3-100B turbofan engines, each with a maximum T-O rating of 16.2 kN (3,650 lb st). Total usable fuel capacity will be 3,123 litres (825 US gallons) for the Model 54, 3,728 litres (985 US gallons) for the Model 55, and 4,520 litres (1,194 US gallons) for the Model 56. Production aircraft are scheduled for delivery in early 1980.

The specification and performance details which follow are subject to confirmation on completion of the certification flight test programme:

DIMENSIONS, EXTERNAL:
- Wing span: 13.33 m (43 ft 9 in)
- Length overall: 16.79 m (55 ft 1 in)
- Height overall: 4.47 m (14 ft 8 in)

DIMENSIONS, INTERNAL (A: Learjet 54; B: Learjet 55; C: Learjet 56):
- Cabin: Length:
  - A: 5.42 m (17 ft 9½ in)
  - B: 4.94 m (16 ft 2½ in)
  - C: 4.36 m (14 ft 3½ in)
- Max width: 1.80 m (5 ft 11 in)
- Max height: 1.73 m (5 ft 8 in)
- Baggage compartment, pressurised:
  - A: 1.30 m³ (46 cu ft)
  - B: 0.85 m³ (30 cu ft)
  - C: 0.76 m³ (27 cu ft)
- Baggage compartment, unpressurised:
  - A, B, C: 0.85 m³ (30 cu ft)

AREA:
- Wings, gross: 24.57 m² (264.5 sq ft)

WEIGHTS AND LOADINGS (A: Learjet 54; B: Learjet 55; C: Learjet 56):
- Weight empty:
  - A, B: 4,634 kg (10,216 lb)
  - C: 4,652 kg (10,257 lb)
- Max T-O weight:
  - A, B: 8,391 kg (18,500 lb)
  - C: 9,072 kg (20,000 lb)
- Max ramp weight:
  - A, B: 8,505 kg (18,750 lb)
  - C: 9,185 kg (20,250 lb)
- Max landing weight:
  - A, B, C: 7,257 kg (16,000 lb)
- Max wing loading:
  - A, B: 341.5 kg/m² (69.94 lb/sq ft)
  - C: 369.2 kg/m² (75.61 lb/sq ft)
- Max power loading:
  - A, B: 258.9 kg/kN (2.53 lb/lb st)
  - C: 280.0 kg/kN (2.74 lb/lb st)

PERFORMANCE (at max range T-O weight, unless stated otherwise; A: Learjet 54; B: Learjet 55; C: Learjet 56):
- Max level speed, from S/L to 4,265 m (14,000 ft): 300 knots (555 km/h; 345 mph) IAS
- Max level speed, from 4,265 m (14,000 ft) to 7,315 m (24,000 ft): 350 knots (649 km/h; 403 mph) IAS
- Max level speed, above 7,315 m (24,000 ft): Mach 0.81
- Stalling speed, full flap, at typical landing weight: 87 knots (161 km/h; 100 mph)
- Max rate of climb at S/L:
  - A: 1,640 m (5,380 ft)/min
  - B: 1,530 m (5,020 ft)/min
  - C: 1,433 m (4,700 ft)/min
- Balanced field length:
  - A: 1,073 m (3,520 ft)
  - B: 1,189 m (3,900 ft)
  - C: 1,268 m (4,160 ft)
- Landing distance, at typical landing weight:
  - A, B, C: 756 m (2,480 ft)
- Range (A, B with payload of 544 kg: 1,200 lb: C with payload of 363 kg: 800 lb):
  - A: 2,160 nm (4,002 km; 2,487 miles)
  - B: 2,585 nm (4,791 km; 2,977 miles)
  - C: 3,180 nm (5,893 km; 3,662 miles)
- Max range, no payload:
  - A: 2,300 nm (4,262 km; 2,648 miles)
  - B: 2,825 nm (5,235 km; 3,253 miles)
  - C: 3,380 nm (6,264 km; 3,892 miles)

Prototype of the new Gates Learjet 28/29 Longhorn series, unveiled at the 1977 NBAA convention, Houston, Texas

A PILOT REPORT

fly, hover, and FIGHT!

The writer, a fighter pilot, checks out in the Marine Corps AV-8A Harrier—and changes his opinion about both the Harrier and attack pilots.

BY MAJ. HARRY W. BLOT, USMC

My initial reaction on being assigned to a Harrier squadron was that they obviously didn't realize I was a fighter pilot. Flying attack is for the less skilled—the peasantry, if you will—hard working, but without color. What had I done to deserve such a fate? And to top it off, Harriers, the Marine Corps's AV-8A! I'd heard that they could fly only about fifty miles and carry a single bomb. Oh well, let's make the best of it. I'm scheduled for my first flight today, and I want you to come along as I reluctantly transition into the world of V/STOL attack.

The mission is a two-plane low level to a target about 150 miles north. As I approach my plane, I realize that the Harrier is extremely small. The tailplane of the F-4 parked in the next spot looks as big as the Harrier's wing. Good camouflage paint job, though. Should blend in well with the terrain we're flying over today. The tandem landing gear looks strange compared with the normal tripod arrangement on conventional airplanes, but if B-52 pilots can get used to it, so can I.

Let's walk around and check everything. The four exhaust nozzles look OK. Kind of different having four "tailpipes" in a single-engine airplane and none of them in the tail, but if this two-to-a-side configuration will let me vector my thrust in the air and hover, then I'm all for it. The hot-air (reaction control) ducts in the nose, tail, and wingtips check out, so I should be able to control my attitude in jetborne flight.

Ordnance secure: 3,000 pounds of bombs, two AIM-9 Sidewinder missiles, and two 30-mm cannons. Not bad for such a little airplane! Those 30-mms on the fuselage look huge. They certainly are a step up from the 20-mm guns we have on fighters. I wonder what it would cost to retrofit F-4s with them?

The single service panel for refueling is a good idea. All refueling switches combined into two masters, and no external power required. Just press a button and it checks the oil level too. This should cut down on servicing time.

Time to climb in. Pull the step down, and the canopy opens! Close the canopy, and the step comes up. Everything is built for a one-man

Vertical operations and tandem landing gear distinguish the Harrier from conventional craft.

operation. Good grief, is this cockpit small! It's a good thing I've memorized the position of these switches, because I won't be able to see them once I'm strapped in.

Well, let's start checking. Nozzle lever, FORWARD . . . the only new control in the cockpit. They put it right next to the throttle with "forward" positioning the nozzles to the rear for high speed, and "aft" turning them down for hovering. Very good. Must have gotten the idea from fighter pilots at happy hour. Flaps, UP . . . switch near the throttle. Looks as if it might be difficult to reach in a dogfight. I'll have to check that out. Engine limiter switch, SET . . . I like that. By pushing the throttle forward I can knock all the engine temperature limiters off and get full emergency power. Necessary for vertical landing airplanes, but a good idea for fighters, too. Better to cook the engine and shake the MiG than to lose the whole airplane (not to mention the pilot).

Gear button, IN . . . buttons instead of a handle. Different, but no big thing. Head-up display (HUD), SET . . . nice. No new airplane should be built without one. All the information required to take off, cruise, deliver weapons, and land is displayed right on the windscreen. No more looking down, frantically trying to gather the necessary information from a bunch of gauges.

Camera, LOADED . . . terrific—a camera that automatically records what you see through the HUD. Now those attack pilots won't be able to argue about whether or not the gunsight was on them when I claim a kill. They'll be able to see themselves on film. Maybe if I get enough shots I can have a showing at the club.

Fuel system, SET . . . two-stage low fuel level warning lights on each side of the HUD . . . good, since nobody is in the backseat to tell me I'm running out. The fuel flow gauge is in pounds per minute (PPM) instead of the standard pounds per hour (PPH). That will take a while to get used to, but most of the time I work in minutes rather than hours anyway, so it will be worth the effort. Come to think of it, I wonder why we started with pounds per hour?

Radios, SET . . . three independent radios—at last! Many airplanes have been lost because they didn't have a backup radio and now I have three! From rags to riches. There's a mixer box so I can transmit or receive on two radios simultaneously, or transmit on one and just monitor the other. Both UHF and VHF. Score one for the attack types.

Self starter, START . . . a self-contained starter/aux power unit. Great! No more ground support equipment. Things are really beginning to look up. Seat, ARMED . . . and the best they make. It can safely get me out at zero airspeed, with the plane sinking to zero altitude at eighty feet per second. The seat comes out so fast they had to put an explosive cord on the canopy to get it out of the way. If you ejected in the chocks, it would rocket you as high as a twelve-story building, and then deploy the parachute automatically. Hope I never have a chance to try it out. Right now I have the makings of a legendary pilot—same number of takeoffs as landings—and I would like to keep it that way. All in all, there are a lot of good features in this cockpit.

Maj. Harry W. Blot, USMC, formerly with the Naval Air Test Center, Md., and now with the Naval Air Systems Command, Washington, D. C., has flown more than twenty-five models of tactical airplanes. He has seen both air and ground combat as an F-8 pilot and platoon commander in Vietnam. He graduated from Villanova University in 1962 and the USAF Aerospace Reseach Pilots School in 1968.

"Catapult" Takeoff

The pilot in the Lead airplane is on the radio telling me to start up. Punch the start button, bring the throttle around the horn, and here she comes. What a racket! Better tighten my helmet and mask. That engine sounds like it's in the cockpit with me. I guess that's because the compressor is only a few feet behind my head. This airplane is literally an engine wrapped in titanium and aluminum. Time to go through my post-start checks. Simple. The only new checks are to see that the reaction control ducts are receiving engine bleed air, and that the nozzles are where I want them.

There goes Lead. Release the brakes, energize the nose-wheel steering, and follow him. Easy now, don't overcontrol the steering. Remember, it's a variable gain system with a small response about the neutral position, but an ever-increasing output as you press the rudder pedals further. This will definitely take a while to get used to, but I'd better catch on fast, because there's no differential braking to help steer. The only brakes on this beauty are on the centerline main landing gear. Easy now, you're getting too close to him. Slow her down by rotating nozzles to about sixty degrees and save the brakes. Something new, but nice.

Time for takeoff. I still can't believe Lead briefing me to use less than full power so I wouldn't get behind the airplane. Well, that may have been necessary for attack pilots, but not for me. Here goes, full throttle. The engine is coming on like a freight train. Full power in less than four seconds. It's making so much noise I'm *sure* it's in the cockpit with me. Even with my load of bombs, missiles, and 30-mm guns, I can't hold the brakes at more than fifty-five percent RPM. The engine is now at 106 percent, and I'm thrown back in the seat. The airspeed is building so rapidly I can hardly read it.

Now I have 105 knots—time to put the nozzles down. The Harrier jumps into the air even though its attitude is the same as it was on the runway. Move the nozzle lever forward now (nozzles aft) at a rate that won't let me sink. The airspeed is building unbelievably. There's 300 knots and I still have the gear and the flaps down. You're overstressing them! Get your nose up! Slow down, you dummy! Pull the power back. OK, under control again. I'll have to give those flaps and gear doors a good postflight, and maybe have the maintenance officer look them over. No need to tell anybody else.

That whole sequence of events takes place before I pass the end of the runway. I rolled only 1,100 feet and was at 110 knots in less than

eight seconds. Almost like a catapult shot off a carrier.

Back on with the power. Slide out to about a half mile abeam Lead and start looking for other airplanes. Visibility over the nose is excellent, but when I turn around to see if anybody is coming up behind us, all I can see is the engine intake. I'd better slide out a little wider so I can see at least a mile behind Lead. This is going to be tough. This little airplane with its camouflage paint and smokeless engine is almost impossible to see from out here, but if I move in closer, I won't be able to cover Lead's tail. I'll have to devote more time to just keeping track of him, and less to looking around. One good point: If I'm having this much trouble keeping sight of Lead, the bad guys will have just as much trouble seeing us.

There goes the first checkpoint. Very nice. Low-level, high-speed cruise with a load of ordnance, and I'm only looking at seventy-six percent RPM and ninety-eight PPM fuel flow. That is as good as any airplane I've flown, and none of them had this kind of power in reserve. So much for the fifty-mile, one-bomb story.

On Target

Time to switch to VHF/FM and talk to the groundpounders at the target. The radio setup is terrific! Monitor UHF for airborne information, and simultaneously talk directly to the "grunts" on FM. What an improvement over Vietnam days, where we had to relay all air-to-ground communications through a third party because we didn't have FM. Well, at least we learned.

There's the clearance from the target controllers. Set up the armament switches and select the air-to-ground mode of the HUD. Let's see . . . patching, fuzing, pylon, delay, master arm, and mil depression all set. That's a lot to do this close to the ground. Hope I didn't forget anything.

Pull up, full power. Beautiful! Even with ordnance she climbs like a fighter in afterburner. Roll over and pick up the target. Pull the nose down and ride the pipper to the aimpoint. There's power to spare, honest handling, and a simple scan pattern. Everything you need is in the HUD: airspeed, altitude, and a roll stabilized pipper.

Approaching release airspeed now, so reduce power. No stick trim force change with changing airspeed, so it's easy to track. That's a design feature the US should incorporate in all our tactical airplanes. It makes flying straight and level slightly more difficult because there's no feedback through the stick with a change in airspeed, but it sure pays off in easier tracking during maneuvering.

The AV-8A Harrier—Facts and Figures

Designer and Manufacturer	Hawker Siddeley Aviation Ltd.
Primary Mission	Close air support
Crew	Pilot only
Powerplant	One Rolls-Royce Bristol Pegasus 11 F402-RR-402 vectored-thrust turbofan engine with 21,500 pounds of thrust
Length	45 feet 6 inches
Height	11 feet 3 inches
Wingspan	25 feet 3 inches
Wing Area	201 square feet
Internal Fuel Capacity	5,161 pounds
External Fuel (Maximum)	3,924 pounds
Operating Weight Empty	12,200 pounds
Takeoff Maximum Weight	24,600 pounds
Total Vertical Takeoff Weight	17,050 pounds
Short Takeoff Weight (1,000 feet)	22,300 pounds
Armament	Two 30-mm Aden guns in underfuselage gun pods
Ordnance Capacity	Five weapon stations for bombs or laser or electro-optical guided weapons; air-to-air missiles
Unrefueled Ferry Range	1,346 nm
CAS Range, with 20-Minute Loiter	241 nm
Performance, Max Level Flight	0.93 Mach

Everything is looking good. Raise the safety flap over the bomb button and press as the pipper is superimposed on the target and we pass through release altitude. Pull her up, safe the switches, and join on Lead. Time to go home.

The controller calls the miss distance at forty feet. This HUD must be off, because I had everything perfect at release. Visually check the pylons to make sure all the bombs came off. Oops! All I can see are those intakes again. Guess I'll have to check Lead over, and he can check me.

Dogfight

Where is Lead now? Uh-oh!

"Lead, bogey six o'clock high. Looks like he's making a run on you from about four miles out! Come port, and let's get some speed up."

Look at the airspeed climb! Six hundred knots just like that! There's something wrong with the way that fighter is acting. His smoke is gone, so he's in burner, but his intercept course is too wide.

"Bring her back starboard, Lead. I think he's shifting his attack to me."

Now he's sliding through my six o'clock. Reverse and pick him up as he comes through the other side. Again he's too wide to make a good attack on us.

"He can't see us, Lead! He lost us when we turned port. There he goes still in full burner." Now he has us and is turning in!

Check Sidewinders and guns. He lost all his advantage by losing sight so we should be able to meet him head on.

"Lead, I'll turn with him. You cover."

As he goes by, pull on the stick until 7.5 Gs and hold it. Turn 180 degrees and still on opposite sides of the circle. All the way around and we meet again, only this time he has a slight advantage in nose angle. Time to change tactics. Reverse back into him and pitch the nose high. Now he is forced to engage in a slow speed fight against an airplane that can virtually stop, or he will have to disengage.

His nose is coming up. He's going for altitude and trying to get high enough to come back for a gun run.

Constant stick trim force despite changing airspeed makes for easy tracking during maneuvering.

Lead has got his own problems with a second fighter, so he won't be any help. Point your nose at him and make him commit himself. I'm holding my own in this race for altitude. He's slow now and is going to have to get his nose down or stall. This little bird could care less how slow we get.

There goes his nose. He's on the run now. Roll on your back, pull back stick, drop full flaps, and lower the nozzles. With the aerodynamic controls, reaction controls, and the center of pressure shift caused by lowering the nozzles, the nose comes through at approximately fifty degrees a second. That's about twice as fast as he can do.

OK, the nose is down. Put the nozzles aft, get the flaps up, and go get him. Coming downhill the acceleration is terrific. From seventy knots to 450 knots in eighteen seconds, and closing rapidly. His afterburners have my missiles howling now, but I'm not quite in range, yet.

Lead is screaming, "Dash two—break left, bandit seven o'clock at 7,000 feet."

Now pull hard left and up, hiding those nozzles under the wing from his IR missiles and increasing the angle off. Here he comes now about 3,000 feet out and closing for a gunshot. Full back-stick and nozzles to reverse thrust. In less than a second the nose pitches thirty degrees into him from the pressure shift, the airplane jumps about 150 feet straight towards the inside of the circle and I feel a tremendous deceleration, moving us further toward the inside of the turn. I can't see him, but after that he must have overshot, unless he pulled fourteen Gs.

Reverse, using top rudder, and there he is, sliding by. My turn now. If he turns back into me, I've got him. No, he's breaking off, and so is Lead's attacker. They are probably still trying to figure out how they went from the offensive to the defensive so quickly.

Check the fuel. Still OK. Even at full power I burn less than 12,000 PPH, about one-fifth that of an afterburner-equipped machine. This little bird has more potential in air combat maneuvering than I gave it credit for. The Harrier is the best dogfighter I have flown, and capable of turning the table on any fighter if

he makes even the slightest mistake.

Home plate is coming up. Close up tight on Lead. Have to make it look good for the troops. Tight formation is easy to fly with these lightstick forces.

Landing Lore

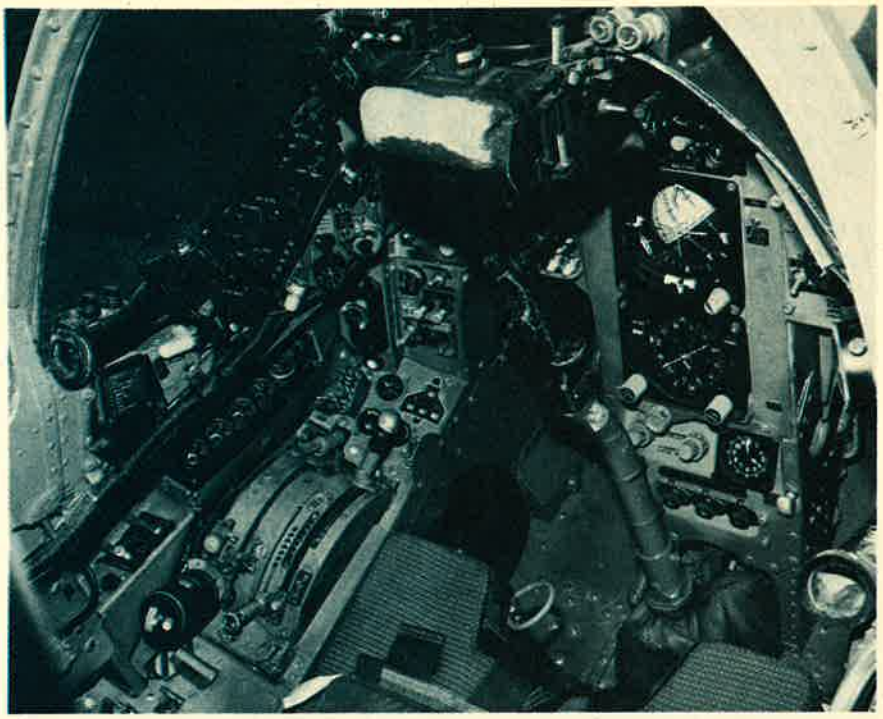
Lead kisses me off and breaks. Give him three seconds and pull. Nothing different so far, except that I have four gear coming down instead of three. There's the 180 degrees position. Check duct pressure. Must have air flowing through the reaction control system, or I won't be able to control the airplane in V/STOL flight. Nozzles down now, and I'm slowing down like I had a drag chute out.

Add power to compensate for the loss of wing lift as the transition from conventional flight to jetborne takes place. A little strange, adding power to slow down, but nothing compared to the fact that I have to use the rudders to keep the nose pointed the way I want it to go. Conventional airplanes require little or no pilot input to keep the nose pointed in the right direction during landing. This one would be just as happy going backwards. On the good side is the fact that she responds immediately to any control input I make.

Here comes the ground. Still doing seventy-five knots. Nozzles to reverse thrust. Touchdown. Wow, is she slowing now! Wet runways won't bother me anymore. Reverse thrust off, and step on the antiskid brakes. This airplane doesn't need much room to stop even if you roll her on instead of landing vertically.

Taxi back and shut her down. No downlocks or ground crew required. That should help the turnaround time.

The flight debrief goes smoothly, except for my exclamations about the raw power of the airplane. Twenty minutes after touchdown a maintenance man brings in the film from the HUD camera. A quick look shows that at bomb release I was two degrees steep on dive angle, five knots slow, fifty feet high, and tracking twenty feet to the right of the target. A device like this camera is invaluable! I am a little embarrassed, but certainly a smarter pilot after reviewing that film. I could have sworn that I had all the release parameters "spot on." This will certainly stop a lot of arguments about whether it was a pilot or an airplane malfunction that caused a bomb miss.



Despite its cramped size and 1960-vintage "switchology," the Harrier cockpit has many good features such as a head-up display (HUD) coupled with a documenting camera, three VHF/UHF radios, and a pounds-per-minute fuel gauge.

Pros and Cons

Lead says it is fairly common for a fighter to break radar lock on a Harrier and then be unable to pick up a visual sighting, as happened today. Sure wish I had a radar warning receiver to tell me that I was getting looked at, though. That second fighter almost had me before I knew he was there. A tactical formation of radar-equipped fighters trailing AV-8As would serve the same purpose. The fighters could warn the AV-8As when the enemy fighters were coming, and then the Harriers could either do the dogfighting if the enemy turns in, or visually identify them for our fighters to get with radar missiles if they just slash through.

On the air-to-ground side, we just flew for one hour and seventeen minutes after taking off with an 1,100-foot ground roll, delivered 3,000 pounds of ordnance apiece on a target 150 miles away and had a five-minute dogfight before returning to base.

This airplane is no toy. It's a real live war machine with more flexibility than any other airplane in our inventory. It has its shortcomings, such as poor aft visibility, insufficient thrust to take off vertically with a full load of ordnance and fuel, 1960-vintage switchology, and the requirement for a "stick-and-rudder" pilot to compensate for the lack of stability in V/STOL flight.

To put these in perspective, though, one must consider that the aft visibility problem is roughly equivalent to that of the F-4, and the Harrier can take off from a 1,000-foot runway with more payload and go further than any other attack airplane. It's in a class by itself when restricted to a zero-takeoff roll. It is the lack of stability in V/STOL flight that allows it to be so maneuverable in air combat; however, an improved stability augmentation system is being designed to reduce the pilot work load during takeoff and landing, when high levels of stability are needed.

When all is said and done, I was sold on the airplane. I now consider myself a V/STOL fighter-attack pilot. While I'm at it, I guess I'll have to reevaluate my earlier position on attack pilots. Why, I might even let one go out with my sister. ■

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What does the Army expect of tactical air forces? At what level should ground and air firepower be integrated, and by whom? Would traditional concepts of tac air employment work in a NATO scenario? An Army aviation officer discusses these and other issues in . . .

Tac Air: An Army View

BY BRIG. GEN. CHARLES E. CANEDY, USA

QUANTIFYING the Army's need for tactical air support is simple:

In a place like Europe, we need tons of it at the outset of hostilities, and the need will not let up until the numerical superiority of the opposing force is significantly reduced. Qualifying the Army's need for tac air, however, deserves some detailed discussion.

Folks tend to think of tac air only in terms of close air support (CAS), visualizing the fighters rolling in on a target that has been identified by the ground maneuver commander and very closely controlled through the classic tactical air control party (TACP) mechanism. True, this is a large part of the tac air support package, but far from the total contribution that the Army expects tac air to provide. If we assume the standard scenario for Central Europe and focus on a single US division in that sector, the requirement becomes obvious.

Let's look at my friend Maj. Gen. Bill Webb's 1st Armored Division, Old Ironsides. We know that he has the mission of defending a wide sector of Germany, and we also know that he has eleven maneuver battalions, an armored cavalry squadron, and two attack helicopter companies with which to defend that extended sector. Soviet doctrine indicates that for their breakthrough tactics they plan to mass up to twenty-four battalions within a ten-km front to achieve penetration and allow the second echelon forces to follow on in exploitation. Our analysis tells us that we can probably sustain a defense if we are capable of achieving a 1:3 force ratio. Without reinforcing the 1st Armored Division, the only way General Webb can do this is to move eight of his eleven maneuver battalions into the ten-km sector that Ivan has selected to conduct his breakthrough.

Instant Intelligence

First problem: How do we know precisely where this penetration will occur? Our classic response has been through the use of our signal intelligence and reconnaissance resources, and this is still true; however, we really need to think this one through very carefully. The Army has its family of collectors, as does the Air Force, plus national means. The trick is to properly fuse and deliver all of the information quickly so that Bill Webb makes the right decision in time. So the first thing the Army needs in the way of tactical air support is a sharing of all the relevant data that the Air Force is collecting on target massing and emitter locations, and, equally important, in sufficient detail to sort out the main attack from the many diversionary attacks we can expect.

I am talking about providing General Webb with filtered information from Tactical Electronic Reconnaissance (TEREC), Precision Location Strike System (PLSS), Side-Looking Airborne Radar (SLAR), and other intelligence sources, in a near real-time fashion. We can't wait for hard copy to be developed at the Tactical Air Control Center (TACC) and passed to VII Corps, and finally down to the division. Similarly, the Army needs to be sharing information from its signal intelligence collectors, such as Quick Look, Guardrail, etc., with the Air Force.

It is important to appreciate that although the Army and the Air Force have many look-alike collection systems, the areas of concern to the two services are different, and for good reasons. The Army's concerns are generally from the forward edge of the battle area (FEBA) out to the fifty- to seventy-five-km ranges, whereas the Air Force areas of concern go much deeper. For example, the Army goes after countermortar/counterbattery and ground surveillance radars, whereas USAF views the SAMs, AAA, and early warning/ground control intercept (GCI) radars as the greater threat. Quite obviously, no single service can afford all the collection means that it would like, so we simply have to figure out a fusing/sharing mechanism and then make it function.

For purposes of this discussion, assume that we were successful in determining the breakthrough sector, and that Maj. Gen. Bill Webb had done everything just right and was successful in repositioning his maneuver battalions. His next two immediate problems are hitting the targets so that he can maintain the defense and ensure that the enemy's second echelon never arrives. I will not dwell on the contribution of our tanks, ground antitank systems, artillery, or attack helicopters to this battle, but focus on the requirement for tac air.

Coordinated Counterbattery Operations

No doubt the first scream from General Webb will be to get the enemy artillery off his back. Our own artillery-locating radars and counterbattery fire will be swamped. Some of the enemy artillery will be out of range for our supporting fires. If tac air can pound their artillery, the immediate front line defense against Soviet tanks can probably be handled by our organic means. Again, information sharing is essential. We will be able to tell USAF the Red artillery's location with great accuracy. Similarly, USAF can give us radar locations of ZSU-23-4 antiaircraft artillery systems that will be extremely helpful

to friendly attack helicopter units.

This simple scenario suggests some new twists. Note that I said we will need help with artillery targets. Heretofore, we have generally discussed the requirement for close air support in terms of tank targets. That requirement remains, and all of our forward deployed forces, including the attack helicopters, will need Air Force close air support assistance. The priority targets will very quickly become the artillery and the second echelon staging area. The target ranges will probably be from twenty to fifty km behind the FEBA.

To get at these targets, a great deal of mutual effort will be required to clear a path for the CAS aircraft. Soviet air defenses must be suppressed or destroyed by every means that can be brought to bear. Artillery, attack helicopters, Wild Weasels, and everything else within range must assist. The idea is to provide the most benign air defense environment possible to give relatively free rein to the attacking aircraft. For the fighter pilot who is worrying about identifying artillery targets, I suggest that he cease worrying. Active artillery units will provide plenty of signature, so he can go ahead and roll in. He certainly will not be assisted by a nearby forward air controller (FAC), but he will be receiving coordinates from some element of the Tactical Air Control System or perhaps even directly from the division artillery target acquisition battery. It may sound a little far out, but it certainly can be made to work.

Integrating Firepower

Handling front-line targets will not be a simple task. Certainly there will be plenty of targets for all, and the coordination required between the services will be greater than ever before. World War II, Korea, and Vietnam doctrinal employment of tac air will not work, or at least our joint testing experience suggests that it won't work, until we have achieved a significant level of defense suppression. With the Army's attack helicopters operating at nap-of-the-earth altitudes, and the A-10s just above the trees, we should not have to be concerned about airspace management. However, target acquisition, identification, handoff, and navigation become more difficult from these operating altitudes.

One of the front-line ground commanders' most difficult tasks will be establishing the priority of targets to be destroyed by the various means available. With the mass and attacking speeds of Soviet breakthrough doctrine, we can't afford to kill the same target twice. Coordination and integration of available firepower has to happen quickly and simply. The key to success in my mind is to make this integration work at the battalion level. The TACP and, most importantly, the FAC must be as familiar with the battle plan as the battalion commander and operations officer —the battle manager. The FAC has got to be able to move to the right location at the right time and be in constant communication with the battle captain. What this all adds up to is that there won't be time or resources for separate air and ground wars around the FEBA, as in the past. Our demands for efficiency and speed in attacking targets dictate a closely coordinated, near instantaneous close air support/ Army support mechanism.

Merging Interdiction and CAS Targets

With respect to General Webb's second problem—the second echelon—close air support becomes vital. I realize that by definition the second echelon properly falls into the classic interdiction mission as opposed to CAS. Clearly, if there are adequate air assets to perform all of the tactical air force mission the second echelon would not be a problem to General Webb. Unfortunately, the numbers of combat aircraft available to the Warsaw Pact suggest that priorities will have to be established and interdiction may not be viewed as vital as CAS or counterair, and for a period of time that view might be proper. The fluidity of the second echelon, again because of Warsaw Pact doctrine, suggests that the time between this force being a staged interdiction target and a CAS target will be difficult to determine.

Let me wrap up the Army's view on tac air with a discussion on the FAC. I believe that he is going to be an increasingly important guy to have on the battlefield. I think that we could all agree that he is not going to be orbiting over the FEBA, directing aircraft to targets. The FAC's very survival and effectiveness are dependent upon how close to the FEBA he can operate. From our tactics development and evaluation experience we have pretty well documented that scout and attack helicopters are extremely survivable at nap-of-the-earth altitude while maintaining a standoff of a couple thousand meters. These tactics protect against the air defense and small-arms fire. Quite obviously the helicopter has to vacate the artillery barrage areas, as will all other thin-skinned vehicles.

The helicopter's advantage over ground vehicles is its agility and its ability to move out quickly. All of the battlefield cannot be under intense attack all of the time. As has been demonstrated, the scout helicopter could provide the FAC with a capability he has never had. Similarly, a case can be made for putting the FAC in a tank or an infantry fighting vehicle. The latter option, although providing him with the protection required, decreases his flexibility and capability. This also suggests to me the obvious integration level of Army Air and Air Force tactical air support.

This is truly where the rubber meets the road. There will be targets that can be better killed by attack helicopters, and instances where clearly the A-10s or the A-7s are the right CAS weapons. The FAC, the scout, and the ground maneuver commander are going to be the best judges of the optimum weapon systems approach. No single weapon system is going to survive by itself. ■

Brig. Gen. Charles E. Canedy is Deputy Director and Army Aviation Officer, Requirements Directorate, Office of the Deputy Chief of Staff for Operations and Plans at US Army Headquarters. Prior to his present assignment he was Commander, 6th Cavalry Brigade, Air Combat, at Fort Hood, Tex. Among his decorations are the Silver Star with cluster, DFC with two clusters, Air Medal with four clusters, and the Purple Heart.

It was a frustrating, demanding, nerve-racking assignment—but the most important in his career. For despite the job's sleepless nights, the author of this amusing but astute reminiscence finds that being an Air Staff action officer is, as the title implies, . . .

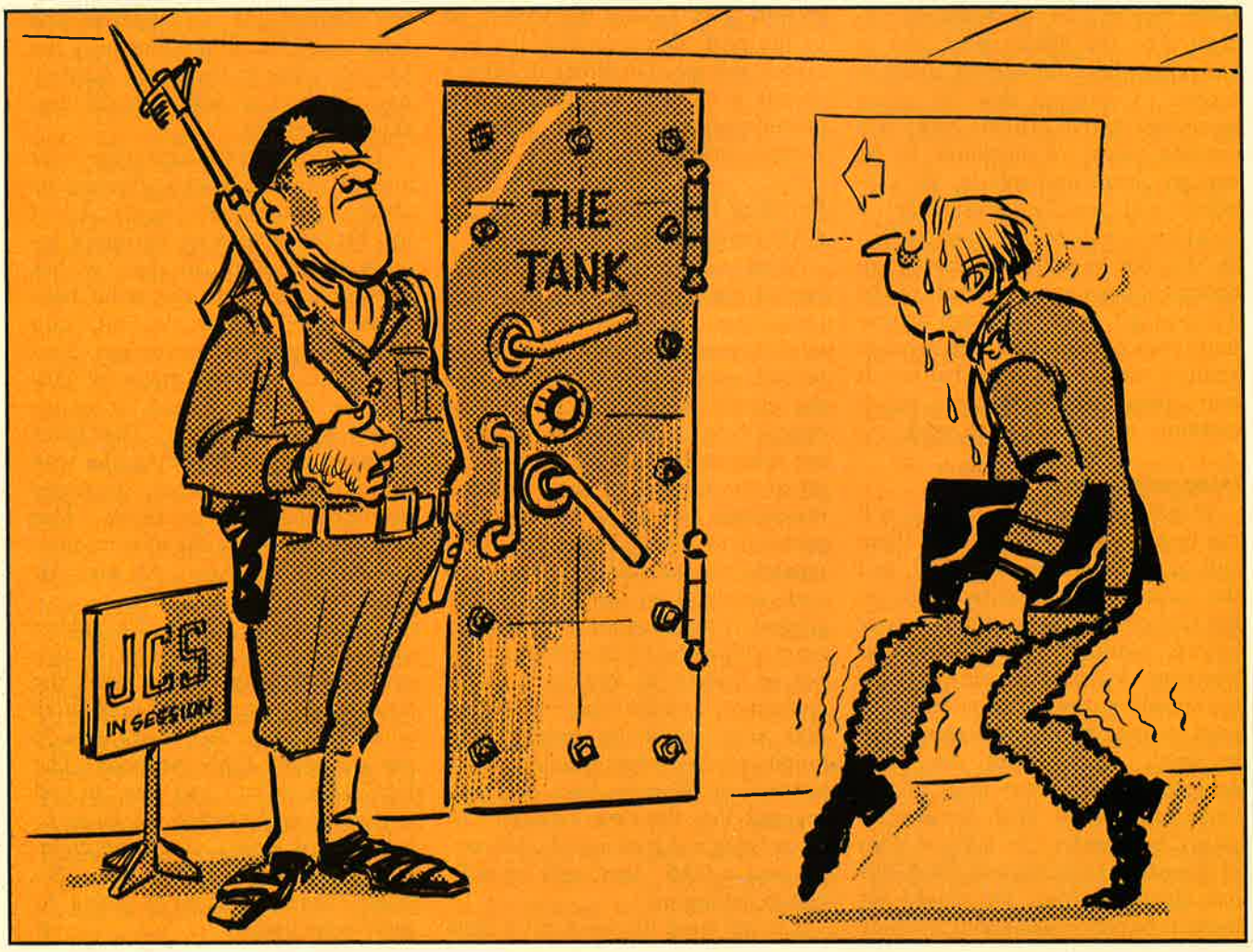
WHERE THE ACTION IS

BY LT. COL. JIM BEAVERS, USAF (RET.)
CARTOONS BY BOB STEVENS

It was now evident that I wasn't going to make it. Beside me on a small table sat an ivory telephone with the seal of the President of the United States in the little circle where the number usually appears. Taking a deep breath, I picked it up. A radio operator in a compartment forward of the presidential lounge answered. I gave him a telephone number in Alexandria, Va., but that didn't matter. It could have been almost any place in the world, and toll free. The call went through about as quickly as if I had dialed direct, which I couldn't do in view of the fact that we were at 35,000 feet somewhere off the coast of Newfoundland. My wife answered, and I gave her the bad news. There was no way I could make my dental appointment at Bolling AFB the next afternoon, and she'd have to call and cancel it.

That single ride in Air Force One was a bright moment in what then seemed the worst assignment of my entire career. The job was that of "action officer" in War Plans on the Air Staff. Elsewhere on the airplane sat an Air Force major general who represented the Joint Staff, representatives of the Army and Navy, and some Joint Staff types who were, like me, peons at the working level. We were all on special assignment to an interservice planning group. As a lieutenant colonel, I represented the Air Force.

Getting the President's airplane had been a surprisingly simple matter. The Joint Staff major general buttonholed me one day and told me we all had to make a quick trip to brief SACEUR (NATO's Supreme Allied Commander Europe) on a highly sensitive problem. "You're the Air Force representative," he said from within his own blue uniform. "Go see if we can get Air Force One. We've got to be able to discuss the briefing in route, and we can't do that on just any airplane. All you can do is ask. If the



Chief says no, we haven't lost anything."

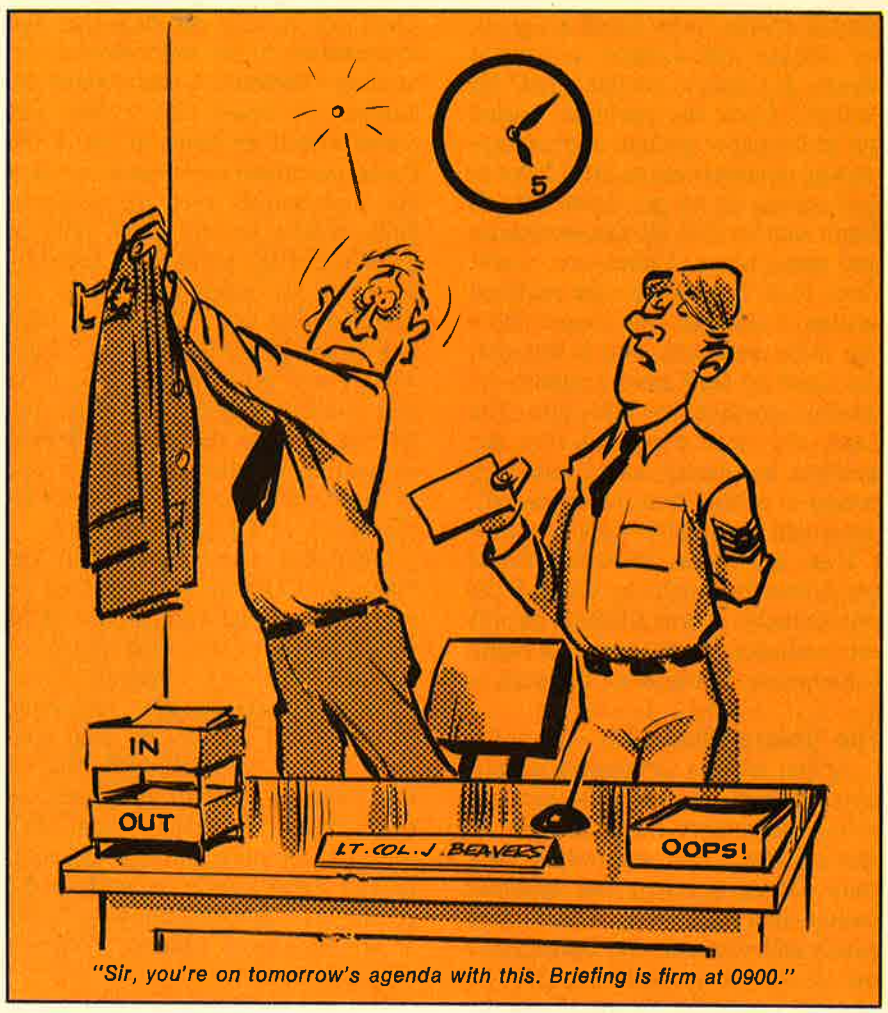
After a series of fruitless gulps intended to get my heart out of my throat and back where it belonged, I went to the office of the Chief of Staff of the Air Force. Half paralyzed, I asked him if I could have the President's airplane for the trip, and explained why we needed it. He growled something around his cigar, and that was that. I had the airplane. It meant bumping the Vice President to a smaller jet for a planned trip to Florida, but that was life. What we were doing was important, and he didn't need all that seating space, as we did.

I've never been prouder of the Air Force than I was on that trip. The efficiency of the crew of Air Force One is something that has to be seen to be believed. But to cap it all, it turned out that the crew viewed me, an insignificant drone from the Air Staff, as the decision-maker. The major general was treated deferentially, of course, but it soon became clear that he was just another passenger. The airplane, it seemed, was in my name. I courteously let the general sit in the President's chair awhile.

That was one of few occasions during my Air Staff assignment that I can look back on with unmitigated pleasure. If I had known what I was getting into when I received orders transferring me to War Plans in the Pentagon, I'd have asked immediately for a compassionate transfer to combat. That would have been a nice alternative, but we didn't seem to be mad at much of anybody at the time.

Low Man on the Ladder

Perhaps things are better now, but I doubt it. The basic problem, which can't have changed much, is that action officers serve the Chief of Staff mainly in his capacity as a member of the Joint Chiefs of Staff. That august body has a statutory responsibility to the President—in general to advise him on matters affecting the security of the United States. The first extrapolation of the problem is that almost anything can affect the security of the nation. The next extrapolation is that the world does not uniformly go to bed and sleep quietly during the same eight hours of every day. I knew each night, during my tour as an action officer, that while I was innocently snoring in my wife's ear, some dingbat somewhere was stirring up trouble that was going to make life miserable for me—possibly before morning.



"Sir, you're on tomorrow's agenda with this. Briefing is firm at 0900."

The third extension of the whole mess is that the advice of the Joint Chiefs has to be timely if it is to be of any value. If Nation X contains a thousand US citizens and is being invaded by Nation Y, the President hears about it immediately. The question to the Joint Chiefs—and other agencies, too—is what to do about it. The Chiefs can't reply, "Hoo boy! That's a toughie—can we get back to you later in the month?" If they did, some new faces would quickly appear around the JCS conference table in a gold-carpeted room on the first floor of the Pentagon known as "The Tank."

The final part of the problem is that no service chief knows everything there is to know about everything that can happen in the world that might affect national security. Each Chief needs help. Not surprisingly, he gets it. That's where action officers come in. When I was one, there were twelve echelons between me and the Chief of Staff, but I was, in effect, the "bottom line" on any problem I was working, and I knew it. To sum it up, the action officer often has a staggering responsibility and no authority whatever.

In my day, an action officer usually got fingered at odd hours to handle a hot problem that suddenly appeared on the next day's JCS agenda. Ten minutes after quitting time, and just as he was putting on his blouse, an administrative NCO would wander back to his office, hand him a piece of paper, and in ringing innocence announce, "Sir, you're on tomorrow's agenda with this. Briefing is firm at 0900."

There went the action officer's evening. It didn't matter that he had a dinner date with his wife. It had to be canceled. It didn't matter that he was scheduled to fly. He wasn't going to. It didn't matter that his

sainted mother was about to go to her reward. She'd have to wing it alone. It didn't matter that he couldn't work the problem spelled out in the paper without a lot of supporting documentation. He'd have to find somebody to get it for him. It didn't matter that all the secretaries had gone home. Either one would come back or he'd type the required written brief with one finger. Only one thing mattered, and it was that the Chief of Staff have a solidly defensible position to take into The Tank the next day, and that the position be clearly stated and supported in a brief that the action officer would personally explain to him.

If he was lucky, the action officer got home that night by 2200. If he was unlucky, it was 0130. If he was *very* unlucky, he was there all night. It happened. It still does, I'm sure.

The Unforgivable Sin

Action officers developed specialized areas of interest and—presumably—competence. The process of specialization was somewhat arbitrary and at times by fiat. It didn't matter that somebody wasn't sure which end of a rifle the bullet came out of; if his branch chief decided he was an expert in Army affairs, he was an expert, and his salvation lay in making fact out of fiction as rapidly as possible.

I was designated an expert in strategic operations and targeting, possibly out of the perverse logic that I had never set foot in a B-52 but had once served four short months in SAC as an acting provost marshal. That, plus some years' experience with nuclear weapons, presumably qualified me to stand up, six feet away from the Chief of Staff, the man who had built SAC almost single-handedly into the most powerful force on earth, and brief him on some phase of strategic operations or plans. Of course, I provided the same degree of expertise to his Operations Deputy—the Deputy Chief of Staff/Plans and Operations—his alter ego in the JCS and a man who had more hours in the B-47 than I had total flying time. Briefing the Secretary of the Air Force was different. I *had* to know more about strategic operations than he did.

Just as demanding as the inescapable responsibility for briefing the Chief for a JCS meeting was the requirement to be available for debriefing afterward. I can't count the number of times that I had just seated myself for lunch in one of the Pentagon cafeterias, opened my napkin, and bravely eyed the unidentifiable matter on my plate, only to have one of the pretty little secretaries from my office tap me on the shoulder and say, "Debriefing right now in the JCS briefing room." I did what every other action officer on that morning's agenda did. I got up, left the food on the table, and went to debriefing. Missing lunch in one of the Pentagon cafeterias wasn't all that much of a sacrifice anyhow.

Debriefing was conducted by the Operations Deputy, and this time we action officers sat and listened as *he* spoke, telling us what had transpired on each topic on the agenda. It was usually a statesmanlike recitation, even if some matters of deep controversy had been involved. But on one occasion, we had no sooner assembled in the briefing room than the Ops Dep burst through the door, looked malevolently around at the rectangle of uniforms standing rigidly at attention, and snarled, "Where's that guy Beavers?"

It was a good thing I hadn't eaten lunch, because I might have refunded it then and there, right on the carpet. It turned out that I had committed the most unforgivable of all sins. I had given him some erroneous information, and he had been crucified in The Tank as a result. It was of no consequence that the bum information had come from another section of the Air Staff. I was the action officer and I was responsible. If I said it was so, it was so. That was the way the system worked, and it had to be that way. The Chief and his Ops Dep had to have a single source of information because they didn't have the time to seek counsel from everybody on the Air Staff. That's what action officers were for. I understood that, and there was nothing to do except stand there and take it.

The Wonders of War Games

Some odd assignments came out of my alleged qualifications as a strategic operations and targeting authority. One was designation as the Air Force representative to the special interservice planning group for which I conned the Chief of Staff out of the President's airplane. Another was appointment as Air Force rep to a joint task force of sorts whose function was to supervise national war gaming in behalf of the JCS.

For those who have never been exposed to it, war gaming is a process by which mountains of operational data are massaged by a computer programmed to arrive at a conclusion determined by the assumptions that went into the game. At the time, war gaming was highly controversial for a number of reasons, including but not limited to the fact that rigged assumptions could produce game results embarrassing to one of the services.

A war game can be likened in many ways to a toy electric train on a complicated track with all sorts of switches leading to different stations. The switches are analogous to the assumptions governing the game, and the stations are analogous to its conclusions. But no child I ever saw was even slightly surprised when he closed a switch and observed that the train now went to a new destination. What baffled me in dealing with national war gaming was that grown men were not only surprised but impressed by essentially the same thing.

The worst thing about our war games was that from time to time somebody concluded they proved something of national significance, and they wound up on the JCS agenda. Since it followed from my assignment that I was an expert on the matter, I invariably got stuck with preparing written and oral briefings for the Chief of Staff. The problem in writing and presenting such a briefing was that war gaming was almost impossible to explain in clear, concise terms. The mechanics of it were a tedious mess that interested few people—not among them, it turned out, the Chief of Staff. It involved statistics, probability theory, computer programming techniques, nuclear weapon effects, and many other sleep-inducing topics along those lines. If there was a fallacy in the outcome of the game and it could be traced to misapplication of some such mysterious topic, I was seated on a very dead horse

Jim Beavers quit the cold "Tank" in 1963 for summery Winter Park, Fla., where, hardly in retirement, he runs his own business and writes. His varied USAF career (ranging from B-25 pilot to nuclear weapons specialist) has inspired two earlier articles for AIR FORCE Magazine—both also brightened by Bob Stevens cartoons—and a growing cadre of fans among our readers.

when the starting gate opened. The Chief just wasn't interested in belabored technical dissertations. He had a substantial degree of cynicism where war games were concerned anyhow, and I wasn't of much help because I shared that cynicism, to a large degree.

Juicing up a war game briefing was a problem I never solved. I used to rack my aching brain for some simple way to get to the heart of the matter without getting into such things as theory that I, with a high degree of probability, didn't understand myself. Even the electric train analogy, however oversimplified, occurred to me as a way out, but I couldn't bring myself to stand up at the rostrum and begin my briefing with, "General, did you ever have a choo-choo train?"

Inoperable Tasks

Another odd job was a special assignment to accompany an Army general on the Joint Staff to SHAPE Headquarters, then in Paris, and with him to attend a meeting of the NATO Council of Ministers. My orders were to "keep him out of trouble" when he started talking about strategic operations. I had a picture of that—of me clapping my hand over his mouth and saying, "Bite your *tongue!*" Fat chance. Orders were orders, though. I went along and sat outside every important office in SHAPE Headquarters while the general went in and said whatever he said.

The subject before the Council of Ministers was the Multilateral Nuclear Force. It was a US concept, and the American delegate to the Council was not a little hamstrung in his efforts to generate meaningful discussion of the subject because nobody was quite sure what the concept was—not even the US attendees. But SACEUR viewed the basic proposition as a simple dilution of his authority. He saw his position being eroded under the concept from that of SACEUR to SACWHALE —Supreme Allied Commander of WHAt's LEft—and objected strenuously. That reduced the issue in the meeting to a dispute between the US delegation and the US commander of NATO forces. When the meeting started, I wondered why I was there. When it ended, I wondered why anybody was there.

Still another inoperable task was responding to a request from a different Deputy Chief of Staff that he be briefed on strategic operational plans. I was sent. I had a rehearsed presentation on the subject. Some of the material in it was so sensitive that it required special clearances that I hadn't known existed until I got them. When I got to the Deputy Chief's office, I found every available seat taken by members of his staff, there to hear my pitch along with the general. I already had real misgivings about passing along such touchy material to the general himself, because I could see no need for the information in his capacity, but when light colonels are instructed by light generals to do something, light colonels are prone to comply. Nevertheless, there was no possible way of justifying the need-to-know of all those people. Instead of doing the sensible thing and putting the problem before the Deputy Chief, I elected to speak in nearly unintelligible generalities for half an hour.

I didn't get away with it. The lieutenant general got on the telephone and called the Deputy Chief of Staff, Plans and Operations, to complain about having been given the idiot treatment by a two-bit lieutenant colonel from War Plans. The DCS/P&O soothed his ruffled feathers as well as he could and agreed to have me come back with something more specific to say, and then called me into his office. "Go back to General Blank's office," he said, "and give him a slightly more detailed idiot treatment."

A few of my more unshakable colleagues viewed being an action officer as just another job, but to most of us, it was a frustrating, endlessly demanding, nerve-racking assignment. Still, it was a job somebody had to do, and maybe it wasn't as unvaryingly bad as I've depicted it. If nothing else, it was interesting.

"General, did you ever have a choo-choo train?"

But more than that, it was a job in which a man's reach exceeded his grasp to the outer limits of his capabilities. All of that perhaps best came into focus when a young major went to the rostrum in the Air Force's JCS briefing room and in a cool and confident voice told the Chief of Staff what to recommend to the President on a problem of immense international importance—not only told him what to recommend but what to say and even how to say it. And the Chief listened very carefully. He knew that he was hearing the product of untold hours of researching the matter, sorting the relevant from the irrelevant, finding the solution, and convincing twelve echelons of progressively more hardheaded critics that the answer was the right one.

Million Dollar Blue Suit

I retired after three years as an action officer, and, to be honest, I've regretted doing so a thousand times. With all of its stress and strain and sleepless nights, it was in fact the worst assignment of my career, but it was also the most important.

Not long before I hung it up, the JCS met with the Secretary of Defense at SAC Headquarters in Omaha on the subject of strategic target planning. All the indicators pointed to some tough decision-making with lasting repercussions.

First on the day's agenda was a presentation by the SAC staff. Lunch came next, and then a closed session of the Chiefs, the Operations Deputies, and the Secretary. I had already briefed my Chief and Ops Dep on what to expect and what to do about it, and carried my written, classified brief with me rather than saddle either one of them with the job of taking care of it. We sat through the presentation and then broke for lunch. Some SAC acquaintances began herding me to the officers' club, and I was almost out of the building when I heard somebody calling me.

I turned to find the Operations Deputy in hot pursuit. The Secretary of Defense had decided to postpone lunch in favor of an immediate closed session.

"For God's sake, gimme my brains," the general said, smiling. "We're meeting right now."

That was mere flattery—keeping up the morale of the troops, and all that. He needed those "brains" like China needed fertility pills. I said, "Yes, sir," handed him my written brief, and he took off for the meeting. Still, there was something about that little exchange that went to the heart of the matter of being an action officer. Certainly I had labored over that brief; I labored over every one I wrote. But now the Chief of my Service was about to take on the Secretary of Defense in a debate over an issue that was vital to the nation's security, and he was going to be using whatever logic I had put into the brief, my supporting argumentation, and even my very words, lifted from what was called a "talking paper," to get my recommendation adopted. In that sense I, rather than my Chief, was debating the Secretary. And in that sense, the Chief was now working for me, because the outcome mattered very much to me, both as a citizen and as a guy in a blue suit.

It was a rare occasion when action officers were allowed to sit silently in The Tank while the Joint Chiefs considered a problem they had worked on. I did that a couple of times, and, at one point, the Chairman of the JCS proposed a compromise to the conflicting views being presented by the individual Chiefs. The Navy Chief agreed to the compromise. The Army Chief agreed. The Commandant of the Marine Corps agreed. But the Chief of Staff of the Air Force held out until he caught my eye, and the question on his face was unmistakable: "Is it all right if I agree?" Bursting with pride at that simple gesture, I nodded, and only then did he agree to the compromise. You couldn't have bought my blue uniform for a million in cash that day.

I still have occasional dreams about my tour as an action officer. Most of them are fantasy, but there's one that always jolts me awake right away. In it, an administrative NCO walks into my office, hands me a paper, and says, "Sir, you're on tomorrow's JCS agenda with this. Briefing is firm at 0900." Then I realize that I was only dreaming again. That puzzles me. If the job was all that bad, why is it the only one I ever dream about? ■

"DO SOMETHING WITH THE POTATOES"

During the Vietnam War, one of the volunteers in our Red Cross office became frustrated waiting for word from her husband, serving at Osan AB in Korea, about his rotation date. She sent the following message to the Red Cross Field Director on her husband's base:

FROM ARC VENTURA CALIFORNIA: TO FDO [FIELD DIRECTOR OVERSEAS] RE: LT COL R.H.S. . . . APO SF 96570. OFFICER DUE ROTATION ONE MARCH. NO WORD REGARDING PLANS SINCE EIGHTEEN FEBRUARY. PLEASE COUNSEL OFFICER ON DIFFICULTIES KEEPING CANDLES LIT, COLD DUCK IN REFRIGERATOR, ROAST FROM DRYING OUT, POTATOES AND OTHER THINGS HOT FOR UNDETERMINED LENGTH OF TIME. WHILE SERVICE WIFE AWARE OF MANY PROBLEMS RE OFFICER'S ROTATION, SONS ARE DISTRESSED BY UNCERTAINTY OVER WHEN TO GET HAIR CUT. FAMILY ONLY WISHES TO BE KEPT INFORMED.

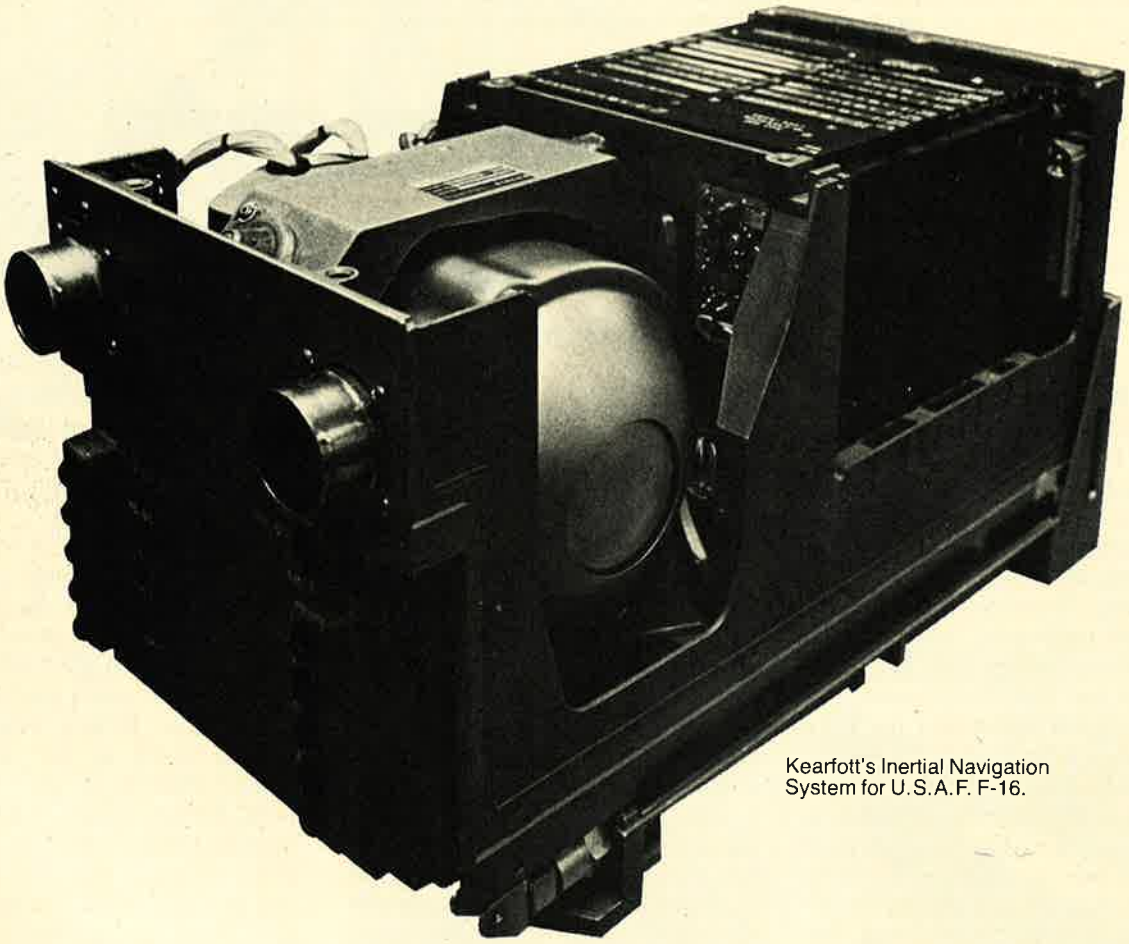
Twenty-four hours later, ARC Field Director's reply was received:

RETEL: LT COL R.H.S. . . . OFFICER CONTACTED THIS DATE. REASON FOR NO WORD CONCERNING PLANS IS THAT THERE IS NO PLAN. SCHEDULED ROTATION DATE STILL FIRM (ONLY YEAR IN DOUBT). OFFICER ADVISES: DON'T DRINK COLD DUCK, SERVE ROAST, DO SOMETHING WITH THE POTATOES, BUT KEEP OTHER THINGS HOT. GET BOYS' HAIR CUT.

—Contributed by Fran Bradbury, former Director of Service to Military Families, ARC, Ventura, Calif.

(AIR FORCE *Magazine will pay $20 for each anecdote accepted for publication.*)

THE STANDARD FOR INERTIAL NAVIGATION SYSTEMS



Kearfott's Inertial Navigation System for U.S.A.F. F-16.

Kearfott's Inertial Navigation System (INS) for the F-16 consists of two major line replaceable units—Inertial Navigation Unit (INU), and a Fire Control Navigation Panel (FCNP). It is a prime sensor for aircraft velocity, attitude, and heading, and a prime source of navigation information.

Navigational data are developed from self-contained inertial sensors consisting of a vertical accelerometer, two horizontal accelerometers, and two-axis displacement GYROFLEX® gyroscopes. The sensing elements are mounted in a four gimbal, gyro-stabilized inertial platform with the accelerometers, which are maintained in a known reference frame by the gyroscopes, as the primary source of information. Attitude and heading information is obtained from synchro devices mounted between the platform gimbals.

The system provides pitch, roll, and heading in both analog (synchro) and digital form. In addition, the following outputs are provided on a serial MUX channel (MIL-STD-1553):

- Present Position—Latitude, Longitude, Altitude
- Aircraft Attitude—Pitch, roll, Heading (True and Magnetic)
- Aircraft Velocity—Horizontal and Vertical
- Steering Information—Track Angle Error

In order to permit operation in aided-inertial configurations, the INS accepts the following digital inputs in MUX serial format (MIL-STD-1553):

- Position Update—Latitude and Longitude
- Velocity Update—Velocities in INS coordinates
- Angular Update—Angles about INS axes
- Gyro Torquing Update—Torquing rate to INS gyro axes

Significant features:

- MUX interface (MIL-STD-1553)
- Lightweight—33 pounds
- Small Size—7.5″h x 15.2″d x 7.5″w
- High Precision—better than 1 nm/h
- Rapid Align—9 minutes at 0° F
- Fast Installation/Removal—rack and panel-type mechanical interface
- Provides Back-up MUX Control in Event of Fire Control Computer Failure

For additional information write to: The Singer Company, Kearfott Division, 1150 Mc Bride Ave., Little Falls, N.J. 07424.

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During the Battle of Britain, German pilots were mystified by the better-than-predicted performance of the Spitfires and Hurricanes awaiting them across the Channel. Then German technicians, analyzing the inner workings of a Spit shot down in Belgium, discovered the potency of . . .

Dr. Sweeney's Secret Formula

BY RUSSELL WARREN HOWE

THE Battle of Britain lasted for thirteen weeks, from early July through the end of September 1940. Early in the conflict, German pilots realized that there was something wrong with the briefings they were getting on the RAF's Spitfires and Hurricanes. Those two British fighters were performing well beyond their forecast capabilities. Why?

It was not until three weeks before the Battle ended that the Germans learned how stunningly simple was the British secret.

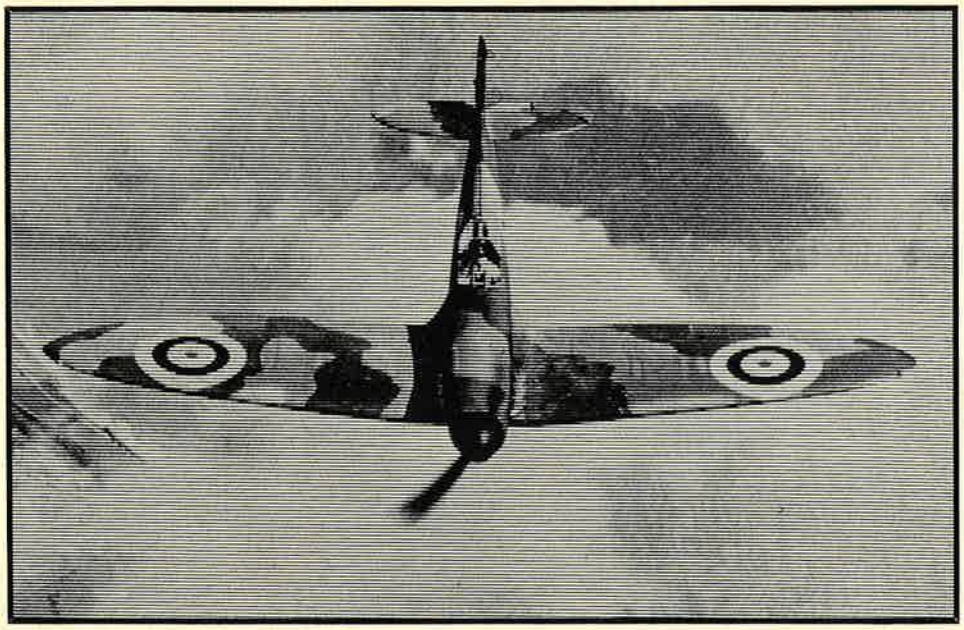
Adolf Galland—Hitler's youngest general and possibly the best pilot on either side in 1940—still recalls his mystification about the unexpectedly high performance of the two British planes. That the fighting spirit of the mostly amateur British pilots should be at least as good as that of the highly trained Germans was not surprising: The British were playing a home game, every day. A pilot might lose an encounter, bail out, and still be home for dinner; a German who escaped from a burning plane could look forward to a long stretch behind barbed wire.

That the British had caught up with—and improved on—the German invention of radar had been confirmed at the outbreak of war the year before, when trelliswork antennas had sprouted on the white cliffs of Dover.

The virtues of the Rolls-Royce Merlin engine in both the Spitfire and the Hurricane were well known in Berlin. One of the Merlin's predecessors, the "R" engine, twice had captured the Schneider Trophy (single-engine speed contest), and another, the Kestrel, had powered the earlier model of the Messerschmitt Bf-109. But the Merlin was seen by Luftwaffe experts as slightly lower-powered than the 1,100-hp Daimler-Benz 601A with which the Me-109E entered the war.

The Germans also knew that, after the Battle started, a rush job had been done to replace the Spitfire's two-pitch propeller and the Hurricane's fixed-pitch wooden prop with constant-speed models.

All these factors were seen as helping make up for the greater maneuverability of the "109" over both British planes. The Spitfire's turning radius (880 feet at 90 degrees of bank and 300 mph) was not as tight as the Messerschmitt's (750 feet), nor as the Hurricane's (800 feet). But the Spit was the fastest of the three (360 mph in a thirty-second burst) and, because of its strong, elliptical wings and mono-



The Spitfire was the fastest of the fighters engaged in the Battle of Britain.

When not flying, RAF fighter pilots stood alert (left) awaiting the next scramble (below). As the attackers, Luftwaffe pilots did not face that fatigue factor.

shell construction, could pull out of dives at speeds that would have wrenched the wings off the German fighter. (A diving Spit was the first aircraft to go through the sound barrier—unintentionally, of course—and survive, thus discovering the crossed-controls factor.) What the Hurricane lacked in speed and slightly in maneuverability, it made up for in armament. (Hurricane squadrons scored as many kills as Spitfire squadrons, but Hurricanes were shot down more often.)

All of this still left the Germans, on balance, the likely victors. As the attackers, and with 2,500 bombers and fighters opposing the RAF's 900 fighters when the Battle started, they could choose the time and place of battle every day. Spitfire and Hurricane pilots, many with only two weeks' type-conversion and combat training, not only had to fight, refuel, and fight for nine hours at a stretch, but also had to spend ground time sitting or sleeping at "dispersal," not knowing when the next call was coming. Galland, Mölders, and their comrades could work to a prearranged timetable. The main single German advantage may well have been their lower fatigue factor. Nevertheless, they were not winning a quick victory, and the performance of both British aircraft, notably in rate and speed of climb, could not be accounted for by the data the Germans had. In Battle of Britain dogfighting, when the RAF had to climb not only above but around Luftwaffe formations on their northward course from bases across the Channel, climbing performance was of major importance.

The Secret Is Out

It was not until that bright, unusually warm September of 1940 that a crippled Spit on bomber escort went out of control over Belgium. Before bailing out, the pilot tried but failed to point his aircraft toward the Channel. German technicians were soon all over the first Spitfire wreck they had had a chance to see. Someone ordered a routine analysis of the fuel. *Gott im Himmel!* The British were not using 87-octane at all as did every other European air force, including the Luftwaffe. They were using 100-octane, which only the Americans made. So those Yankee scoundrels were not obeying their own Neutrality Law about war supplies! Moreover, the fuel in question proved to be something special and the Germans could not use it. The powerplant in the "109" wasn't adequately supercharged.

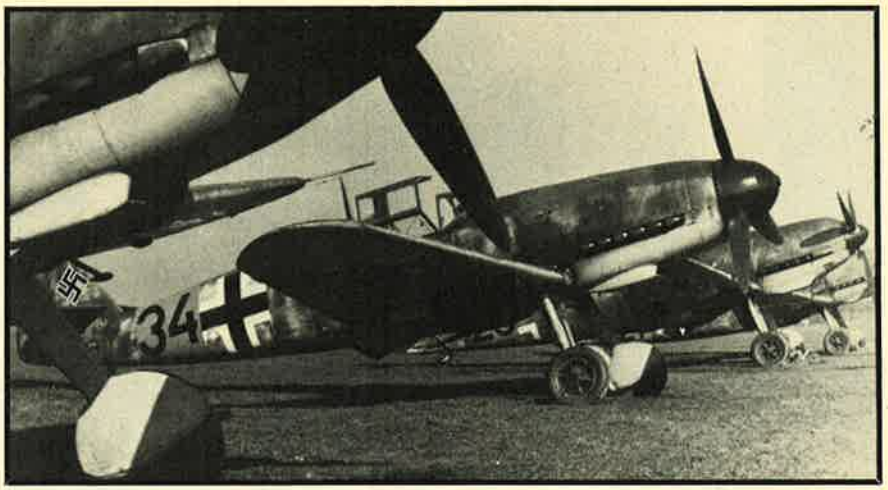
Some months later, the RAF's Air Chief Marshal Arthur Tedder was asked about the Battle of Britain, and was expected to make the standard response that it was won by three factors—the "Few," their Spitfires, and radar. Instead, Tedder left out the last two factors, ascribing the victory to "the skill and bravery of the pilots, the Merlin engine, and the availability of suitable fuel." He did not elaborate, and the reporter never thought to ask him what he meant.

The fuel to which Tedder referred was so "suitable" that, with the Merlin's automatic mixture control, governed by the manifold pressure, the engine produced 1,300 horsepower instead of the roughly 1,000 horsepower achieved with earlier fuels (which explains why 100-octane became known as 100/130). Codenamed BAM-100 (British Air Ministry 100 octane), this superblend was evolved by Standard Oil of New Jersey (company names are those used during World War II) at its Bayway, N. J., research affiliate, under the guidance of Harvard and MIT-trained Dr. William J. Sweeney, then the firm's vice president for fuels research.

On the old 87-octane gasoline, Spitfire and Hurricane pilots had to take off at less than full throttle,

with a manifold pressure not exceeding six pounds per square inch. A "gate" on the throttle quadrant set the limit. Only at lean-mixture levels could the pilot begin to force the throttle lever past the gate. With the 100/130 mixture, the Merlin could take off at full throttle, with twice the former manifold pressure.

Today, as the Battle of Britain is gradually being demythologized—with "kill" figures scaled down to reality, and now-declassified reports revealing glaring mistakes and high-echelon ego-battles on both sides—a sober appraisal of the event points



Above, two Me-109Fs in foreground with two 109Es behind them. The 109E was the Luftwaffe's principal fighter during the Battle. Left, Hurricanes heading for an intercept.

to two facts: The British won by a hair, and they would not have mauled the Luftwaffe sufficiently to persuade Hitler to drop his invasion plans, and fatally revise his whole war strategy, without BAM-100.

How BAM-100 Happened

Early aircraft used automobile fuels. Since detonation (knocking), or anything else that damaged an engine, was more of a problem in the air than on the road, there was massive research on aviation gasoline between the two world wars. Two major breakthroughs were the use of TEL (Tetra-Ethyl-Lead) and hydrogenation, or clustering two hydrogen atoms around each carbon atom to produce a branched chain iso- (identical) molecule with the formula C_8H_{16}—iso-octane in its 2-2-4 trimethyl pentane form. Ironically, hydrogenation had, like radar, been pioneered in Germany, with patent licenses being acquired by Standard Oil through an exchange-of-technology agreement with I. G. Farbenindustrie.

The "100/130" story goes back to shortly before World War II, when Sweeney and Merle R. Fenske —a Penn State chemist whom Sweeney had met while lecturing as an assistant professor at that university—began working together on advanced iso-octane blends, using hydrogenation, alkylation, and various copolymers to increase antiknock qualities in high-octane aviation gasoline. Because of Rolls-Royce and RAF interest, they worked in close cooperation with Anglo-American Oil, Jersey Standard's British subsidiary, where such people as Will Walter White, Hugh Tett (later, Chairman of Esso-Britain), and aviation and petroleum engineer Alexander R. Ogston (now an American and a retired Exxon executive living at Tenafly, N. J.) were deeply involved.

By 1939, the US Army Air Corps had gone over to 100-octane, but the British wanted a blend of their own that would exploit the "rich-mixture response" of the highly supercharged Merlin. This was the first aviation engine with automatic mixture control: an aneroid capsule was actuated by the manifold pressure, with a second capsule leaning the mixture according to altitude. "Rolls-Royce," Alec Ogston recalls, "had decided that a pilot in combat would be much too busy to fuss with a manual mixture control."

Various blends were tested against the BAM-100 specification before Sweeney and his chemists hit the money in the spring of 1939 with a batch of fuel prepared by hydrogenation at Baton Rouge, La., using a feed stock processed from high-quality Quiri Quiri crude from Venezuela.

Tested on a single-cylinder engine at Wright Field (now Wright-Patterson AFB, Dayton, Ohio) and later in single-cylinder Pegasus and Merlin engines in Britain, Sweeney's blend, incorporating aromatics and a high TEL factor, stunned the experts. It had such antiknock qualities that the fuel-air mixture could be enriched to raise the supercharger or "boost" pressure enough to give a thirty percent increase in power without causing detonation.

The British ordered all the BAM-100 they could get. Jersey Standard

Russell Warren Howe, a former correspondent for the Washington Post, is currently a free-lance writer. He was an RAF pilot during the final stages of World War II. Mr. Howe's next book, The Game of Weapons: Arms, Money & Diplomacy, *is to be published by Doubleday & Co. early in 1979.*

put three refineries to work. In June 1939, three months before the outbreak of war, a company tanker, the *Beaconhill,* set out across the Atlantic with the first commercial-quantity load, some of which was set aside in Britain as the RAF's 100-octane "reference fuel," whose rich-mixture response curve had to be matched by all future deliveries and by other suppliers.

The British began stockpiling their American fuel from the day the *Beaconhill* arrived, but it was not until March 1940 that the decision was taken to convert all aircraft in Fighter Command to 100-octane. By then, the Battle of Britain was less than four months away, and the decision was not without its critics, since it would make the key squadrons of the RAF entirely dependent on foreign gasoline. What if Britain came under siege? Vulnerable London already was partly evacuated: Ogston and his colleagues were now doing their fuel experiments at Milton Hill, the prewar British estate of US sewing-machine tycoon Mortimer Singer.

The Wellspring of Victory

All British fuel had to be imported from colonial or other sources, but the concern about being dependent on *American* fuel was not unreasonably chauvinistic. The previous September, America-firsters in Congress had made 100-octane gasoline a "strategic material," which could not be supplied to "any belligerent" under the Neutrality Act. But through a Rooseveltian compromise, a month later, US fuel became available again on a "cash and carry" basis, if it was shipped in non-American bottoms from "non-neutral" refineries.

Jersey Standard, which supplied eighty-three percent of the fuel used by Fighter Command in the Battle of Britain and about seventy percent of that Command's needs throughout World War II, relied on its refinery at Aruba in the Dutch West Indies. Shell, which perfected 100/130 fuel shortly after Standard, and which provided the remaining seventeen percent of avgas for the Battle of Britain, used its facility on Aruba's sister-island of Curaçao. (Holland, because of the Nazi invasion, was a "belligerent.") After America entered the war, Esso also supplied Britain, under Lend-Lease, from Baton Rouge and Bayway, while Shell supplied avgas from Houston, Tex. Later in the conflict, the Anglo-Iranian Oil Co. (now BP) made 100/130 in Abadan, while more came from what is now Indonesia. More than 300 tankers carrying 100/130 across the Atlantic were sunk by the German Navy—roughly one in every six.

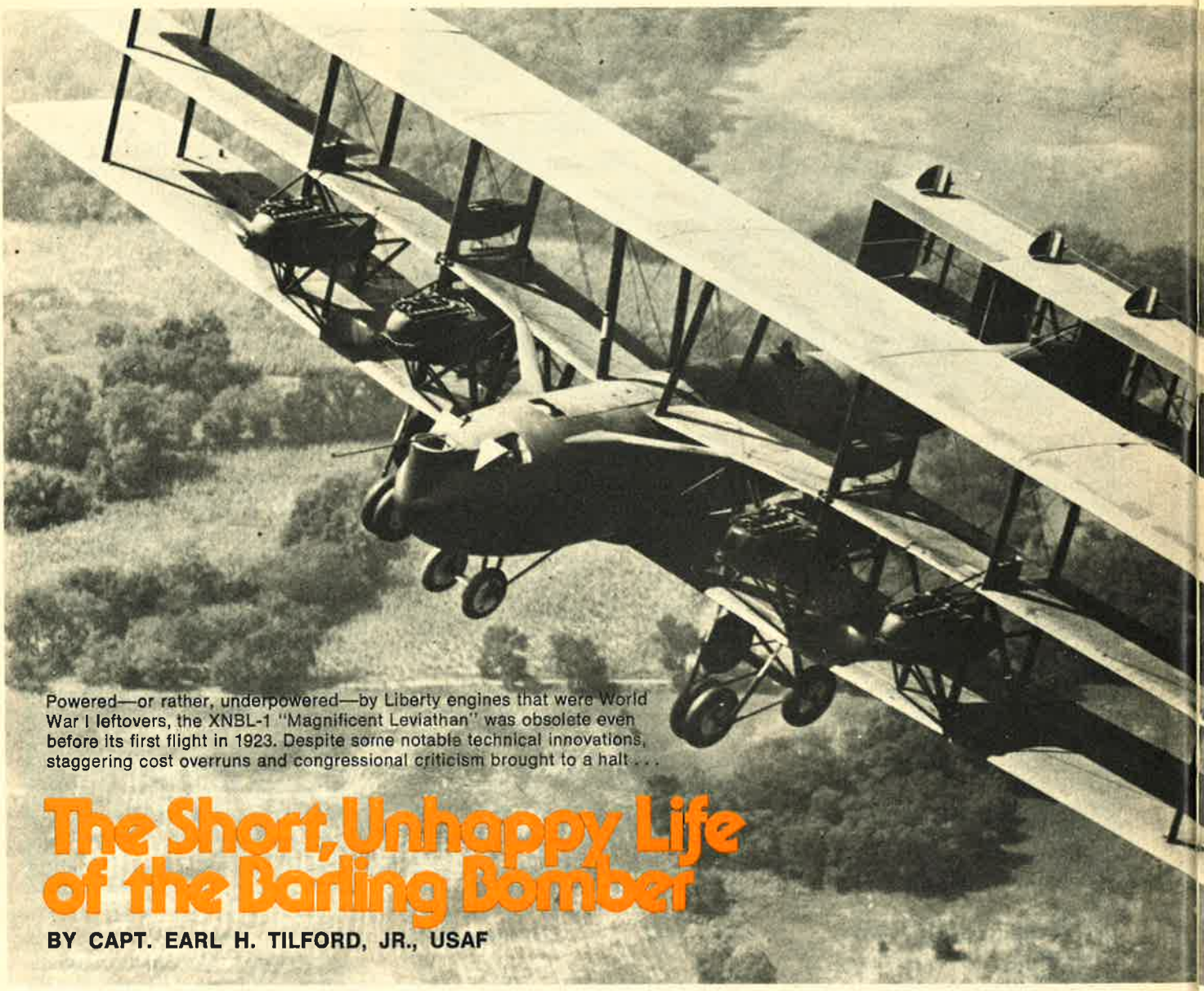
After the Battle of Britain, RAF Bomber Command went over to 100-octane, to be eventually followed by all other units except Training Command.

The first 100-octane avgas made in the United States had cost $25 a gallon. Eventually, when "100/130" became the plasma of all the Allied air forces, the price came down to fifteen cents. Only in July 1944, when the US Army Air Forces began ordering 115/145 avgas for B-29 Superfortresses, did a new superblend steal the limelight. By war's end, the Allies were consuming 26,680,000 gallons of aviation gasoline of all grades every day, almost ninety-five percent of which was produced in the US and at three Caribbean refineries.

Today, Dr. Sweeney, now living at Summit, N. J., is one of the few surviving American fuel technologists who tipped the scales for Fighter Command in the Battle of Britain. He still talks with passion of his achievement and of the events that led up to it. Sweeney's visits to Germany before World War II had convinced him that an epic war was in the making, and from his talks with Rolls-Royce engineers in Britain, he had come to understand their challenging problem: Without a superfuel the highly supercharged Merlin would be like an unshod racehorse.

Using an American corporation's huge network of facilities, technicians, and tankers, he came up with a blend that gave Spitfires and Hurricanes the edge needed to win the battle that turned the fortunes of war. ■

A convoy in the North Atlantic, heading for Britain. During the war, more than 300 avgas tankers were sunk en route to the UK.



Powered—or rather, underpowered—by Liberty engines that were World War I leftovers, the XNBL-1 "Magnificent Leviathan" was obsolete even before its first flight in 1923. Despite some notable technical innovations, staggering cost overruns and congressional criticism brought to a halt . . .

The Short, Unhappy Life of the Barling Bomber

BY CAPT. EARL H. TILFORD, JR., USAF

In 1919, Brig. Gen. William "Billy" Mitchell, Assistant Chief of the Army Air Service and public relations tactician to the core, asked a young aircraft engineer, Walter Barling, to design a dramatically new airplane able to carry enough bombs to sink a battleship. Mitchell wanted an airplane that would prove his bold claims about bombers in aerial warfare and stimulate public pressure on Congress to revive the post-World War I Air Service budget. The resulting aircraft only partially accomplished the first goal and antagonized Congress in the bargain. But despite these failings, the "Barling Bomber" furnishes an interesting but seldom told early chapter in the history of bomber aircraft in US aviation.

Barling, who had just emigrated from Britain when Mitchell commissioned the project, had previously worked on the Royal Air Force's six-engine Tarrant "Tabor," an experimental triplane bomber and largest airplane of its day, which crashed on its first takeoff, dooming both pilots as well as further hopes for developing the aircraft. From 1919 to 1923, while Barling designed and supervised construction of Mitchell's plane, classified as an Experimental Night Bomber, Long-Range (XNBL-1), Mitchell publicly advocated an expanded role for bombers but kept the XNBL-1 under wraps. Not until eight months after Mitchell, using existing aircraft, sank the German battleship *Ostfriesland* and three smaller warships in June and July 1921 did Congress first become aware of the Barling Bomber—with reactions opposite from what Mitchell had hoped for.

Far from being enthusiastic about the plane, Rep. Daniel R. Anthony protested the projected $375,000 cost for two prototypes and condemned the bomber's weight and size, pointing out that only two airfields in the country, both in Texas, had runways long enough for the plane. Though eventual tests showed the aircraft could take off in 960 feet, Anthony's criticism was the first expression of growing indignation in Congress over the Barling Bomber.

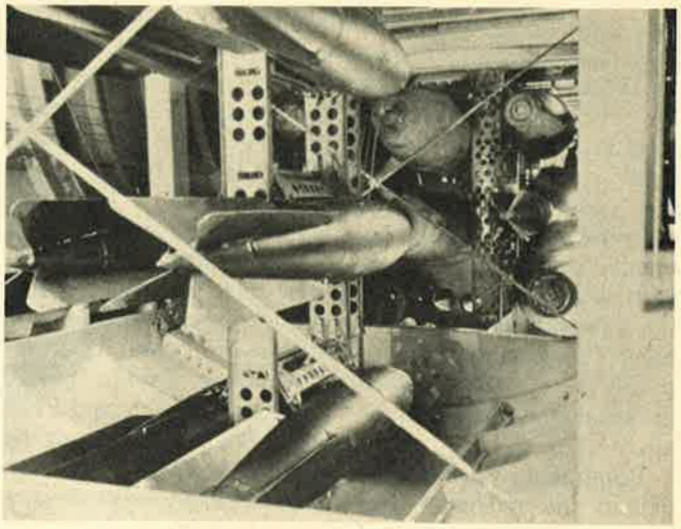
Ironically, Mitchell's characteristic outspokenness on bomber aviation in general further diverted notice of the XNBL-1's potential. Emboldened by the *Ostfriesland* sinking, Mitchell stepped up his debate with military opponents of bombers, ultimately resulting in

his celebrated 1925 court-martial. But neither congressional protests nor the overshadowing military controversy matched the trials encountered in the plane's development and early flights.

Overpriced and Underpowered

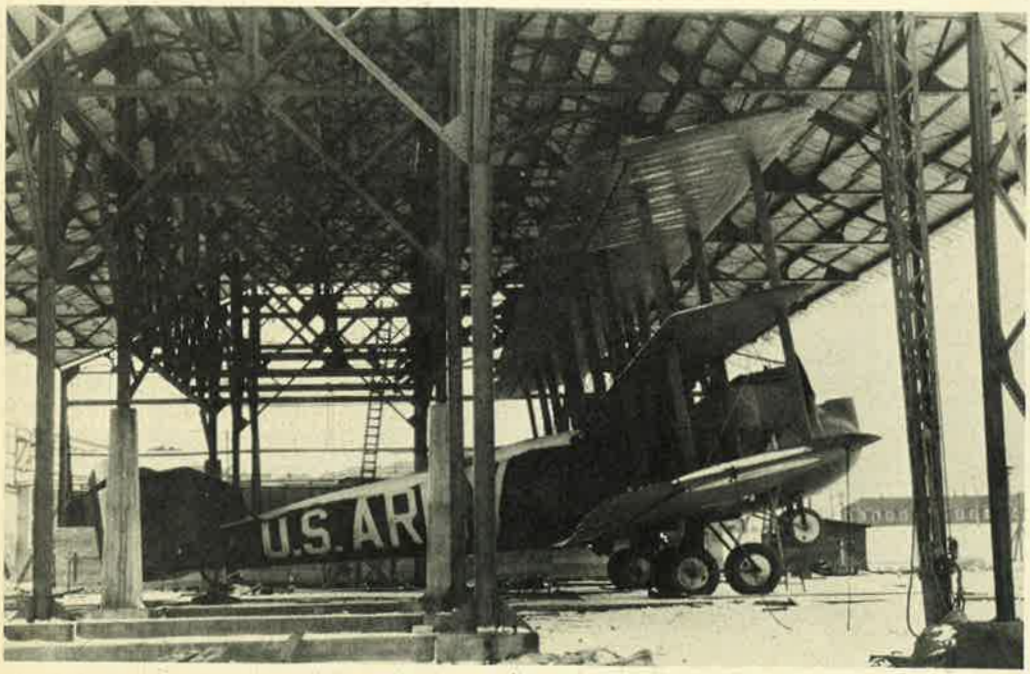
The bomber components were built in Teterboro, N. J., by the Witteman-Lewis Co., but assembled at the Army's McCook Field near Dayton, Ohio, because the Army Engineering Division insisted on coauthorship of the project. This arrangement resulted in mismatched parts and drove costs to $525,000 for a single prototype. Poorly sealed wings trapped large quantities of rainwater, thus throwing off weight measurements during early flights. Since existing hangars were too small, a new large structure was built to keep the plane out of the rain—at a cost of $700,000.

Assembled, the nearly twenty-eight-foot-high bomber was a giant triplane or, more correctly, a two-and-one-half-plane since the middle wing was shorter than the 120-foot upper wing. Three 400-hp Liberty engines—two tractors and one pusher—were on either side of the fuselage between the middle and lower wings, affording a low center of gravity and stability during takeoffs and landings. The surplus World War I Liberty engines, however, were significantly underpowered, resulting in an average power-to-weight ratio of 2,400 hp to 40,000 pounds. By contrast, the B-25 of World War II had two 1,700-hp engines and a loaded weight of 38,700 pounds. The use of Liberty engines, forced by congressional refusal to fund newer engines until World War I powerplants were depleted, doomed the bomber despite its innovations in other areas.



It was ironic that the XNBL-1's bomb bay could accommodate the largest bombs of the day when the plane itself was so underpowered it couldn't get across the Appalachians.

Left: Barling Bomber in flight. Below: The $700,000 hangar built to keep rainwater from accumulating in the top wing.



The XNBL-1's fuselage, for example, was of semi-monocoque construction, reinforced by bulkheads and longerons, rendering the aircraft less vulnerable to anti-aircraft fire. Crew members entered the aircraft through a door on the lower left side of the fuselage and moved forward along a walkway to the nose, which resembled a cross section of a small three-story house. The bombardier sat on a bicycle seat all the way forward on the lower level, a bombsight on his left and a release mechanism on the right. A pulley and rope arrangement delivered written corrections for speed, heading, or altitude to the pilots seated side by side in an open cockpit above him.

The cockpit contained conventional instruments

and controls except for an unusual single-knob throttle. When pushed forward, the knob opened all six throttles. A lateral movement increased power on one side only, while a diagonal shift partially decreased power on one bank of engines while performing the opposite on the other bank. This capability proved useful in taxiing as well as in turning the bomber in the air.

Bomb racks were located behind the navigator and radio operator's compartment and could hold any bombs in the inventory. The racks could carry a mixed payload or a single class of ordnance, including the giant 2,000- and 4,000-pound bombs designed for destroying battleships.

A Short, Unhappy Life

On April 22, 1923, Lt. Harold R. Harris, an aviation pioneer destined to become a brigadier general in the Air Force Reserve; Lt. Muir S. Fairchild, a future USAF Vice Chief of Staff; and engineer Douglas Culver joined Walter Barling for the XNBL-1's maiden flight from Wright Field outside Dayton. The giant bomber lifted from the grass runway after a 960-foot run that took thirteen seconds, silencing some critics who had said it would roll into downtown Dayton before taking off. Harris and Fairchild flew the plane over the field at 2,000 feet, then landed twenty-eight minutes after takeoff.

Despite the bomber's impressive performances at several midwestern air shows, and its establishment of a weight/altitude record, the Liberty engines were unable to lift it high enough to cross the Appalachian Mountains, forcing cancellation of its appearance at a Washington, D. C., air show. Altitude limitations and staggering cost overruns prompted Congress to cut off further development of the Barling Bomber. In 1927, the one prototype was dismantled and stored at Fairfield Depot, near Wright Field, where, in 1929, Maj. Henry H. Arnold, the newly appointed commander, ordered it burned.

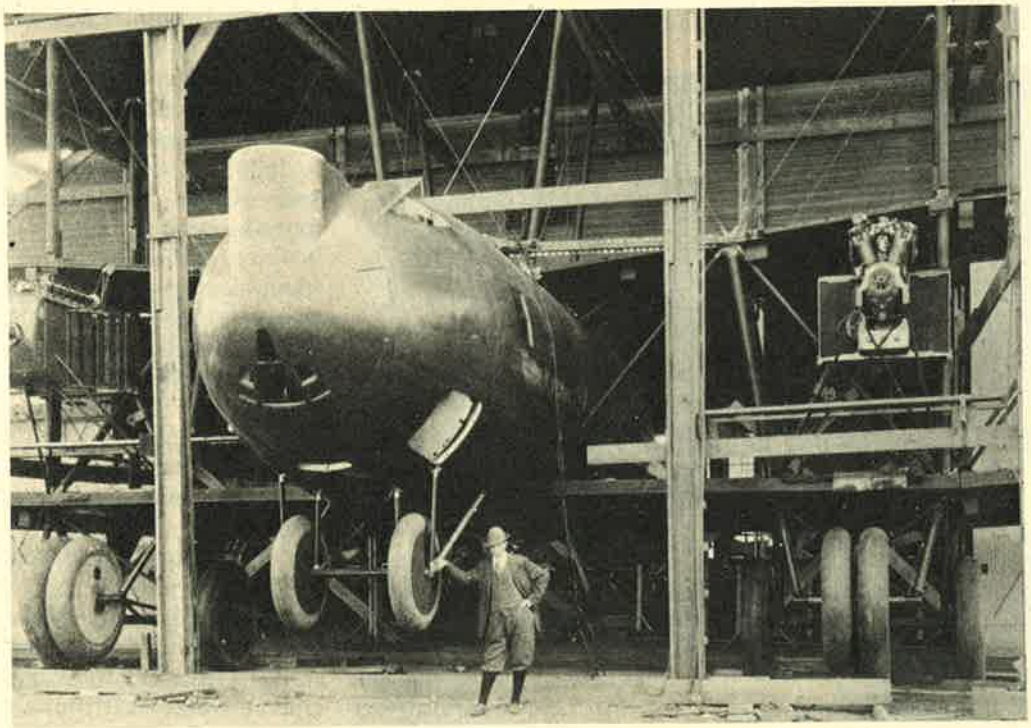
The XNBL-1 was already obsolete when it rolled down the runway on its first flight. Despite innovative construction and throttle controls, the bomber was restrained by engines designed nearly a decade before its airframe construction began, forcing the giant aircraft into a technological dead end—and a public relations washout. Though General Mitchell envisioned the plane as ushering in a new age in aerial warfare, it recalled memories of an earlier generation of flight. Charles G. Grey, an editor of *Jane's All the World's Aircraft,* called the XNBL-1 "a monument of misplaced ingenuity and misspent money . . . which might well have been conceived by an imaginative artist in 1912. . . ."

Progress, however, cannot always be measured in unqualified successes. The "Magnificent Leviathan," as the Barling Bomber was nicknamed, represented a bold attempt to develop a large, multiengine aircraft and, as such, was typical of the innovative spirit and vision prompting development of today's giant airplanes. Barling himself went on to work on other aircraft, including the B-24 and the B-36—planes that helped finally and securely to establish the bomber's role in US aviation. ■

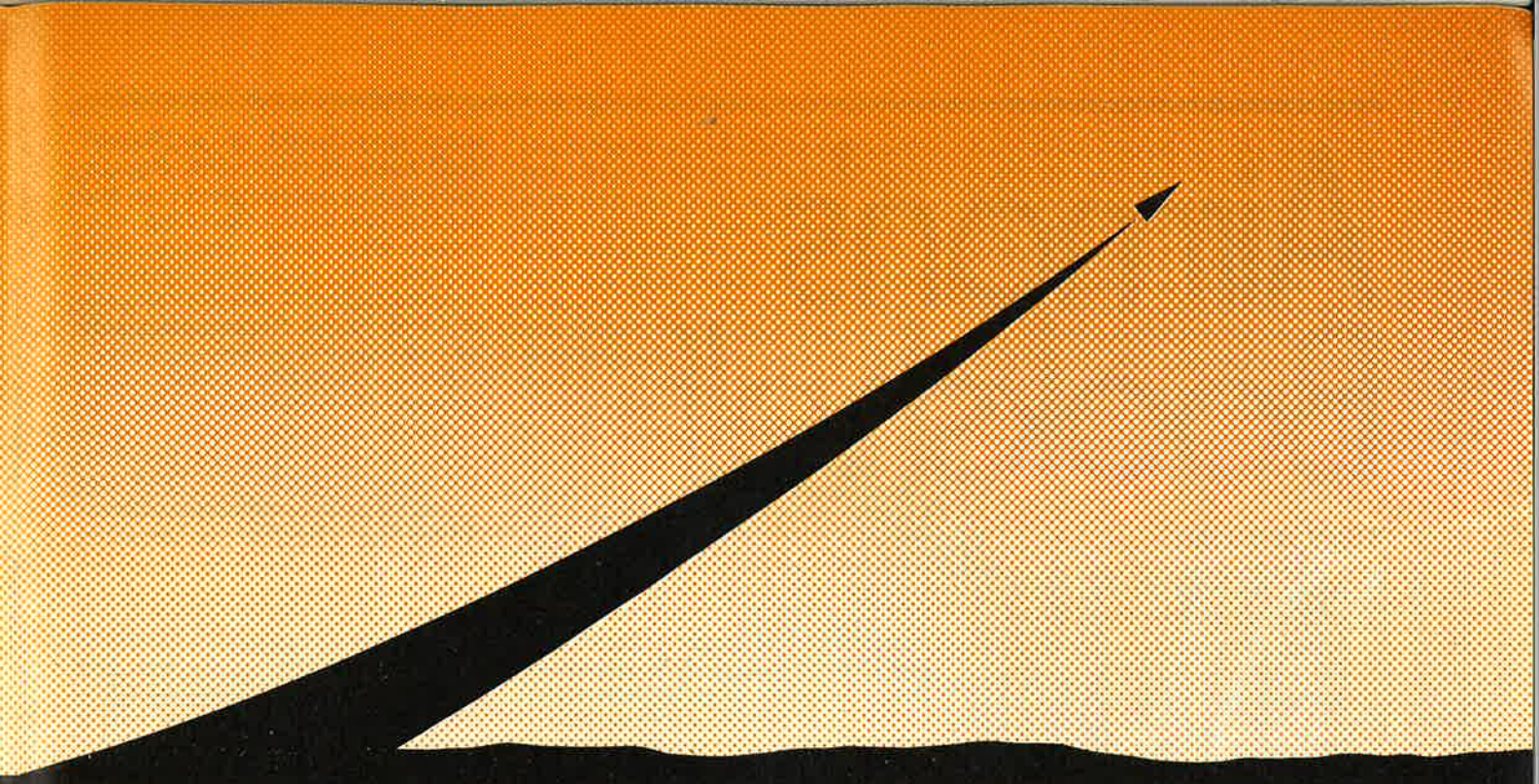
Capt. Earl Tilford, Jr., holds an M.A. in history from the University of Alabama. Currently assigned to the Office of Air Force History, Hq. USAF, he is preparing a history of search-and-rescue operations in Southeast Asia. In previous assignments, he served as an intelligence analyst in Thailand and at Hq. SAC.

TALE OF THE TAPE

	Barling Bomber	B-17	B-52G
Span	120′	103′ 9″	185′
Length	65′	73′ 10″	157′ 7″
Wing Area	4,017 sq. ft.	1,420 sq. ft.	4,000 sq. ft
Empty Weight	27,132 lb.	32,250 lb.	175,000 lb.
Gross Weight	42,569 lb.	53,000 lb.	480,000 lb.
Maximum Speed	95.5 mph	287 mph	660 mph



The Barling presaged the big bomber era of the 1930s and, in fact, had a greater wing area (see box) than its descendant, the B-52G.



The Annual Air Force Almanac

In May, AIR FORCE Magazine will publish its 28th Annual Air Force Almanac issue... the largest and most authoritative reference work on the US Air Force. The 1978 issue will include important reference material, organization charts and statistical data on the Air Force Commands and Agencies, as well as a Guide to Air Force Bases worldwide, USAF and NASA R&D facilities, the list of aces, Medal of Honor winners... plus special articles by the Secretary of the Air Force and the Chief of Staff.

A Gallery of Weapon Systems is being prepared by the staff of "Jane's All the World's Aircraft" with comprehensive descriptions and photographs of all USAF aircraft and missiles. Also included will be expanded data on Air Force budgets, personnel, aircraft inventory, flying hours and procurement.

As you can see, this issue will be a most valuable desktop reference issue, consulted many times during the year by decision-makers in the Air Force, government and the aerospace industry.

You are invited to participate in this important issue with your advertising.

Closing for advertising reservations is March 24, copy by April 5.

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

Airman's Bookshelf

Soviet Airpower

The Soviet Air Force Since 1918, by Alexander Boyd. Stein & Day, New York, N. Y., 1977. 259 pages with glossary, bibliography, and index. $10.

The author traces the development of Soviet airpower from its Imperial Russian origins through the post-World War II era. It is a story of technical progress and ingenious adaptability.

The multitude of facts and figures on airframe types, engine models, and production facilities and rates contrasts with the vibrant characters, policies, and events that color the history of Soviet aviation. Men like Nikolai Zhukovski, the team of Baranov and Alksnis, dozens of designers, pilots, and military commanders interact with each other and with the politics and preferences of Stalin and, to a lesser extent, Khrushchev. Success was frequently rewarded with state honors, special work facilities, or sometimes a personal limousine. For some, failure resulted in imprisonment in special design bureaus for interns, while others disappeared during the purges of the late 1930s.

This history illuminates several attributes of Soviet aviation that originate in Russia's past and apply, though to a lesser extent, to the Soviet Union today. Technology transfer, emphasis on quantity, reliance on proven products, and systemic inhibitions against radical change are very much a part of the Soviet experience. The book also brings into focus such key events as Soviet air experience in the Spanish Civil War, Finland, and Japan; the trials, errors, and success of World War II; and the almost total relocation of the Soviet aviation industry during 1941–42.

Unfortunately, the author devotes too little attention to Soviet air doctrine and strategy. Even the chapter entitled "The Fortunes of Soviet Air Strategy" rapidly deteriorates into a recantation of bomber design and production and military organizations. Doctrine, strategy, and those factors that impact on their development are fundamental to understanding any nation's air forces.

With the author's stated preference for history, the reasons for including the last two chapters on recent developments are unclear. These chapters lack historical perspective and are not sufficiently developed to relate lessons from the past to the Soviet Air Force of today. John Erickson comments on these lessons in his Foreword to the book, but many readers may not grasp the significance of the author's omissions.

In all, Alexander Boyd's book is generally direct and to the point, his bibliography is excellent, and footnotes are informative despite the lack of page references for cited sources. The book contributes significantly to our knowledge of Soviet airpower, if not the Soviet Air Force per se, and may serve as a catalyst for further research.

—Reviewed by Capt. Donald P. McCallin, USAF, Air Force Intelligence Service.

A Hell of a Good Show

Flying Buccaneers: The Illustrated Story of Kenney's Fifth Air Force, by Steve Birdsall. Doubleday & Co., Garden City, N. Y., 1977. 312 pages, including appendix, bibliography, acknowledgments, index. $15.

When Gen. Hap Arnold sent Maj. Gen. George Churchill Kenney to Australia in July 1942, Kenney found the Southwest Pacific Allied Air Forces a shambles. World War II was being fought on a "Europe first" basis. In the Pacific, disorganization and a shortage of men and planes prevailed. Operating distances were great. Theater commander Gen. Douglas MacArthur was unhappy with the performance of his air forces. Kenney calculated he had inherited a mess.

Steve Birdsall's *Flying Buccaneers: The Illustrated Story of Kenney's Fifth Air Force,* begins with the organization of the Fifth Air Force in September 1942 and ends when Kenney stood with MacArthur on the deck of the battleship *Missouri* in Tokyo Bay to accept the Japanese surrender.

This is not a scholarly history, but a fast-paced, profusely illustrated narrative that emphasizes men and missions, often a minute-by-minute account of the air actions fought by the Fifth. It is the story of airmen struggling against distances, weather, and the enemy, and how a superior air force was built almost from scratch. The battles are described in detail—Bismarck Sea, Hollandia, Rabaul, the Philippines—as well as the exploits of Bong, McGuire, Walker, Pease, MacDonald, Lynch, Henebry, Ellis, Gunn, and many others. Kenney liked "operators," airmen with confidence and imagination—in today's jargon, "problem-solvers." He placed them in command—men like Walker, Whitehead, and Wurtsmith.

Birdsall, an Australian, worked in the relevant archives and talked with the men of the Fifth. He succeeds in recapturing the struggles and victories of those who flew air-superiority, reconnaissance, transport, attack, and bombing missions. Here are the stories of the development of para-frag bombing, skip-bombing, and the many remarkable innovations made by men like "Pappy" Gunn.

General Kenney was able to win MacArthur's confidence and admiration by simultaneously building his forces, instilling confidence in them, and making the appropriate strategic moves against the enemy. He also had to convince Hap Arnold that the Allied Air Forces (subsequently the Far East Air Forces) deserved additional men and planes. It was a constant struggle for resources in competition with the European Theater. Even here Kenney did well, usually getting less than he wanted, but often more than he expected.

From New Guinea and the Philippines to Formosa and Japan itself, the Fifth Air Force wrote a fascinating chapter of air history. Its accomplishments have been overshadowed by the great strategic bombing offensives against Germany and Japan.

However, the Fifth's campaigns remain unique in scope and character and in their vital contribution to winning the Pacific war. As Gen. George C. Kenney would have put it: "It was a hell of a good show."

—Reviewed by Herman S. Wolk, Office of Air Force History.

The Generals on Vietnam

The War Managers, by Douglas Kinnard. The University Press of New England, Hanover, N. H., 1977. 216 pages; with appendices, bibliography, and index. $14.

Those given to questioning the credentials of authors who address the American experience in Vietnam, a frequent reaction when their findings are critical of the US effort, will have to argue with the author of this book on a different basis.

Douglas Kinnard, now an Associate Professor of Political Science at the University of Vermont, is also a retired Army brigadier general (USMA, 1944) who served two tours in Vietnam: 1966–67 as a colonel with J-3, MACV; and 1969–70 as CG of II Field Force Artillery and later CofS, II Field Force Vietnam. Following retirement in 1970, he began work for a Ph.D. at Princeton. On learning, in 1974, that Gen. Creighton Abrams was seriously ill, it occurred to him that a reassessment of the war, from the point of view of the Army general officers who had commanded in Vietnam, not only might prove valuable but had better be gotten under way while those generals were still around and before their memories of the war faded.

On the basis of his own experiences and independent research, Kinnard designed a sixty-item questionnaire that he sent to the 173 general officers who qualified. (There had been 183, but nine had died and he excluded himself.) An astonishing 111, or sixty-four percent, responded, an extraordinarily high level of cooperation given the nature of the survey. The results, which will lead some readers toward disparaging remarks about 20/20 hindsight, are often striking, particularly with regard to the level of introspection frequently revealed. Some ninety-one percent of the respondents, for example, now admit that a better definition of objectives was necessary, while more than half of the generals thought, at least by September of 1974, that US forces should never have participated in combat in Vietnam, that our involvement should never have gone beyond the advisory level. Even at that level, some of the comments suggest we were largely unprepared for the special nature of the task. For example:

> If I were a Vietnamese, I would have been overwhelmed by the Americans, if not in numbers, then in energy, ideas, and activity. This is not the Vietnamese way of doing things. We focused on everything to the point where the Vietnamese had no idea of priority.

> We never took into account the cultural differences. We tried to use the advisory methods of Korea in Vietnam. They were not applicable. The Koreans perceived they were struggling to survive. The Vietnamese perceived it differently—their environment was more benevolent in their eyes.

> . . . we never really established rapport. This was largely due to our overinflated hypnosis with the myth that the American way—in economics, politics, sociology, manners, morals, military equipment, methodology, organization, tactics, etc.—is automatically and unchallengeably the best (really the only) way to do things. This failure may well be the area of greatest weakness for the future of American arms.

Such comments, which this reviewer can attest are equally valid for the Air Force advisory effort, sound more like those we are accustomed to finding in the writings of people who looked on from afar. Also, they are on the mild side when compared with some of the comments Kinnard includes pertaining to such topics as the adoption of an attrition strategy, methods of command and control ("too many squad leaders in the sky"), or measurement of progress via body count ("a blot on the honor of the Army").

Inevitably, such viewpoints will call forth queries about whether they were raised at the time by those in charge. Surely many of them were, but just as surely the majority had to be set aside in the prevailing context of getting the job done. The point is not whether they are owing to hindsight, but whether they have a validity worthy of our attention. The examples given above, to be sure, represent only one aspect of our involvement and only a minor part of the survey results and Kinnard's analysis thereof. They are, however, representative of ideas that literally beg for study and debate at the war colleges, where the current tendency is to concentrate on the details of tactics and logistics (when it is not to slight the Vietnam experience by emphasizing improbable scenarios of conventional war on the North German plain).

General Kinnard stands squarely with those who believe that the need for incisive reassessment of our Indochina experience is self-evident. His book, the result of an excellent idea brilliantly executed, offers a superb starting point. As such, it deserves the attention of all serving officers.

—Reviewed by Lt. Col. David MacIsaac, Department of History, USAF Academy.

The Jane's Yearbook

Jane's All the World's Aircraft 1977–78, edited by John W. R. Taylor. Distributed in the US by Franklin Watts, Inc., 730 Fifth Ave., New York, N. Y. 10019. 903 pages, large format, with index. $72.50.

Each December—all the world around—government agencies concerned with foreign, defense, and commercial affairs; journalists; engineers and designers; and aviation buffs look forward to the new edition of *Jane's All the World's Aircraft.* Its publication is an event, for *JAWA* is something more than a book. Now in its sixty-eighth year, it, along with Editor John W. R. Taylor and his staff, forms an institution that is unique in the aerospace world.

This year's *JAWA* received more than the usual media attention. In the Foreword—Editor Taylor's annual review of the state of aerospace affairs—Mr. Taylor documents in detail his opening statement that ". . . the fragile coexistence main-

Airman's Bookshelf

tained for a generation by balanced East/West military power is being allowed to slip, inch by inch, from our grasp." It is a message that policymakers in the West should take to heart.

The 1,500,000 words and 1,500 illustrations that follow the Foreword cover in minute technical detail the aerospace products of thirty-seven nations, including fifty-two pages and 159 photos and planviews of Soviet military and commercial aircraft.

Beyond this unparalleled catalog of airplanes, there are sections on engines, sailplanes and hang gliders, home-builts, RPVs and target drones, air-launched missiles, spaceflight and research rockets, and satellites and spacecraft launched during 1976.

Readers of this magazine who see *Jane's Supplement* every other month will be familiar with the *JAWA* format for reporting on aircraft. But those who have not seen the book itself will find a trip to the library for hands-on experience a rewarding exercise. *JAWA* cannot be described adequately in words. While the price may seem a bit steep, there is no substitute for those who need this encyclopedic work in their professions—or for truly dyed-in-the-wool aviation enthusiasts. And after all, one can't buy a Rolls-Royce for the price of a Pinto.

—*Reviewed by John Frisbee, Editor.*

New Books in Brief

Arnhem 1944, by Janusz Piekalkiewicz. This is a day-by-day account of the Allied airborne operations at Arnhem in German-occupied Holland from September 17–26, 1944. The author, a member of the World War II Polish Underground Army who survived to become a filmmaker in Paris, London, and West Germany, interviewed many Allied and German survivors of the battle, and assembled hundreds of combat photos from both sides for this dramatic large format book. The Allied failure was a result of faulty intelligence in this last major German victory of World War II. Charles Scribner's Sons, New York, N. Y., 1978. 113 pages. $12.95.

Armoured Fighting Vehicles of the World (Revised 3d Edition), by Christopher F. Foss. Photographs and technical data on the tanks, armored personnel carriers, self-propelled guns, armored cars, recovery vehicles, and other specialized ground forces armored equipment of twenty-seven countries will be found in this standard work by a British authority on army equipment. Charles Scribner's Sons, New York, N. Y., 1978. 192 pages with index. $7.95.

Brothers in Blood: The International Terrorist Network, by Ovid Demaris. Qaddafi, the premier of Libya, paid $10 million for the Munich killings in 1972, while other Middle East countries pour some $265 million into terrorist activities each year, the author states. He links several other terrorist attacks to interested powers and says the terrorist group responsible for the Olympic massacre had ties to the KGB. This book traces the history of modern terrorism and offers insights into the explosive situations in the Middle East and Ireland. Charles Scribner's Sons, New York, N. Y., 1977. 441 pages. $12.50.

Der Adler, edited by S. L. Mayer and Masami Tokoi. This large format book is made up of articles from the official Nazi Luftwaffe magazine, *Der Adler,* supplemented by color photos from Tokoi's collection of rare World War II pictures. The magazine was part straight reporting on Luftwaffe activities, part propaganda. Of particular interest are items and photos dealing with the Battle of Britain in which, it seems, the Luftwaffe suffered no defeats at the hands of the RAF. Thomas Y. Crowell Co., New York, N. Y., 1978. 192 pages. $12.95.

Three reissues of the TAB/Modern Aircraft Series are: *Lightplane Construction & Repair,* by Al Snyder and William A. Welch; *Aircraft Dope & Fabric,* by Ruth and Warren Spencer; and *Modern Aerobatics and Precision Flying,* by Harold Krier with Bill Sweet. TAB Books, Blue Ridge Summit, Pa. 17214. Books are from 120 to 126 pages. $3.95 each, paperbound. ■

GEN. DAVID C. JONES

CHIEF OF STAFF, U.S. AIR FORCE

THE 100th JIMMY DOOLITTLE FELLOW

Gen. David C. Jones receives the Jimmy Doolittle Fellow plaque, designating him the 100th Jimmy Doolittle Fellow, from the President of the Aerospace Education Foundation, Dr. William L. Ramsey, at the Luncheon in honor of the Chief of Staff, held at the AFA Convention on September 20, 1977.

During the 1977 AFA Convention, a reception in honor of all Jimmy Doolittle Fellows was held on Monday evening, September 19. Shown at the reception, from left, are: the Chairman of the Aerospace Education Foundation's Board of Trustees, Sen. Barry Goldwater; Mr. Richard Knobloch, Vice President, Iron Gate Chapter, New York, who had earlier presented $35,000 from that Chapter to the Foundation (including fifteen Jimmy Doolittle Fellows); Mr. George D. Hardy, former AFA National President and presently Treasurer of the Foundation; and Mrs. Hardy. Also in attendance were the Chief of Staff and the Secretary of the Air Force.

The Aerospace Education Foundation's Jimmy Doolittle Fellow program now has 118 individual Fellows and two Corporate Fellows. The Foundation invites additional affiliations through tax-deductible $1,000 contributions honoring individuals, or $15,000 corporate contributions. All income so received is used for mastering Air Force training courses and disseminating them to the civilian education community on a reproduction cost plus handling fee basis. None of the Fellow contributions is used for overhead expenses.

Support received under the Fellow program has enabled the Foundation to make twenty-three Air Force courses available to civilian schools, with approximately twenty more planned for release in 1978. More than 700 school and training systems in forty-eight states have purchased 1,156 courses, representing 210,000 hours of instruction. Not only does this help the civilian educational community by making accessible to them validated multimedia course systems with the tax dollar serving double duty, but it also enhances the Air Force public image.

For details on the courses available, contact the Managing Director, Aerospace Education Foundation, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. Telephone: (202) 637-3370.

The Bulletin Board

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Early Retirement Hit, Defended

Late last fall, the staff director of the President's Commission on Military Compensation, Reginald J. Brown, said the staff supported elimination of the twenty-year retirement option. It wasn't long before the services, led by their chiefs, fired back.

The occasion was a late December public hearing held by the Commission in the nation's capital. Three service chiefs—Army's Bernard W. Rogers, USAF's David C. Jones, and the Marines' Louis W. Wilson, in that order—staunchly defended the twenty-year option. They explained to the six-member Commission that it's the major device for attracting good people to career service; an important management tool; and the key element in assuring a youthful, vigorous, and combat-ready force.

In his testimony, General Jones urged the Commissioners to examine the issues "without staff preconceptions."

Commission Chairman Charles J. Zwick praised General Jones for his defense of the early retirement option, though he and his fellow commissioners did not disclose their positions. Their recommendations for change, if any, should surface in their official report due out in mid-March. The commissioners made clear that the twenty-year option is under heavy fire from the civilian community, which views it as much too expensive.

General Jones and the other chiefs also deplored the erosion of benefits in recent years, the unrest this has caused throughout the military community, and proposals to switch military pay to a salary system. Each chief strongly supported full travel entitlements for low-ranking enlisted members. AFA has long championed such a position.

The Air Force leader said he favored equalizing pay among married and single members. (For a discussion of this issue, see December "AFA Believes.") But he said the Air Force has always taken care of families and so he wouldn't eliminate all differences in benefits that favor married members, such as larger housing. These "traditional entitlements" are part of the institutional character of the service General Jones said he is trying to preserve.

In fact, the central theme of his lengthy presentation dwelt on "the need to preserve the essential institutional character of the military service."

"If your recommendations foster a climate of elite professionalism," he told the Commission, "the services will be able to continue their emphasis on recruiting and training young men and women with a proud institutional identity and the values which go with it. Conversely, if the compensation system forces us to the marketplace, relying excessively on the mercenary values of occupationalism and self-interest, we should not be surprised if the resulting force adopts the values which their authorities set for them.

"It is my earnest hope that this Commission will choose wisely and recommend a compensation system that will provide military members and their families a standard of living commensurate with the extraordinary demands which we impose upon them."

Opponents of rising military personnel costs, the twenty-year option, and related issues also appeared before the Commission. Sid Taylor of the National Taxpayer's Union proposed a freeze on all military-federal pay and pensions. He asked the President to set an example by volunteering a ten percent cut in his $200,000 annual salary.

L. Shelton Clarke, Jr., a Richmond, Va., pension specialist, denounced "double dipping," early retirements, and the advantage in CPI raises enjoyed by high-ranking retired officers. Last year, he stated, retired colonels received a $1,582 increase, compared to a $382 hike for retired E-7s. The Commission members, though they did not say so directly, seemed unimpressed with his presentation.

The Air Staff's new First Sergeant Functional Manager, CMSgt. Donal L. Hall, right, and the official he recently replaced, CMSgt. Royce A. Flynn, review an article on improving the first sergeant career field. Chief Flynn is now a first sergeant at Little Rock AFB, Ark.

Good News on Commissary Front

USAF will invest $150 million in construction of thirty-three new commissaries and renovation of sixty-four others during the next five years. Twenty-three of the latter are in for "major renovation." The first

two new stores, at Robins and Davis-Monthan AFBs, were scheduled to open last month. A new commissary at Barksdale AFB is due to open this spring. USAF has 163 commissaries.

Maj. Gen. Daniel L. Burkett, the Air Force commissary chief, says the new and refurbished stores will resemble "the finest civilian supermarkets" and feature such things as indirect area lighting, in-store bakeries, delicatessens, wide aisles, etc. The current four percent surcharge will finance the new construction. It's providing about $26 million a year now for that purpose and should increase in the years immediately ahead, General Burkett indicated. "Business is definitely improving," he added. Down for brand new stores are these bases:

Arnold AFS, Tenn.; Barksdale La.; Camp New Amsterdam, Netherlands; Cannon, N. M.; Chanute, Ill.; Clark, P. I.; Columbus, Miss.; Davis-Monthan, Ariz.; Dyess, Tex.; Edwards, Calif.; Elmendorf, Alaska; Hanscom, Mass.; Hill, Utah; Langley, Va.; Little Rock, Ark.; March, Calif.; Mather, Calif.; Maxwell, Ala.; McGuire, N. J.; Moody, Ga.; Nellis, Nev.; Patrick, Fla.; RAF Bentwaters, UK; Randolph, Tex.; Robins, Ga.; Sembach, Germany; Sheppard, Tex.; Spangdahlem, Germany; Tinker, Okla.; Travis, Calif.; Tyndall, Fla.; Whiteman, Mo.; and Wright-Patterson, Ohio.

Stores due major refurbishing are at Camp Butler, Okinawa; Eglin, Fla.; Eielson, Alaska; England, La.; Grand Forks, N. D.; Grissom, Ind.; Hahn, Germany; Holloman, N. M.; Hurlburt, Fla.; K. I. Sawyer, Mich.; Lackland,

AFA Believes . . .

The Social Security Bill's 'Catch-62'

Late in December, President Carter signed a new Social Security bill. As this is written, there still is much public discussion of just what the new legislation will do. This corner would like to take a look at one thing the new bill did *not* do.

Briefly, it did not correct a situation affecting that group of veterans who suffer an enforced loss of retirement income beginning at age sixty-two, if they have previously combined their military and Civil Service time for retirement from federal employment.

During the long and sometimes bitter floor debate on the Social Security bill, Sen. Strom Thurmond (R-S. C.) introduced an amendment that would have corrected this inequity. In his introduction, he said:

> Mr. President, it is disappointing to note that the new Social Security bill fails to deal with a problem caused by the current Social Security law. . . . The term Catch-22 came into our language after World War II. It describes a situation from which there is no escape. In 1956, Congress, in passing a modification to the Social Security law to include the uniformed services, inadvertently created what has come to be known as Catch-62. I am proposing an amendment to correct this injustice.

Senator Thurmond pointed out that this "Catch-62," as he labeled it, applies only to veterans (not just military retirees) who subsequently retire from Civil Service. Essentially, it means that a veteran, or any federal employee, can count all federal service towards one retirement check and can elect retirement as early as age fifty-five. However, at age sixty-two, and sometimes without the veteran being aware of it beforehand, he or she must drop out of this computation all military service credited after 1956. The 1956 Social Security law required this, and provided that, in the place of this loss, a Social Security payment would be made. Unfortunately, the added payment is substantially lower than the amount mandatorily subtracted. Amounts vary, but one source estimates that a retired chief master sergeant who subsequently completes a Civil Service stint can lose more than $300 a month at age sixty-two, while some retired officers could drop as much as $500 a month at that age.

It is quite clear that this consequence was never intended by the drafters of the 1956 Social Security act. Rather, the intent was to bring the military member under Social Security so that he or she might have the same retirement income supplement enjoyed by all other working Americans. It is a cruel contradiction that elderly military veterans retired from Civil Service now face an arbitrary reduction of income because they were forced to contribute to Social Security "in order to help them." Truly a "Catch-62."

Both Senator Thurmond and Rep. Charles Bennett (D-Fla.) introduced bills in 1975 to correct this injustice. These bills, of course, died with the 94th Congress. Both reintroduced their bills in this Congress. A variety of people, including the outspoken Admiral Rickover, have cited the need to change this "quirk in the law."

The exact number of people affected is not known, but it will grow, as will the amount of money lost by the substitution. One source puts the number currently affected at somewhat more than 100,000 veterans, of whom some eighty percent are retired enlisted.

In support of his own amendment, Senator Thurmond pointed out that this action would "remove a grossly unjust provision of the law which singles out a certain group to penalize because they paid to the Social Security program. I am strongly in favor of the Social Security program being put on a solvent basis," he said, "but I am not in favor of a certain group of veterans being penalized to help the Social Security program from going bankrupt." He added that DoD supports his measure and that the Speaker of the House Thomas P. O'Neill also had indicated he would support it if reported favorably by the House Post Office and Civil Service Committee.

Unfortunately for passage in December, Sen. Abraham Ribicoff (D-Conn.), while agreeing with the intent of the amendment, argued that it should more properly be considered as related to governmental retirement rather than Social Security. While this view is debatable, his arguments managed to carry the day.

Senator Ribicoff promised to push for early hearings on the matter, as a part of hearings on other "retirement-related legislation . . . early . . . in the next session." He said: "I want to emphasize that I, too, am concerned that federal employees who have served in the military receive equitable retirement benefits. . . . Hopefully, the hearings will produce a body of testimony to support the Senator from South Carolina's proposal."

In view of these assurances, Senator Thurmond withdrew his amendment.

And that is how "Catch-62" did *not* get resolved in the current Social Security legislation debate.

However, Senator Thurmond has told AIR FORCE Magazine that he is "optimistic" about chances for change in 1978. He said: "With the support that is apparently building from other sources, I would say that the prospects look brighter than they ever have for some action on this. I, for one, do not intend to let it drop."

We hope not. We believe that early correction of this inequity is needed before the problem grows any larger. Twenty years is long enough to be caught in Catch-62.

—JAMES A. MC DONNELL, JR.

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Tex.; Lowry, Colo.; Luke, Ariz.; Minot, N. D.; Mountain Home, Idaho; Myrtle Beach, S. C.; RAF Lakenheath, UK; Reese, Tex.; Scott, Ill.; Seymour-Johnson, N. C.; Shaw, S. C.; US Air Force Academy, Colo.; and Zaragoza, Spain.

AFRAP Success; Re-Ups Down

Air Training Command has given the Air Force Recruiter Assistance Program (AFRAP) good marks for generating 46,500 applicant leads for USAF membership. Unfortunately, more than 10,000 of those leads are worthless because they came from class rosters, mailing lists, etc., and often the persons weren't in the right age group or were otherwise ineligible for Air Force service. ATC Commander Gen. John W. Roberts urges referrers to name only prospects they know to be basically eligible and interested in the Air Force.

AFRAP, meanwhile, will continue as a major thrust to produce good leads, create awareness of the USAF, and provide quality enlistments. General Roberts, in a letter to major air commanders, said base tours, career days, open houses, etc., are effective ways of creating awareness of the service. AFA is strongly supporting AFRAP. Several chapters have established continuing liaison with recruiters, and more are expected to do so.

In a related manpower development, first-term USAF reenlistments fell last year to 15,167 compared with 17,977 the previous year. The re-up rate was about the same; the problem is that the pool of eligibles has been dropping each year. In FY '71, 95,600 recruits entered service, but by last year the annual intake was down to 72,500. This year's goal is 74,000, and the recruiting "climate" is growing tougher.

Another problem is the expiration of the regular reenlistment bonus for airmen not on active duty before June 1, 1974. The selective re-up bonus, which offsets this slightly, extends only to forty-seven skills.

Because of the first-term re-up falloff, about 240 AFSCs are short. In some of them, less than ten percent of the manpower requirements has been met. All this, of course, is causing "growing concern" at Hq. USAF, the service said in a recent message to the field. Helping the situation is the fact that retraining into critical skills is on the rise.

Recall Alert?

Voluntary recalls of Reservists to fill skill shortages are few and far between, and officials say they are expected to remain that way. Still, as noted above, manning problems do exist; officials are checking their options.

Both the Air Reserve Personnel Center and the Air Force Military Personnel Center, the main USAF agencies involved in recalls, recently released material explaining how Reservists and Air Guardsmen can apply for recall. The MPC publicity, dealing mainly with Reserve airmen, said "continual review of career field manning may lead to the initiation of voluntary recall programs if shortages can't be filled from active-duty resources." AFR 45-21 contains application details.

The ARPC release explains that Reserve officers can volunteer for recall simply by submitting two copies of AF Form 125 to the Center. In

Ed Gates . . . Speaking of People

The Pros and Cons of Up-or-Out

It was the Navy, back in 1916, that established the first "up-or-out" system in the US military establishment. The Army, to its later regret, held on to its rigid seniority promotion setup. The results were predictable: stagnating promotions, twelve-year-in-grade lieutenants, fifty-five-year-old majors, ho-hum performances generally, and many physically unfit officers. If the Army had forced attrition before World War II, a promotion flow and a vigorous officer corps could have been assured.

In congressional hearings on the Officer Personnel Act (OPA) of 1947, General Eisenhower said that an advancement in the Army below-star rank "was absolutely a lock-step promotion" and about the only way it could remove an ineffective officer was for the commission of a crime.

The 1947 Act at long last put the Army—and the then brand-new Air Force—under carefully structured machinery for selecting the best officers for promotion and eliminating the less effective. The general consensus over the past thirty years: Up-or-out has been successful.

OPA's tenure provisions, plus those added by policy for nonregular officers and for the airman force, make up Air Force's present up-or-out system. For regular officers, permanent captains passed over twice must separate at about the fourteenth year of service. Permanent majors twice deferred to permanent O-5 must retire at twenty years, while permanent O-5s and O-6s may complete twenty-eight and thirty years respectively.

Active-duty Reserve officers failing to make O-3 or O-4 are automatically separated. With few exceptions, O-4s and O-5s must retire at the twenty-year service point.

Air Force generates attrition among senior airmen by forcing retirement at certain points depending on grade held. E-5s and below are mandatorily retired at twenty years' service, E-6s at twenty-three, E-7s at twenty-six, E-8s at twenty-eight, and E-9s at thirty. A few E-9s are being chosen to serve up to thirty-three years. When and if the government approves severance pay for enlisted members, Air Force expects to ease out some marginal performers in lower grades.

USAF authorities believe that these force-out rules, meshed with a finely tuned selection-promotion process, provide the services with a vigorous officer corps containing the proper balance of youth and experience. The Defense Department agrees wholeheartedly.

So does the House Armed Services Committee. The up-or-out concept gives "the armed forces what they never before had in peacetime—a youthful, vigorous, fully combat-ready officer corps," the committee said recently.

Nevertheless, up-or-out is a dirty name in many quarters. Reserve officer groups remain unhappy with it. It's understandable that the thousands of individuals, regulars and Reserves, who have fallen prey to the inflexible exit machinery are also unhappy; few are likely to agree with the services that in the always rugged competition for advancement their own performance and potential didn't quite measure up.

a related development, Air Force announced that its Officer Training School production for FY '79 will increase from 1,753 to between 2,300 and 3,200 new officers.

AFROTC Enrollments Up

The 17,000 students currently enrolled in the 145 AFROTC units represent a 3.5 percent increase over last year, reversing a five-year downward trend. What equally pleases authorities is the 8.5 percent boost in freshman entries. That and the expected further boost in the next freshman group should enable USAF to meet its production goal of about 3,000 new AFROTC lieutenants annually starting in FY '79. This year's target is 2,650.

Air Force Junior ROTC enrollment currently stands at about 33,000, an increase of 300 over last year. There are 275 units.

In the college program, the nearly 7,000 freshmen include some 2,700 women and members of minority groups. About 900 of them received four-year scholarships to colleges of their choice, more than twice the number awarded to members of the sophomore class. About 1,225 members of next fall's freshman class will receive scholarships, officials said.

While Air Force is authorized 6,500 AFROTC scholarships of varying lengths, only 5,000 are presently awarded because of funding curbs, a restriction that AFA has strongly protested. Air Force officials again are pressing the Administration and Congress for funding of all 6,500.

Vet Aid Bills Pour In

Maybe they were stung over persistent criticism of the inadequacy of the GI education program, high veteran unemployment, or poor treatment by Uncle Sam of Vietnam-era vets. Whatever the reasons, lawmakers during the waning days of the first session of the 95th Congress dropped dozens of new aid-the-vet bills into the legislative hopper.

Examples include measures to give more tuition money to students at high-cost colleges, increase government insurance, hike burial allowances, liberalize home loans, boost housing grants, add benefits for veterans' children and spouses, increase compensation awards, and increase outlays to elderly vets.

Perhaps the most generous is S. 2384, introduced by Sen. Alan Cranston (D-Calif.), which would establish a pension system for veterans with nonservice-connected disabilities. H.R. 10336, sponsored by Rep. G. V. Montgomery (D-Miss.), would change from fifty to ten percent the minimum disability rating a veteran needs to receive additional VA compensation (service-connected) for dependents.

The first session of the 95th raised disability compensation, dependency-indemnity compensation for survivors, and GI educational payments 6.6% each. Pensions of low-income veterans and survivors were raised 6.5%. It also extended VA's authority to make special pay agreements with doctors and dentists, thereby assuring continued quality care in VA facilities; approved low-interest loans up to $2,500 a year for GI Bill students; and approved VA benefits for Women's Airforce Service Pilots (WASPs) and similar groups for service to the country.

In summarizing the 95th's legislative record so far, Rep. Lee H. Hamilton (D-Ind.) said there is "much more to be done" in 1978 for veterans. Rep. William D. Ford (D-Minn.) said he hopes Congress

Somewhat surprising, however, is the substantial opposition from the Defense Manpower Commission and the Senate Armed Services Manpower and Personnel Subcommittee, headed by Sen. Sam Nunn (D-Ga.).

The DMC, a congressionally established body, was staffed with prominent career officers, including a former Army vice chief of staff. Yet it labeled up-or-out "failure oriented." It advocates splitting the officer contingent into two major elements: a combat force, and a corps of technicians and support personnel. The second group, with few exceptions, would stay for thirty years, thus supposedly providing stability and reducing replacement and training costs.

This is the "corps concept" that many military leaders feel would prevent development of "generalists" for high-level posts, upset rotations, limit crossfeed opportunities between combat and support corps members, and promote misunderstandings, professional jealousies, parochialism, and "tunnel vision." The Air Force also disagrees with the DMC's contention that the plan would save millions of dollars.

Senator Nunn's opposition is more crucial. In blocking DOPMA, he is holding up much-needed service management improvement steps and the permanent officer grade ceilings Air Force has been denied for so many years. DOPMA, of course, would continue, with slight modifications, the up-or-out system that Senator Nunn claims is too rigid. It "prohibits the continuation on active duty of highly qualified officers even when they wish to continue and the services need them," he contends.

Senator Nunn wants to let twice-deferred captains and majors stay aboard, without promotion consideration, until they reach the twenty- and twenty-four-year service point. The present rules bounce the O-3s out with $15,000 in severance pay (one version of DOPMA would double it) at the twelve-to-fourteen-years-of-service point. The O-4s usually make twenty and retirement.

The "extended tenure" for these two groups, according to the Nunn subcommittee, would trim turnover, reduce training of replacements, allow the services to get further mileage out of satisfactory performers, soften the impact of promotion failure, and save Uncle Sam money.

Extensive probing by Pentagon officials, however, disputes the claimed savings. Senator Nunn's extended tenure plan not only wouldn't save funds, it would increase them slightly. Officials agree that keeping passed-over O-3s and O-4s on for many years may indeed trim procurement and training outlays, but they say these savings would be more than offset by boost in basic pay, longevity payments, and retirement expenditures.

Military opposition to the Nunn plan centers more heavily on the question of quality. "Would conscientious passovers be willing to remain with an employer who has indicated they are in the bottom twenty percent of their peer group?" an Air Staff study asks.

And "would those who do continue 'retire' on active duty?" The fear is that many would do just that; after all, some would serve in their terminal grades for twelve, fourteen, even sixteen years. That's unlikely to stimulate job holders to do much more than go through the motions.

The Assistant Secretary of Defense for Manpower, Reserve Affairs and Logistics, John P. White, has equally strong feelings about major tampering with up-or-out. He does not think the O-3 and O-4 extended tenure plan will help keep skilled people. And the motivation, effectiveness, and productivity of those who would stay in "are seriously questionable."

Secretary White believes "a system that recognizes those people who are needed and who we want to keep through the positive incentive of promotion, is preferable to one that continues others in a second-class category."

That says it pretty well. ■

The Bulletin Board

this year "might effectively deal" with the problems of Vietnam veterans.

In related veterans developments, Max Cleland, Administrator of the Veterans Administration, praised AFA's Policy Paper on Defense Manpower Issues for supporting government efforts to find jobs for unemployed Vietnam-era veterans. In a letter to AFA President Gerry Hasler, Cleland urged AFAers, especially those who are employers, to "assist us in finding meaningful employment" for the vets. Mr. Hasler earlier had written President Carter about AFA's new manpower paper.

Mr. Cleland also announced that full-time GI Bill students participating in VA's work-study program will receive the new minimum wage of $2.65 per hour. To supplement their GI Bill income, students can work 250 hours per semester under the work-study program.

Fifty-Two Win First Star

SAC and its bases copped seven of the fifty-two new USAF brigadier general nominations. *(See p. 81 for list of nominees.)* MAC with six was second. Twelve of the nominees, including Col. Harold W. Todd, the first Air Force Academy graduate to win star rank, are on duty in the Washington, D. C., area. Todd, the junior man on the new list, is Chief of the Readiness NATO Staff Group, Office of the Assistant Vice Chief of Staff, Hq. USAF. Other prominent nominees include Robert E. Chapman, who heads Air University's Leadership and Management Development Center, and Schuyler Bissell, Air Attaché to Israel. The new B/G list contains no women.

Opposite Sex Dorm Visits

Air Force bases in Europe are allowing enlisted men and women to visit each other in their dormitory rooms. It's part of a three-month test. Permanent approval, which rests with USAFE commander Gen. William J. Evans, seems likely.

"I feel that our people are mature enough and professional enough to have the privilege of room visitation, and I hope they don't disappoint me," General Evans said at the start of the test. USAFE and USAF Security Service bases in Europe plus MAC's Rhein-Main site near Frankfurt, Germany, are participating in the trial. Curbs include a 10:00 p.m. curfew and dorm managers to check visitors in and out.

Six commands allow regular room visits, while others restrict such visits to lounges and dayrooms. Headquarters officials said there are no plans to "formulate a standardized visitation policy."

Visitation curbs have not been placed on bachelor officers, Headquarters said, because their quarters "generally provide an individual room or suite arrangement with a private or semiprivate bathroom," which is not true of many airmen dorms.

General Evans allowed room visits between male and female airmen throughout Systems Command when he headed that organization.

Short Bursts

A recently released thought-provoking report, dealing with military and civilian manpower in the defense establishment, concludes that the services employ more labor than security needs justify. The report holds that the best, most cost-effective course is to **shift a great many military jobs to civilian billets.** The report's author is Col. Martin Binkin, USAF (Ret.), who prepared it for the Senate Armed Services Committee. Binkin has also produced studies for the Brookings Institution on women in service and military pay.

Air Force's **physician manning picture** is not encouraging. The service had 3,187 doctors aboard last October (start of FY '78) and wants to fill its 3,438 authorized billets by next fall. Unfortunately, the Air Force Surgeon General's Office projects only 415 "known gains" against 600 losses. The major shortages are in aerospace medicine, internal medicine, surgery, obstetrics/gynecology, and radiology.

Since last summer, when the Air Force Aid Society liberalized its loan policies, **loans have increased** by about $40,000 per month. Headquarters is encouraging any member with financial problems to hurry to the nearest AFAS office.

Airmen in all 340 of USAF's enlisted specialties are now basically eligible to **transfer to Air Reserve or Air Guard units** before their

The seventh Air Force Wing Historian of the Year Award is presented to John H. Cloe, 1931st Communications Group, Elmendorf AFB, by Alaskan Air Command Commander Lt. Gen. M. L. Boswell. Dr. Charles H. Hildreth, Assistant for Air Force Field History Program, is at the right.

active-duty hitches end. Previously, under PALACE CHASE, airmen in only 128 skills were eligible. Rated officers remain eligible to transfer, but nonrateds are still barred; Reserve Forces units don't need them. Despite the change for EM, the service won't be early-releasing many of them in critical skills. Formerly, active-duty people had to have six months left in their enlistments to transfer. No longer; short-timers can now line up a Reserve-Guard slot and step right into it.

Important **regulation changes** just out do the following:

- **AFR 900–48.** Bans "favorable communications" from folders used by boards considering colonels for brigadier general. The change equalizes rules long in effect for LCs and below.
- **AFR 35–42.** Sets forth new rules for award of the Missileman Badge. Aim: "Reestablish the lost or fading image of the badge by holding the line on proliferation of its award."
- **AFR 36–10.** Incorporates all interim changes to the old OER directive plus some new ones. Also, the rating form now has space for the reviewer to state how many people he reviews and the number of 1's, 2's, and 3's he hands out.

CMSgt. Jack B. Bristol, a member of the Langley AFA Chapter, recently urged a pay panel examining military compensation to ask the government to **preserve and improve military entitlements.** Chief Bristol, a twenty-year man, is exec to TAC's Director of Administration, Langley AFB, Va. The Fleet Reserve Association conducted the pay panel.

Midshipman Lisa Cicchini shows her sisters a captured cannon from the Mexican War at the Naval Academy in Annapolis, Md. Lisa's twin, Michelle, is a cadet at the Air Force Academy; their older sister, Karen, is a West Point cadet. They are daughters of Air Force Col. and Mrs. Michael J. Cicchini of Santa Maria, Calif.

The January 1, 1978, **increase in the minimum wage,** from $2.30 to $2.65 per hour, is the latest action increasing "economic pressure on Air Force Morale, Welfare and Recreation (MWR) programs." So says Col. Irv R. Gerro in an Air Force-wide message from the Military Personnel Center. The service's MWR director told MWR managers to find ways to "minimize" the impact of the wage boost and provide Hq. USAF with new data on MWR employees, the payroll, etc. He emphasized "the necessity for aggressive management action to ease financial pressures." ■

Senior Staff Changes

RETIREMENT: Gen. F. Michael **Rogers.**

PROMOTIONS: To **Brigadier General:** James P. **Albritton;** Spence M. **Armstrong;** Ernest A. **Bedke;** Donald W. **Bennett;** Schuyler **Bissell;** William R. **Brooksher;** James R. **Brown;** Thomas B. **Bruton;** Robert E. **Buhrow;** John T. **Chain,** Jr.; Robert E. **Chapman;** Joseph H. **Connolly;** Thomas G. **Darling;** Donald L. **Evans;** Kenneth R. **Fleenor;** James L. **Gardner,** Jr.; Lawrence D. **Garrison;** Harry A. **Goodall;** William H. **Greendyke;** Titus C. **Hall;** Richard D. **Hansen;** Guy L. **Hecker,** Jr.; Robert C. **Karns;** Melbourne **Kinsey.**

Also, Donald L. **Lamberson;** Gerald D. **Larson;** John R. **Lasater;** William E. **Lindeman;** Leo **Marquez;** Keith D. **McCartney;** Gerald E. **McIlmoyle;** Robert E. **Messerli;** John F. **O'Donnell;** Marvin C. **Patton;** Milton R. **Peterson;** Richard W. **Phillips,** Jr.; George B. **Powers,** Jr.; Winston D. **Powers;** Marc C. **Reynolds;** Thomas C. **Richards;** Graham W. **Rider;** Davis C. **Rohr;** John P. **Rollston;** Robert A. **Rosenberg;** Click D. **Smith,** Jr.; William L. **Strand;** William E. **Thurman;** Edward L. **Tixier;** Harold W. **Todd;** Brien D. **Ward;** Clinton H. **Winne,** Jr.; Thomas E. **Wolters.**

CHANGES: B/G (M/G selectee) Robert W. Clement, from Asst. DCS/Ops. & Intel., Hq. USAFE, Ramstein AB, Germany, to DCS/Ops. & Intel., Hq. USAFE, Ramstein AB, Germany, replacing M/G Lloyd R. Leavitt, Jr. . . . **M/G (L/G selectee) Edgar S. Harris, Jr.,** from C/S, Hq. SAC, Offutt AFB, Neb., to Vice CINC, Hq. SAC, Offutt AFB, Neb. . . . **M/G Lloyd R. Leavitt, Jr.,** from DCS/Ops. & Intel., Hq. USAFE, Ramstein AB, Germany, to C/S, Hq. SAC, Offutt AFB, Neb., replacing M/G (L/G selectee) Edgar S. Harris, Jr.

SENIOR ENLISTED ADVISOR CHANGES: CMSgt. Lewis C. Covington, from Office of IG, Hq. TAC, Langley AFB, Va., to Senior Enlisted Advisor, Hq. TAC, Langley AFB, Va. . . . **CMSgt. Sam E. Parish,** from 36th Combat Support Group, Bitburg AB, Germany, to Senior Enlisted Advisor, Hq. USAFE, Ramstein AB, Germany, replacing CMSgt. Jackson L. Davidson. ■

AFA News

By Don Steele, AFA AFFAIRS EDITOR

Unit of the Month

THE VIRGINIA STATE ORGANIZATION cited for consistent and effective programming in support of the missions of the Air Force and AFA, most recently exemplified by its Distinguished Visitors Program at Tactical Air Command Headquarters.

—OFFICIAL USAF PHOTO

Dr. John J. Martin, Assistant Secretary of the Air Force/Research, Development and Logistics, was the guest of honor and speaker at the fourth annual joint dinner meeting cosponsored by AFA's Scott Memorial, Ill., and Spirit of St. Louis, Mo., Chapters. Joining Dr. Martin, right, in an informal discussion after the dinner are, from left, SrA. Robert E. Ousley, 375th Consolidated Aircraft Maintenance Sqdn.; Maj. Gen. Robert E. Sadler, Air Force Communications Service Commander; Amn. Maurice Richardson, 375th Air Base Group Hq. Sqdn. Sec.; and Lt. Gen. Thomas M. Ryan, Jr., Military Airlift Command Vice Commander in Chief. Ousley and Richardson were among eight Scott AFB outstanding airmen hosted by the Scott Memorial Chapter.

At the Monterey Bay Area Chapter's recent Celebrities Awards Banquet, California State AFA Past President Stanley Hryn was cited by the Monterey Bay Area Aviation Advisory Board for promoting aviation education in the local schools. Shown during the award presentation are, from left, Lt. Gen. David R. Adamson, CF, Deputy Commander in Chief, NORAD, the guest speaker; Bert Rudolph and Melvin Jasper, former and current Advisory Board Chairman, respectively; Mr. Hryn; and Beirne Lay, author of Twelve O'Clock High, *the master of ceremonies. Head-table guests also included Lt. Gen. James H. Doolittle, USAF (Ret.), one of AFA's founders and its first National President; Monterey Mayor pro tem James Collins; and AFA Board Chairman George M. Douglas.*

The Virginia State AFA, in cooperation with Hq. Tactical Air Command (TAC), recently sponsored a Distinguished Visitors Program at Langley AFB for the group of Virginia civic and business leaders shown above. Designed to provide a closer understanding of the contributions to national readiness made by TAC and Langley AFB, the program included briefings on TAC's functions and equipment, a tour of the base, and an F-15 scramble. The highlight of the program was an address by Gen. Robert J. Dixon, TAC Commander, at the opening luncheon. Each of the State AFA's Chapters was asked to invite five local civic or business leaders and one AFA escort. In recognition of this outstanding program, AFA National President Gerald V. Hasler names the Virginia State AFA as the "Unit of the Month" for February.

chapter and state photo gallery

Air Force Secretary John C. Stetson, left, was the guest speaker at the December luncheon meeting of AFA's Iron Gate Chapter in New York City's famous "21" Club. During the program, Chapter President Burl McLaughlin, right, presented the Secretary a plaque designating him a Jimmy Doolittle Fellow of the Aerospace Education Foundation, AFA's education affiliate.

INTERESTED IN JOINING A LOCAL CHAPTER

For information on AFA Chapters in your area, write:
Assistant Executive Director/Field Operations
Air Force Association
1750 Pennsylvania Ave., N. W.
Washington, D. C. 20006

COMING EVENTS

Arnold Air Society and Angel Flight 30th Annual National Conclave, Del Webb Townehouse, Phoenix, Ariz., April 1–6 . . . **Fifteenth National Air Force Salute,** New York Hilton Hotel, New York City, April 8 . . . **Tennessee State AFA Convention,** Tullahoma, April 14–15 . . . **Massachusetts State AFA Convention,** Hanscom AFB, April 22 . . . **Florida State AFA Convention,** Fort Walton Beach, April 28–30 . . . **Tenth Annual Bob Hope AFA Charity Golf Tournament,** March AFB, Calif., and Norton AFB, Calif., April 28–30 . . . **South Carolina State AFA Convention,** Myrtle Beach AFB, May 5–6 . . . **Colorado State AFA Convention,** Pueblo, May 12–13 . . . **New Jersey State AFA Convention,** Golden Eagle Inn, Cape May, May 19–21 . . . **AFA Golf and Tennis Tournaments,** The Broadmoor, Colorado Springs, Colo., May 26 . . . **AFA Board of Directors and Nominating Committee Meetings,** The Broadmoor, Colorado Springs, Colo., May 27 . . . AFA's Nineteenth Annual Dinner honoring the **Outstanding Squadron at the Air Force Academy,** The Broadmoor's International Center, Colorado Springs, Colo., May 27 . . . **AFA's 32d Annual National Convention,** Sheraton-Park Hotel, Washington, D. C., September 17–20 . . . **AFA's Aerospace Development Briefings and Displays,** Sheraton-Park Hotel, Washington, D. C., September 19–21 . . . **AFA National Symposium,** Los Angeles, Calif., October 26–27 . . . **Seventh Annual Air Force Ball,** Century Plaza Hotel, Century City, Calif., October 27.

—PHOTO BY JOHN THOMAS KANTOREK

AFA's Thomas B. McGuire, Jr., Chapter, N. J., sponsored a luncheon honoring Maj. Gen. Alden G. Glauch, right, and Mrs. Glauch, left, on the occasion of his retirement. During the program, Chapter President William J. Demas, center, presented the General a Life Membership in the Air Force Association, in appreciation of his support of AFA and the McGuire Chapter. At the time of his retirement, General Glauch was the Commander of the Twenty-first Air Force at McGuire AFB.

AFA News

—USAF PHOTO BY 2D LT. JOE SAXON

In observance of the fifth anniversary of AFA's Delaware Galaxy Chapter, Col. (Brig. Gen. selectee) Click D. Smith, Jr., right, 436th Military Airlift Wing Commander, presented a plaque to Delaware State and Chapter AFA officials dedicating a room in the Dover AFB Officers' Open Mess as the Delaware State AFA Room, in which State and Chapter AFA charters, awards, and other artifacts will be displayed. Accepting are, from left, George Chabbott, Vice President for AFA's Central East Region; Diamond State Chapter President Robert Petry, Jr.; Delaware State AFA President Harold Hester; and Delaware Galaxy Chapter President Jack Strickland.

—USAF-AEDC PHOTO

Tennessee's Fourth District Rep. Albert Gore, Jr., left, holds a plaque designating him an honorary member of AFA's H. H. Arnold Memorial Chapter, Tullahoma, Tenn. Chapter President Jessup D. Lowe, right, a retired Air Force major general, made the presentation at a dinner meeting sponsored by the Chapter at which Representative Gore was the guest speaker. In his address, Representative Gore expressed support for AFA's 1977–78 Statement of Policy and complimented AFA for its positive stand and recommendations for future action made immediately following the cancellation of B-1 production.

At a recent Alamo Chapter program, Sandy Faust, right, Vice President for AFA's Southwest Region, presented Texas State AFA President Tim Glasgow, left, an AFA Medal of Merit.

Brig. Gen. Darrol G. Schroeder, center, Chief of Staff, North Dakota ANG, and the Air National Guard Advisor to AFA's National President, is shown receiving an AFA Medal of Merit from Hoadley Dean, left, Vice President for AFA's North Central Region. North Dakota State AFA President Ernest J. Collette, Jr., right, also participated in the presentation during a meeting sponsored by AFA's Red River Valley Chapter in Grand Forks, N. D.

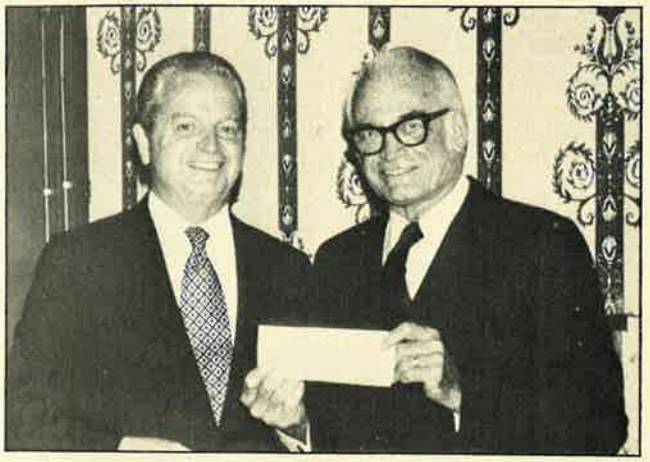
chapter and state photo gallery

—PHOTO BY LT. COL. ROBERT E. MAYER

An AFA Medal of Merit was presented to Illinois State AFA President Alexander Field during a recent Dining-In sponsored by the 9014th Air Reserve Information Squadron in Chicago. Shown following the presentation are, from left, Lt. Col. Emmanuel Glyman, 9014th ARIS Commander; Brig. Gen. Harry J. Dalton, Jr., Director of Information, Office of the Secretary of the Air Force, who made the presentation for AFA; Mr. Field; and Chicagoland Chapter President Richard Becker.

—PHOTO BY CHUCK SKIDMORE

During the Mid-Ohio Chapter's Annual Awards Banquet, Robert J. Puglisi, right, Immediate Past Chapter President and current Ohio State AFA Executive Vice President, received an AFA Medal of Merit. Col. Ralph L. Kitchens, left, Director of Maintenance, Aerospace Guidance and Metrology Center, Newark AFS, made the presentation on behalf of the Air Force Association.



At the last meeting of the Aerospace Education Foundation's Board of Trustees, Richard Knobloch, left, Iron Gate Chapter Vice President and Chairman of the Chapter's Fourteenth National Air Force Salute, presented a check for $35,000 to Sen. Barry Goldwater, right, Chairman of the Foundation's Board. The check included a $20,000 contribution and $15,000 as payment for fifteen Jimmy Doolittle Fellows, all from the proceeds of the Chapter's Fourteenth Salute.

AFA's Eglin Chapter, Fla., and five of its members—Maj. Gen. Howard M. Lane, Lee Terrell, Robert W. Gates, Lt. Col. William Schrimsher, and Donald L. Howarth—were honored by the Air Force Enlisted Men's Widows and Dependents Home Foundation for their roles in the Chapter's Bob Hope Show, which benefited the Foundation by more than $26,000. The recognition was given at a banquet during the Foundation's annual observance of the opening of Teresa Village, its home in Fort Walton Beach for widows and dependents of Air Force enlisted people. Participants in the ceremonies included, from left, Foundation Board Vice Chairman Tony Anthony, a Past President of both the Northern Virginia and Andrews Area AFA Chapters; Maj. Gen. Earl Anderson, USAF (Ret.), Reserve Officers Association President; General Lane, Armament Development and Test Center Commander; Hon. Perry J. Fliakas, Deputy Assistant Secretary of Defense for Installations and Housing; Mr. Terrell, Florida State AFA Vice President, holding the plaque presented to the Eglin Chapter; and Foundation Executive Director D. N. Masone.

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): **Donal B. Cunningham,** 1 Keithway Dr., Selma, Ala. 36701 (phone 205-875-2450).

ALASKA (Anchorage, Fairbanks): **Daniel C. Crevensten,** Box 60184, Fairbanks, Alaska 99706 (phone 907-452-5414).

ARIZONA (Phoenix, Tucson): **E. D. Jewett, Jr.,** 7861 N. Tuscany Dr., Tucson, Ariz. 85704 (phone 602-297-1107).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Gordon W. Smethurst,** RR #2, Box 43D, Cabot, Ark. 72023 (phone 501-374-2245).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hawthorne, Hermosa Beach, Long Beach, Los Angeles, Marysville, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Dwight M. Ewing,** P. O. Box 737, Merced, Calif. 95340 (phone 209-722-6283).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Ft. Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **Edward C. Marriott,** 11934 E. Hawaii Cir., Aurora, Colo. 80012 (phone 303-934-5751).

CONNECTICUT (East Hartford, North Haven, Stratford): **Joseph R. Falcone,** 14 High Ridge Rd., Rockville, Conn. 06066 (phone 203-565-3543).

DELAWARE (Dover, Wilmington): **George H. Chabbott,** 33 Mikell Dr., Dover, Del. 19901 (phone 302-697-6943).

DISTRICT OF COLUMBIA (Washington, D. C.): **Ricardo R. Alvarado,** 900 17th St., N. W., Washington, D. C. 20006 (phone 202-872-5918).

FLORIDA (Bartow, Broward, Cape Coral, Ft. Walton Beach, Gainesville, Jacksonville, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa): **Eugene D. Minietta,** Box 286A, Route 1, Oviedo, Fla. 32765 (phone 305-420-3868).

GEORGIA (Athens, Atlanta, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **William L. Copeland,** 1885 Walthall Dr., NW, Atlanta, Ga. 30318 (phone 404-355-5019).

HAWAII (Honolulu): **James Dowling,** 2222 Kalakaua Ave., Honolulu, Hawaii 96815 (phone 808-923-0492).

IDAHO (Boise, Pocatello, Twin Falls): **Ronald R. Galloway,** Box 45, Boise, Idaho 83707 (phone 208-385-5247).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, O'Hare Field, Peoria): **Alexander C. Field,** 2501 Bradley Pl., Chicago, Ill. 60618 (phone 312-528-2311).

INDIANA (Logansport, Marion, Mentone): **Donald Thomas,** 215 S. Illinois St., Delphi, Ind. 46923 (phone 317-564-4324).

IOWA (Des Moines): **Ric Jorgensen,** 4005 Kingman, Des Moines, Iowa 50311 (phone 515-255-7656).

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum,** 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-681-5445).

KENTUCKY (Louisville): **Stanley P. McGee,** 5405 Wending Ct., Louisville, Ky. 40207 (phone 502-368-6524).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **Bessie Hazel,** 155 E. Herndon Ave., Shreveport, La. 71101 (phone 318-221-7005).

MAINE (Limestone): **Alban E. Cyr,** P. O. Box 160, Caribou, Me. 04736 (phone 207-492-4171).

MARYLAND (Andrews AFB, Baltimore): **Stanley E. Stepnitz,** 11304 Maryvale Rd., Upper Marlboro, Md. 20870 (phone 301-981-4765).

MASSACHUSETTS (Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Albert A. Kashdan,** 910 Watertown St., West Newton, Mass. 02165 (phone 617-271-2198).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Lansing, Marquette, Mount Clemens, Oscoda, Petoskey, Sault Ste. Marie, Southfield): **James N. Holcomb,** 6242 Broadbridge, Marine City, Mich. 48039 (phone 313-466-4154).

MINNESOTA (Duluth, Minneapolis, St. Paul): **David J. Little,** 1888 Princeton Ave., St. Paul, Minn. 55105 (phone 612-699-3600).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Billy A. McLeod,** P. O. Box 1274, Columbus, Miss. 39701 (phone 601-328-0943).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **Donald K. Kuhn,** 3238 Southern Aire Dr., St. Louis, Mo. 63125 (phone 314-892-0121).

MONTANA (Great Falls): **Jack R. Thibaudeau,** P. O. Box 2247, Great Falls, Mont. 59403 (phone 406-727-3807).

NEBRASKA (Lincoln, Omaha): **Lyle O. Remde,** 4911 S. 25th St., Omaha, Neb. 68107 (phone 402-731-4747).

NEVADA (Las Vegas, Reno): **William S. Chairsell,** 2204 Westlund Dr., Las Vegas, Nev. 89102 (phone 702-878-6679).

NEW HAMPSHIRE (Manchester, Pease AFB): **William W. McKenna,** RFD #5, Strawberry Hill Rd., Bedford, N. H. 03102 (phone 603-472-5504).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Newark, Trenton, Wallington, West Orange): **Leonard Schiff,** 246 Franklin Ave., Cliffside Park, N. J. 07010 (phone 201-861-2950).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **M. J. Loftus,** P. O. Drawer 1946, Clovis, N. M. 88101 (phone 505-769-1905).

NEW YORK (Albany, Bethpage, Binghamton, Buffalo, Catskill, Chautauqua, Griffiss AFB, Hartsdale, Ithaca, Long Island, New York City, Niagara Falls, Patchogue, Plattsburgh, Riverdale, Rochester, Staten Island, Syracuse): **Kenneth C. Thayer,** R. D. #1, Ava, N. Y. 13303 (phone 315-827-4241).

NORTH CAROLINA (Charlotte, Fayetteville, Goldsboro, Greensboro, Raleigh): **William M. Bowden,** P. O. Box 1255, Goldsboro, N. C. 27530 (phone 919-735-4716).

NORTH DAKOTA (Grand Forks, Minot): **Ernest J. Collette, Jr.,** Box 345, Grand Forks, N. D. 58201 (phone 701-775-3944).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Toledo, Youngstown): **Edward H. Nett,** 1449 Ambridge Rd., Centerville, Ohio 45459 (phone 513-461-4823).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **David L. Blankenship,** P. O. Box 51308, Tulsa, Okla. 74151 (phone 918-835-3111, ext. 2207).

OREGON (Corvallis, Eugene, Portland): **Philip G. Saxton,** 2899 Timberline Dr., Eugene, Ore. 97402 (phone 503-687-9475).

PENNSYLVANIA (Allentown, Beaver Falls, Chester, Dormont, Erie, Harrisburg, Homestead, Horsham, King of Prussia, Lewistown, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **Lamar R. Schwartz,** 390 Broad St., Emmaus, Pa. 18049 (phone 215-967-3387).

RHODE ISLAND (Warwick): **Charles H. Collins,** 143d TAG (RIANG), Warwick, R. I. 02886 (phone 401-737-2100).

SOUTH CAROLINA (Charleston, Columbia, Greenville, Myrtle Beach, Sumter): **Edith E. Callihan,** P. O. Box 959, Charleston, S. C. 29402 (phone 803-577-4400).

SOUTH DAKOTA (Rapid City): **Ken Guenthner,** P. O. Box 9045, Rapid City, S. D. 57701 (phone 605-348-0579).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Thomas O. Bigger,** Sverdrup/ARO, Inc., AEDC Div., Arnold AFS, Tenn. 37389 (phone 615-455-2611, ext. 243).

TEXAS (Abilene, Austin, Big Spring, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **T. A. Glasgow,** 502 Tammy Dr., San Antonio, Tex. 78216 (phone 512-536-3656).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Leigh H. Hunt,** 1107 S. 1900 E., Salt Lake City, Utah 84108 (phone 801-582-0935).

VERMONT (Burlington): **James W. McCabe,** RFD, Monroe, N. H. 03771 (phone 603-638-4932).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Jon R. Donnelly,** 8539 Sutherland Rd., Richmond, Va. 23235 (phone 804-649-6424).

WASHINGTON (Port Angeles, Seattle, Spokane, Tacoma): **Mario F. Iafrate,** 10613 Douglas Dr., S. W., Tacoma, Wash. 98499 (phone 206-584-6191).

WEST VIRGINIA (Huntington): **Ralph D. Albertazzie,** 1550 Kanawha Blvd., E., Charleston, W. Va. 25311 (phone 304-345-1776).

WISCONSIN (Madison, Milwaukee): **Charles W. Marotske,** 7945 S. Verdev Dr., Oak Creek, Wis. 53154 (phone 414-762-4383).

WYOMING (Cheyenne): **Norman L. Hanson,** P. O. Box 1244, Cheyenne, Wyo. 82001 (phone 307-634-7779).

AFA News photo gallery

During the reception for the Air Force Ball, which was held recently in the Century Plaza Hotel, Century City, Calif., Sen. Barry Goldwater (R-Ariz.), left, Chairman of the Aerospace Education Foundation Board of Trustees, presented a plaque to Dr. Ivan Getting, right, designating him a Jimmy Doolittle Fellow of the Foundation. Dr. Getting's Fellowship was sponsored by the Aerospace Corp. He recently retired as that company's president.

At an Atlantic City Area Chapter meeting, New Jersey State AFA President Len Schiff presented Col. Wes Hannon, NJANG Base Commander at the National Aviation Facilities Experimental Center, a model of a P-40, the airplane the Colonel flew in Africa during WW II. The model was made by CAP Cadets Kimothy Elam and Carmen Digiacinto, and was presented in appreciation of his support of the New Jersey State AFA and its Chapters. Principals in the presentation are, from left, Chapter President Phil Karsten, Colonel Hannon, Mr. Schiff, and CAP Cadets Elam and Digiacinto.

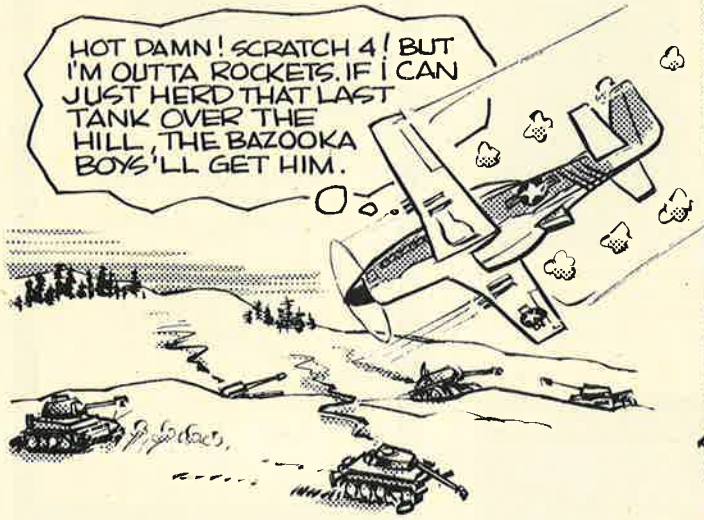
AFA's Chuck Yeager Chapter of Martinsburg, W. Va., named SSgt. Robert D. Powell of Harrisonburg, Va., its Outstanding Airman in West Virginia. The award was made to Sergeant Powell, a member of the West Virginia Air National Guard's 167th CAMRON (Maintenance Squadron), by retired Air Force Col. Ralph Albertazzie, Chapter President. Shown are, from left, Lt. Col. Kenneth F. Gornall, 167th Tactical Airlift Group Commander; Colonel Albertazzie; Sergeant Powell; and 167th CAMRON Commander Maj. Troy G. Judd.

Bob Stevens'

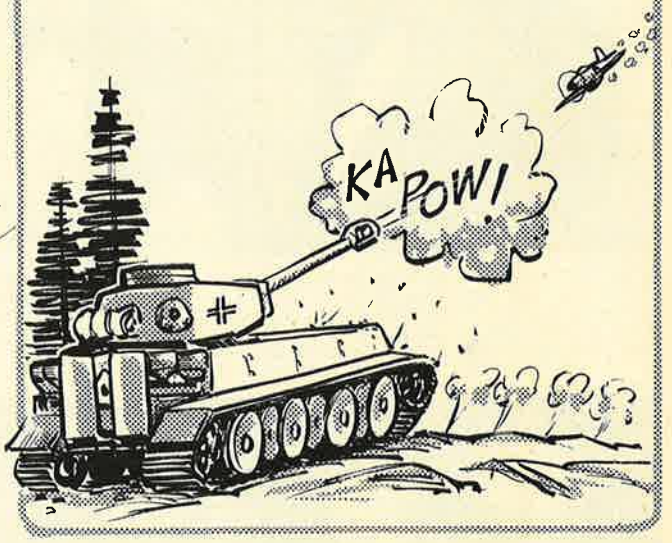
"There I was..."

THIS ONE'S HARD TO BELIEVE, BUT THE GUY IT HAPPENED TO - JIM CROCKER, OKLAHOMA STATE DIRECTOR OF THE COMBAT PILOTS ASSOCIATION - HAS THE SCARS TO PROVE IT. JIM HAS KEPT THIS LI'L EPISODE MORE OR LESS A SECRET - FOR OBVIOUS REASONS.

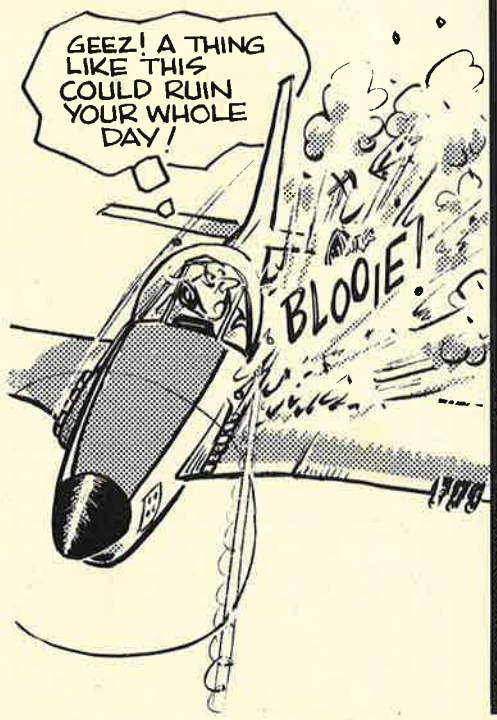
LATE IN WWII, THE AAF'S 9TH TAC IS SUPPORTING THE 90TH INF. IN PUSHING THE RETREATING GERMANS HARD UP AGAINST THE CZECH BORDER -



THE STRICKEN PZKW RAISES ITS 88-mm TURRET GUN and SQUEEZES OFF A DESPERATION SHOT AT CROCKER, THE GADFLY.



BY PURE CHANCE A TANK CANNON ROUND HAS HIT AN AIRPLANE!



JIM BELLIES IN - A CZECH GIRL PULLS HIM FROM THE WRECK and HIDES HIM...

...IN A CELLAR STOCKED WITH BRANDY! TEN DAYS LATER THE U.S. 4TH ARMORED LIBERATES THE PLACE -

Sidewinder AIM-9L: poised for final evaluation...and full production.

Flight tests are now being conducted for Sidewinder AIM-9L—the free world's most advanced short-range, infrared, air-to-air missile.

The testing includes captive-carry flights aboard the most advanced aircraft of the U.S. Navy and Air Force, the F-14 and the F-15 respectively. The aircraft are performing combat-type maneuvers in the air interceptor missile evaluation and air combat effectiveness evaluation programs. When completed, Sidewinder test flights will add up to over 4,000 hours; all this in addition to exhaustive testing previously performed by Raytheon. The next step: full production under a joint U.S. Navy/U.S. Air Force program.

Designed by the Naval Weapons Center, Sidewinder AIM-9L features marked improvements in maneuverability, accuracy, and lethality, combined with an all-aspect capability. Raytheon's experience with the Sidewinder series includes more than 15,000 tactical guidance and control sections delivered to date.

For details on Sidewinder AIM-9L, write on your letterhead to Raytheon Company, Government Marketing, 141 Spring Street, Lexington, Massachusetts 02173.

RAYTHEON

Vital IV throws a whole new light on pilot training.

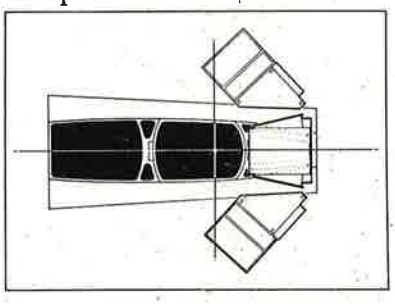
VITAL IV—announced this year—is now slated for over two dozen high-performance military fighter aircraft training simulators. VITAL has a solid background of Navy, Air Force and Marine Corps acceptance. VITAL IV brings greater visual power to a wider range of training challenges: air refueling, air-ground weapons delivery, weapons firing effects, moving targets, day, twilight and night situations.

VITAL IV produces scenes of greater realism and complexity than were ever before possible. Our new VITAL IV imagery, with 8000 simultaneous lightpoints, presents sharp, more detailed twilight and night scenes than earlier VITAL systems. We've added special circuitry to incorporate occultation—the ability to make three-dimensional objects appear solid.

We've added 300 simultaneous solid surfaces to build multi-colored, detailed, high-resolution day imagery. Combat targets, vehicles in motion, ships, airports, buildings, etc. are all sharply defined and detailed in color. Motion relative to any aircraft speed or maneuver, even close to the ground, is shown with dynamic accuracy.

Thirty-seven VITAL systems have already been ordered or installed for military pilot training—25 of them VITAL IVs—for high performance aircraft like the F-4E, the A-7D, the JA-37 Viggen, the A-10. VITAL simulates that performance faithfully.*

The same high performance visual can now be applied to the specialized needs of the undergraduate pilot. Like the combat pilot, the aircraft he flies is fast and maneuverable. The demands placed on him are great. The equipment he uses must train him—not burden him. VITAL IV gives him the same visual environment in the simulator that he experiences in the aircraft, for practicing low altitude maneuvers, VFR approaches by day, acrobatics, bad weather operations, basic takeoff and landing. VITAL IV does all of them and more.



VITAL IV is ready now. It can be demonstrated now.

It satisfies mission training and undergraduate training needs today, and as demands increase will grow with them in the future.

If you'd like more information, or a demonstration, the man to contact is Gordon Handberg, McDonnell Douglas Electronics Company, Box 426, St. Charles, MO 63301. Phone (314) 232-0232 Telex 447369.

Vital IV

MCDONNELL DOUGLAS

*85 VITAL systems are now on order or in operation with 22 airlines in 11 countries, 3 Air Forces and the air arms of the Navy & Marines.