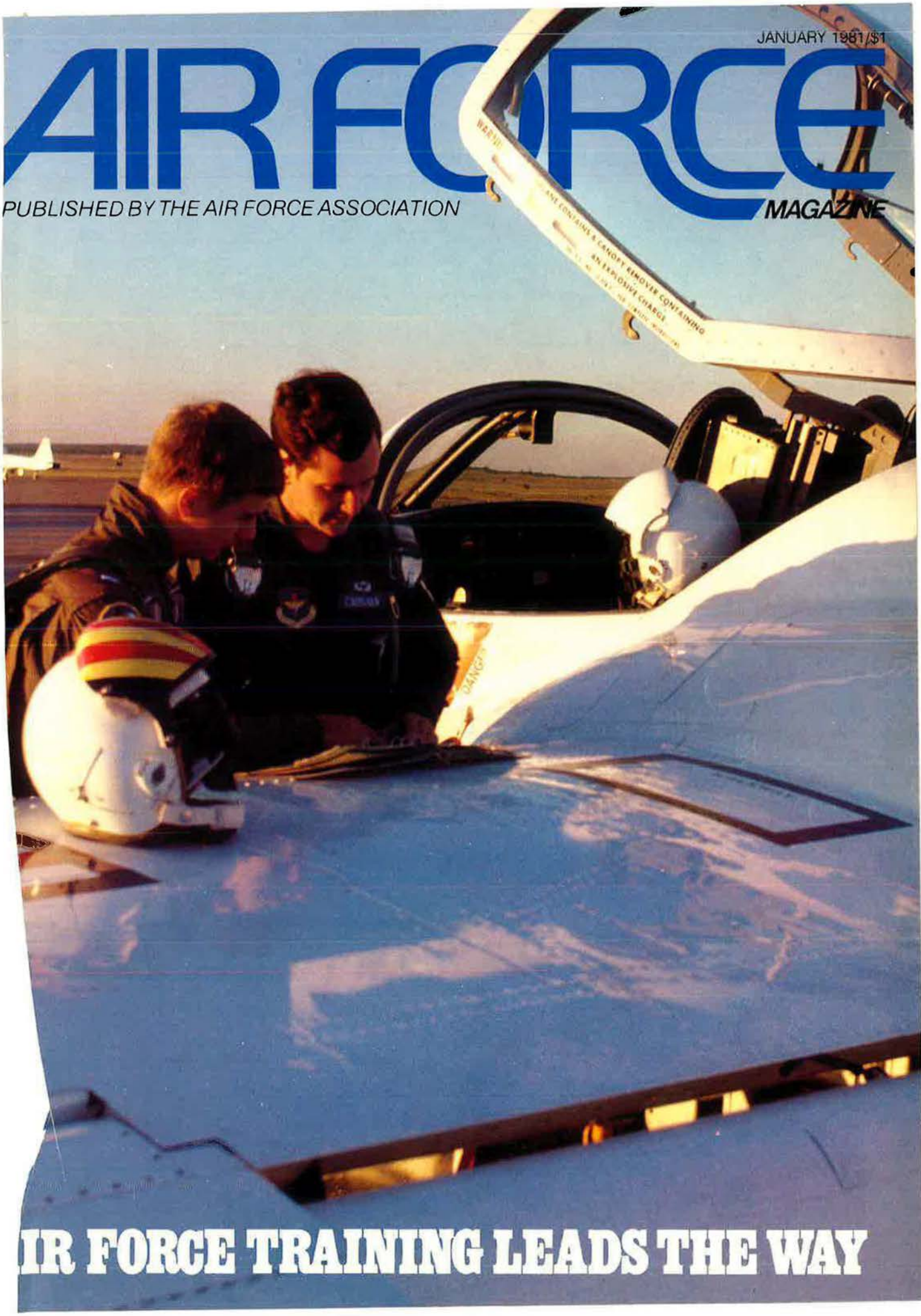
JANUARY 1981/$1

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION



IR FORCE TRAINING LEADS THE WAY

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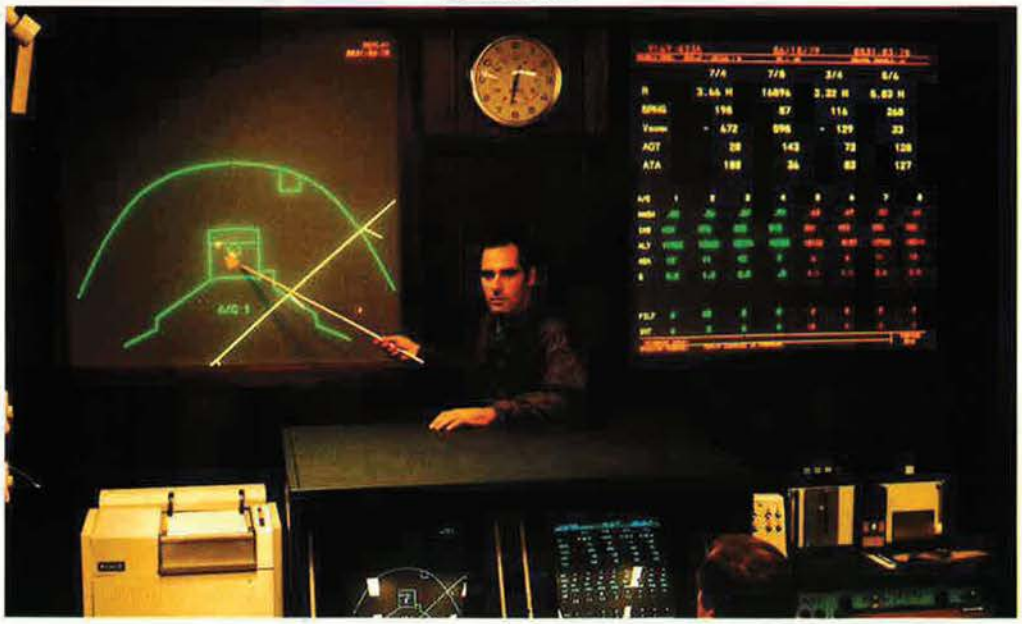
OURS



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AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

AIR FORCE Magazine (including SPACE DIGEST) is published monthly by the Air Force Association, Suite 400, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006. **Phone:** (202) 637-3300. Second-class postage paid at Washington, D.C., and additional mailing offices. **Membership rate:** $13 per year (includes $9 for one-year subscription); $36 for three-year membership (includes $24 for subscription). **Life Membership:** $200. **Subscription rate:** $13 per year; $25 additional for foreign postage (foreign postage has been increased 50% due to increased costs of international mail rates). Regular issues $1 each. Special issues (Soviet Aerospace Almanac, USAF Almanac issue, Anniversary issue, and "Military Balance" issue) $3 each. **Change of address** requires four weeks' notice. Please include mailing label. Publisher assumes no responsibility for unsolicited material.

(USPS 010-280)
BPA Circulation audited by Business Publication Audit

This Month

JANUARY 1981 • VOLUME 64, NUMBER 1

ABOUT THE COVER

Training young people to maintain and, if necessary, use today's increasingly sophisticated weaponry is indeed "the linchpin of Air Force readiness." Our cover depicts instructor pilot 1st Lt. Al Hogden (left) and student 2d Lt. John Croghon in Undergraduate Pilot Training at Laughlin AFB, Tex. (USAF photo by Walt Weible) "Air Force Training Leads the Way" begins on p. 48.

Departments

When it comes ECM experience, our ASPJ team.

Sanders Associates Inc. and Northrop Corporation form one of two teams select to compete in the first phase of full-scale engineering development of the Airborne Self-Protection Jammer (ASPJ).

ASPJ is an internal tactical ECM system designed to protect the new generatio of U.S. Navy, Air Force, and Army aircraft. This system is essential for mission succes and for aircraft and air crew survival in the increasingly dense and sophisticated coml environment of the 1980s and 90s.

In fulfilling the rigorous requirements for the ASPJ program, team experience is of vital importance. Sanders and Northrop are uniquely qualified with a record of prov performance. Only Sanders and Northrop have supplied internal tactical ECM syster in quantity.

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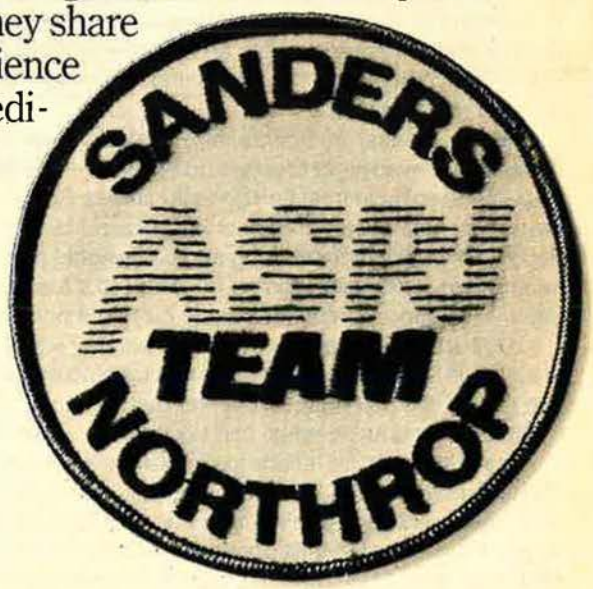
score 6,000 for

The two companies have, in fact, designed, produced, and supported in the field ore than 6,000 internal tactical ECM units for the following front-line aircraft: A-3, -4, A-6, A-7, EA-6B, F-4, F-14, F-15, F-104, F-111, FB-111, and EF-111.

In addition, Sanders and Northrop have extensive experience with other types ECM systems. Between them, the team members have developed and produced ore than 20,000 ECM systems for the U.S. Navy, Air Force, and Army.

And the Sanders/Northrop team offers something more. The two companies ace high value on the importance of teamwork. They share nutual commitment to bring together their experience d expertise to assure a unified, single-minded dedi- ion to ASPJ.



AN EDITORIAL

Perpetual Training Pays

THE theme of this month's issue is Air Force training. If one summarized the topic, it might be said: In the Air Force, training is perpetual and it pays off.

Now more than ever that payoff from training is vital. Faced with resource shortages, increasing operational demands, and retention problems, the Air Force finds that training is an "X-factor." It makes up the difference between operating with what one would like to have vs. executing missions with the resources actually on hand. The latter situation is a way of life for the Air Force and its sister services, and has seldom been more acute than right now.

To see the "X-factor" at work, one need only visit the Air Force in action. For instance, take a Military Airlift Command flight from Dover to Ramstein. An observer sees the following training under way: The navigator is being checked by an examiner to achieve Wing certification; the flight engineer is training a newcomer to the squadron who has transitioned from the C-141 to the C-5; at the same time, a Wing flight engineer examiner is conducting a no-notice check ride; and the loadmaster is being evaluated and is training a younger man at the same time.

A similar real-life training situation is encountered aboard a MAC medevac C-141 bound from Frankfurt to Andrews AFB, Md. In this case, there is no navigator aboard, but the copilot is new and is being trained and evaluated by the aircraft commander. The loadmasters and flight engineers are also either instructing a counterpart, being instructed, being examined, or examining.

In the passenger compartment, members of an Air Force Reserve medevac flight crew are doing the same while caring for patients en route from Europe to the States. Finally, among the passengers are a C-130 pilot from Rhein-Main en route to Pope AFB for simulator training and a physician (captain) returning from advanced training at Oxford to a medical meeting in New York, thence back to his Air Force hospital.

It's the same at a fighter wing, SAC bomber wing, or other installation. Virtually everyone is either training or instructing. The results are manifold, of course, but two stand out: standardization and its benefits, and taking up the slack.

The standardization means that missions are flown the way they are prescribed, not as individual whims dictate. That not only yields missions on time with the right load on the right target; it means safer missions as well. Consider the Class of 1946 from West Point, and the fates of its graduates who entered the Army Air Forces that June.

Of the 875 graduates, about 200 went into the AAF, having received flight training at Stewart Field near the Academy during cadet years. A member of the class, later an Air Force general officer, points up the need for standardization, flying discipline, and constant training by citing the air accident record of his classmates during the first year of active-duty flying. Six were killed before the year was out, and four more died in 1947, all in air accidents.

Gen. Robert C. Mathis, USAF Vice Chief of Staff, hammered home the same point in a speech to the Retired Officers Association, discussing the 1950 pre-Korean War situation: "Our Air Force was losing two and a half airplanes per day to major accidents. Our accident rate then was more than twelve times what it is today." At that 1950 accident rate, today's active-duty fleet of C-130s (371) and C-135s (619) would be wiped out in a little more than a year.

Training's value in "taking up the slack" takes many forms. In essence, to an observer it has most impact in imparting skills to untrained people so they are effective more quickly, and in temporarily making up the difference between novices and experts in most jobs. For example, when a unit is short of noncommissioned officers in the middle grades, the chiefs can step in (and have done so) to work with the novices just out of tech school to keep the unit operating.

This is not to endorse working with E-6 and E-7 shortages. But for a while, at least, the perpetual training can compensate for the shortages.

Elsewhere in this issue, readers will find feature articles on USAF training of yesterday, today, and tomorrow. Of particular value is the article by Gen. Bennie Davis, Commander of Air Training Command, with his views of USAF training philosophy, now and future (p. 48). He foretells possible training initiatives and potential pitfalls, as well as ATC's current approaches. The article by Capt. Slim Connors on his work as a T-38 instructor pilot (p. 58) is not only interesting and entertaining; it illustrates how USAF continues to turn out qualified jet pilots in a relatively brief time at high standards of proficiency.

That leads into topics not discussed in this issue, ones we will be watching and covering in the future. As an example, should the Air Force, Army, and Navy really be subsidizing the nation's airlines by training pilots and technicians for them? Or should the beneficiaries of this military training somehow reimburse the services for it? What about training overlap among the services? Something like forty-eight courses are now being taught by one service for all the others, but are there more that qualify? Should Air Force technical school courses be lengthened and on-the-job training be cut, or vice versa? Should reenlisting airmen be sent back to more advanced tech school courses in their specialties as a reward and career-enhancer? And so on. The field is as fertile as any other in aerospace today.

The point is, training is perpetual and it pays off for the Air Force and the nation, in peace and war, and the Air Force has consistently led the way in achieving the maximum payoffs possible.

—F. CLIFTON BERRY, JR.

The New Collins AN/ARC-190/728U airborne HF. A strong defense against high costs.

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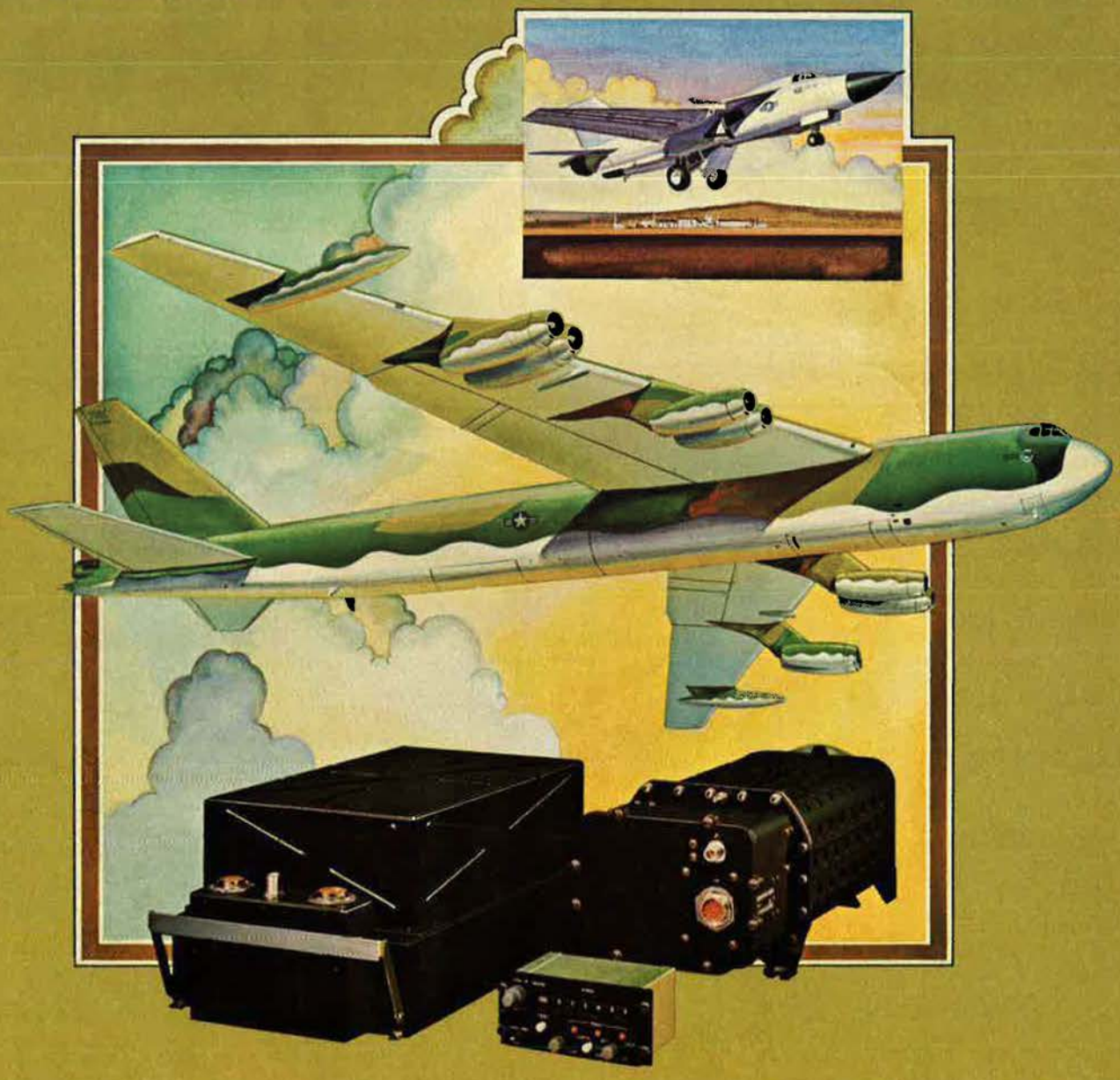

How Hawk more or less, against the competition.

PARAMETER*	THE COMPETITION	THE HAWK	THE MARGIN
Lo-Lo sortie radius, km.	430	430	equal
Hi-Lo-Hi sortie radius, km.	775	1024	32% more
High level sortie max endurance, hrs.	3½	4¼	21% more
Ferry sortie, km.	2900	3440	19% more
Demonstrated maximum Mach No.	0·96	1·2	25% more
Clean aircraft static thrust to weight ratio.	0·54	0·485	10% less
Best steady turn load factor 'g' at sea level.	6·0	6·1	1% more
Corresponding turn rate, deg/sec.	14	16	14% more
Demonstrated weapon load, kg.	2500	3080	23% more
"On aircraft" maintenance, mmh/fh.	7·0	5·6	20% less

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*Manufacturers' published data

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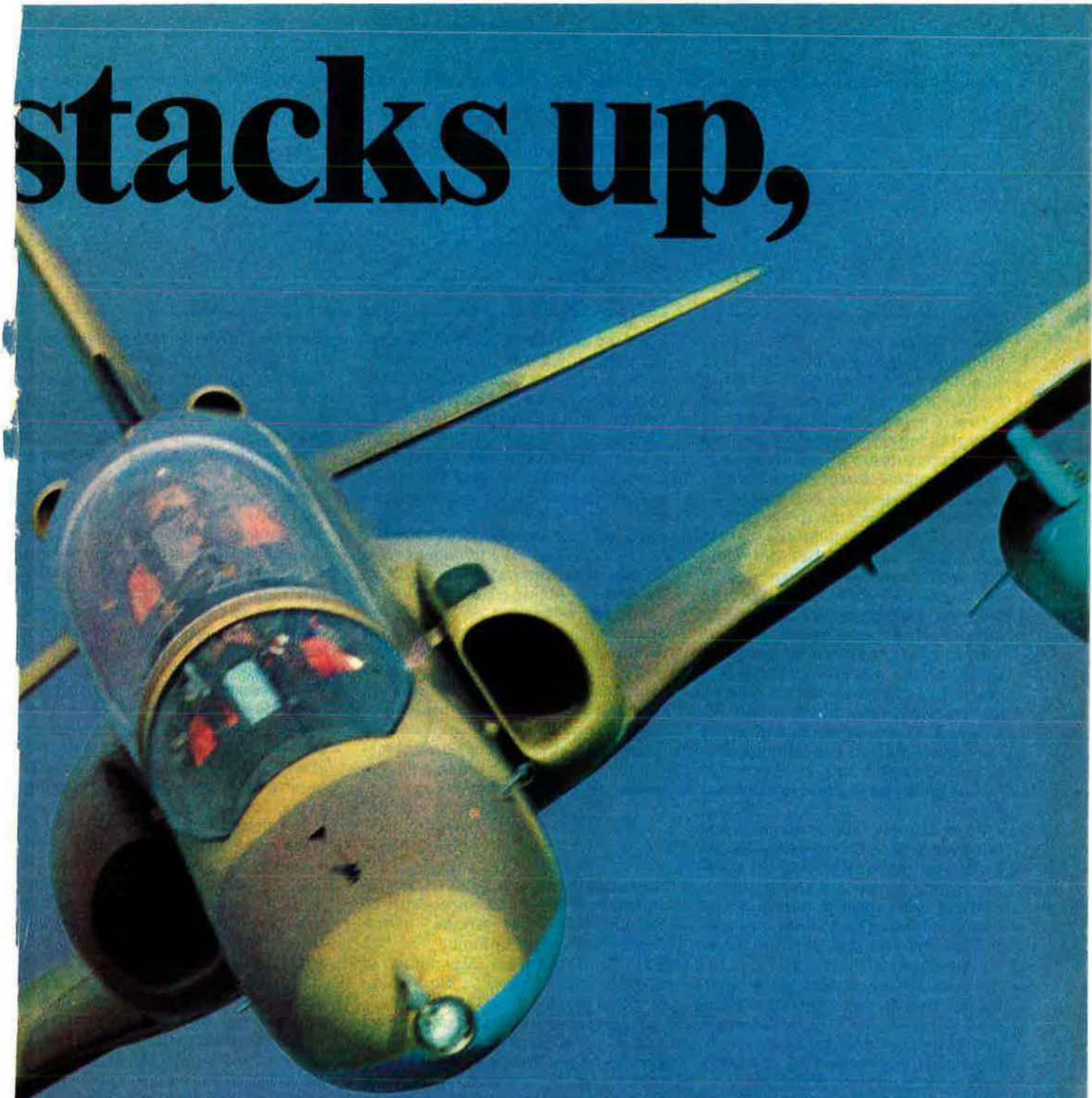

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Senior Officer Pay

Although I agree completely with Gen. T. R. Milton's article, "Restoring Dignity to Military Careers" (October issue, p. 44), I want to add my thoughts regarding what I view as a most critical issue in restoring "dignity" to military careers—particularly to senior leadership. Not voiced by those affected because it is seldom in the best interest of military officers to plead their own case, but I think the time is overdue for the government to act to correct a gross discrepancy in pay and allowances for our senior military officers and leaders.

By this, I do not mean for Congress to authorize another pay raise—I mean to "pay" our senior military leaders what is rightfully theirs, or was, until their salaries had a ceiling imposed by the pay cap rulings under Executive Level V, a 1975 law passed by Congress and reaffirmed each year since.

As an example, senior generals and admirals who are charged with the awesome responsibilities of maintaining the defense of this great nation and who have gone on record time and time again to fight for benefits for their troops and for better equipment to train and fight with are the ones who are suffering the indignities, not only through a steady erosion of traditional benefits of grade and office, but now an increasing financial strain caused by the withholding of their authorized pay.

As a result of the recent 11.7 percent pay increase for the military and the continued freeze on senior pay, the imposed pay cap causes the Chairman of the Joint Chiefs of Staff to lose $23,258 per year, other four stars to lose $16,380 per year, three stars to lose $8,556 per year, and two stars to lose $2,784 per year. What this means is that currently all general and flag officers, two stars and above, are paid the same. This trend, with current inflation rates, coupled with annual pay increases, could conceivably reach down to colonels and below within a year or two.

In contrast, a recent *U.S. News and World Report* survey reported that of 1,052 top officials of 396 of the largest US companies, only twelve executives earned less than $100,000. This compares to the basic pay of our senior military leaders frozen at $50,000.

This situation not only reflects the continued deterioration of the dignity of military leaders, whose continued quality and wisdom we desperately need, but moves even closer toward the reduction of "everyone to a least common denominator" alluded to by General Milton. This inequity in economic well-being as well as the erosion of prestige and status of senior military leaders must be corrected soon or the quality of our military establishment can only decline further. I urge AFA to add this embarrassing problem to the list of priority issues and strongly support correction before our young officers decide the ladder isn't worth climbing.

Oliver Howard
Mayor
Abilene, Tex.

Something Rotten?

Reference the final paragraph of "Washington Observations" in the November issue ["In Focus . . . " p. 26]: To paraphrase Marcellus in Shakespeare's *Hamlet,* "Something is rotten in the City of Washington."

To find that a Director of the First Lady's personal staff is receiving a greater salary than our number one military leader is appalling. Incidentally, note I said receiving more salary, not earning more. I doubt whether the term earning can be compared, considering the values rendered by the principals concerned.

"In Focus . . . " should correct its terminology in that particular case, no?

Col. Paul J. Mascot, USAF (Ret.)
Austin, Tex.

What Happened to Sense of Duty?

I read with interest the letter from Mr. Frank L. Harvey in your November 1980 issue ["Airmail," p. 13]. I agree with Mr. Harvey wholeheartedly.

I spent four years in the Air Force in the mid- to late-'60s. . . . At the time of my hitch most, if not all, of the people I knew were dedicated to one common goal—to defend our country, if necessary with our lives. No one doubted that our mission was "to fly and fight."

Presently I am a staff sergeant in the Louisiana Air National Guard, which brings me to my next point. . . . On my two weeks of active duty during the summer of 1979, I was sent to Luke AFB, Ariz., for refresher training on maintenance of the F-4C. That is when I noticed the drastic change in the attitude of the maintenance personnel. No longer did the specialists have any interest in their jobs, their responsibilities, their obligations. With the exception of one or two airmen, most notably the ones on their second or third hitch, there was no sense of duty on the part of the people at all. They were more concerned with getting off from work early, reading comic books, or sleeping.

The three of us from the Air Guard were only all too eager to go on write-ups with any one of the regulars, but all too often had to round up one of a couple of dependable specialists. This isn't an isolated case either. Other Guardsmen noticed this apathy at other bases.

The point of this is to get your opinion on this problem, and it is a problem. Is it due to the fact that we are an all-volunteer armed force, and no one feels an obligation, a duty to serve his or her country? Or is it because of the politicians? Or the higher-ups in the military, their attitudes rubbing off on the lower echelons? God, I wish I knew what the solution was. If someone doesn't change things soon, we're in trouble, if not already.

One final thing to Mr. Harvey: There are still airmen who run down to the flight line and kick the tire and light the fire—the men of the 159th TFG.

SSgt. R. C. Mattingly, Jr.,
LAANG
Kenner, La.

Sergeant Fisk

Hats off to MSgt. Wayne L. Fisk for his address to the AFA Convention

["Who Can Blame Them for Leaving?" November '80 issue, p. 97].

I believe that he has spoken the exact words felt by enlisted men and women of the Air Force all over this globe!

All that you hear about anymore is the inadequacy of the manpower in the Air Force, along with the inability to compete in numbers with the USSR. Yet, no one wants to spend the money to retain the people and build up the greatest air force in the world.

Sergeant Fisk has handed the ball to AFA and to the people of the United States, as well as to the Congress.

Please . . . do not fumble it!

Amn. Mac McCurdy, USAF
Little Rock AFB, Ark.

It's funny how simple things can sometimes tie diverse events together. The November 1980 issue of AIR FORCE Magazine was a case in point. MSgt. Wayne Fisk's speech proves without a doubt that he is a credit to both the Air Force and the nation. And in the same issue, AFA once again supported increased assistance to the Civil Air Patrol as one of its objectives. The connection between these two items is not obvious until you know a little more about Sergeant Fisk.

Before Sergeant Fisk enlisted as a pararescue specialist in 1966, he was an active and outstanding cadet in the Alaska Wing of CAP. As a cadet, he was the top cadet at three wing encampments, participated in the International Air Cadet Exchange, and attended the FAA Cadet Orientation Program. I'm sure that he also worked on Alaska's numerous SAR missions; this exposure might have led him to devote his life to helping others as a pararescueman.

So you can see that AFA's continued support of increased assistance to CAP is related and important. That assistance will allow CAP to train even more potential "Wayne Fisks" in the future.

The nation and the Air Force can always use a few more like him.

Maj. Gary C. Wilson, CAP
Hamilton Square, N. J.

Stevens's Mnemonic Nemesis

The Nostalgia Quiz Corner ["There I Was . . ." November 1980, p. 128] rekindled memories of my aviation cadet night flights in 1942. The phrase "When Undertaking Very Hard Routes Keep Directions By Very Good Methods" is incorrect, in that it contains eleven words (there were only ten). The second "Very" was not a part of the memory phrase.

As I recall, the light line beacons were installed in series of ten, each having its own Morse identifier with approximately six lights established for each block of 100 miles. Because of the series structure, individual light numbers and their decimal counterparts were always the same. For example, light number six was always "K," as were numbers sixteen, twenty-six, etc. The beacons were plotted on the sectional and regional charts in use at the time. . . .

Bob Stevens, keep those cartoons coming!

CW4 Michael J. Novosel
Fort Rucker, Ala.

In the interest of accuracy, I would like to comment on the "Nostalgia Quiz Corner," page 128 of November AIR FORCE Magazine.

I was an instructor in the T-6 (Terrible Texan) in the early '50s. If my memory is good, I believe that the light line beacons were ten Morse code identifiers: W-U-V-H-T-K-D-B-G-M. The fifth word, as I recall, was *trips*.

If wrong, I will gladly stand corrected.

Your magazine is great. I thoroughly enjoy it.

Lt. Col. Paul B. Nelson,
USAF (Ret.)
Nashua, N. H.

I always turn first to "There I Was . . ." when my copy of AIR FORCE arrives. The Nostalgia Quiz in the [November] issue brought back memories of the first night cross-country in Advanced. However, I don't remember the second "Very" in the sequence. In fact, it doesn't seem reasonable that they would have used two "Vs" in the same sequence.

This was only one of many "memory enhancers." Probably the shortest was the "GUMP" check before landing (Gas, Undercarriage, Mixture, Propellers). A favorite of many of us was the phrase intended to assist in flight planning and navigating: *T*rue *V*irgins *M*ake *D*ull *C*ompanions! Translation: *T*rue course + *V*ariation = *M*agnetic course + *D*eviation = *C*ompass course.

Col. Robert F. Myers,
USAF (Ret.)
Marietta, Ga.

• *Bob Stevens replies: "I'm very impressed by* AIR FORCE's *very observant readers, who in this case are so very correct. It's very gratifying to know that so very many troops out there care so very much. Very truly yours, Bob Stevens. P.S. The second 'very' was superfluous."*

New Stealth Missile?

Regarding the caption on p. 48 of your November issue: "F-15B Strike Eagle closeup shows arrangement of Rockeye bombs and AIM-7 Sparrow missiles grouped around conformal fuel tank." It's great to see (or not to) that we have finally developed the invisible air-to-air missile. The advantages of this system are obvious.

Seriously, it looks like the missiles shown are AIM-9s.

Capt. George H. Newman, USAF
Vance AFB, Okla.

Congratulations on an excellent article . . . depicting the new American muscle centered around the F-15 Eagle ["The US Returns to Farnborough in Strength" November 1980, p. 46], but try as hard as we can, we just cannot find those AIM-7 Sparrow missiles grouped around the conformal fuel tanks. Those are AIM-9 Sidewinder missiles shown mounted on the inboard pylon.

As the first F-16 Fighting Falcon wing, we 388th TFW missile maintenance troops are by no means experts on the F-15, but we do like to keep our missiles straight.

TSgt. Alan J. Brown, USAF
388th TFW Missile Maintenance
Hill AFB, Utah

• *Captain Newman and Sergeant Brown are, of course, correct. The Editor goofed. The caption should have identified the missiles as AIM-9 Sidewinders. We regret the error, and thank Captain Newman and Sergeant Brown and the many other "Eagle-eyed" readers who brought it to our attention.*—THE EDITORS

Orders for the B-32

[I have] a thirty-five-year-old set of orders with a list of most of the people who flew the B-32 shown thereon.

While in training at Fort Worth, we knew there were a couple of B-32s flying reconnaissance against Japan, but that was all.

The first crews (twelve or fifteen) left Fort Worth and went to Mountain Home, Idaho, to drop a few practice bombs and head for Clark Field in the Philippines. Some of them got as far as Guam and all were sent back to the States. I believe most of the B-32s went to Walnut Ridge, Ark., where they were junked. We were en route to Mountain Home when the war ended

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 interest of space or good taste. Names will be withheld on request, but unsigned letters are not acceptable.

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The Falcon 50, as the world's first executive tri-jet, delivers exceptional range performance out of short airfields and has become the increasingly popular choice of heads of state.

All the Falcons, incidentally, are FAA-certified for unlimited structural life, a distinction unique among business jets.

For more information, contact Roy Bergstrom, Senior Vice President/Marketing, Falcon Jet Corporation, Teterboro, NJ 07608. (201) 288-5300.

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AIRMAIL

and were shipped back to Fort Worth immediately. Our other crew members were waiting for us at Mountain Home.

I believe we all enjoyed flying the B-32. The lack of pressurization didn't bother us since we were primarily B-24 instructor pilots from all B-24 bases and were used to the lack of pressurization.

I had a grand total of eighty-five hours in the aircraft, and enjoyed it very much. Perhaps some of those who flew the B-32 will also respond. For its time it was an excellent aircraft.

Lt. Col. Leonard E. Williams, USAF (Ret.)
836 Grelle Ave.
Lewiston, Idaho 83501

More on Fox Able One

Dave Schilling was a born leader and aviation pioneer whose work led to the development of fighter aircraft into an integrated weapon system. I hope that Colonel Klibbe's article ["Fox Able One—The First Transatlantic Jet Deployment" October 1980, p. 72] will generate additional ones to tell the whole story of this remarkable individual. It was my good fortune to work with the dedicated people of the 31st Fighter Escort Wing in connection with installation of autopilots, and followed them across the Pacific as part of Fox Peter One.

I currently live on the shores of Lake Michigan and would very much like to hear from anyone who may remember me from those days.

Herbert Norder
8405 172d Ave.
West Olive, Mich. 40460

Recently at my doctor's office I picked up the October issue of AIR FORCE Magazine and received a very pleasant surprise. Regarding your article, "Fox Able One—The First Transatlantic Jet Deployment": I was on duty in the control tower when they arrived at Dow AFB, Bangor, Me. I have several pictures in one of my photo albums very much the same as in the story.

Thank you for bringing back some old memories.

Art Garrett
Zanesville, Ohio

Southern Museum of Flight

The Birmingham Aero Club proudly announces that another great museum has been added to the cause of preserving the wonderful heritage of flight. It is the Southern Museum of Flight, and is located in Birmingham, Ala.

The response for requests for famous and antique aircraft has been heartwarming and we still are seeking such aircraft. We are concentrating on the less dramatic, but no less important, aspects of flight that need to be preserved and displayed (documents, flight clothing, uniforms, engines, armament, paintings, photographs, books, etc.).

If you are interested in helping to make this museum a real national attraction for all flight enthusiasts, and wish to loan or donate any material, would you kindly provide the museum with the following information?

- Description of item.
- Background information (dates, origin, ownership, etc.).
- Approximate size, weight, and packing requirements.
- Your name, address, and telephone number.

Items donated will be tax-deductible . . . and full credit will be given to all donors as the items are displayed.

All AFA members are always invited to visit the Southern Museum of Flight when they are in Birmingham.

Donald L. Krekelberg
Member, Board of Directors
Southern Museum of Flight
P. O. Box 82
Birmingham, Ala. 35201

Silver Wings Museum

The Silver Wings Museum, located at Mather AFB, Calif., traces the development of airpower from its earliest beginnings. In particular it serves as a history of the disciplines taught at Mather: aerial navigation, aerial bombardment, and electronic warfare.

In the past the museum had depended, in large part, on local patrons who have allowed their personal collections to be used as displays. While this permitted a continuing fresh look for the museum, the constant flux caused a huge work load on those responsible for the project.

The museum now wishes to finalize some of its earlier displays by obtaining permanent exhibits. Sharing a common philosophy, the Sacramento Chapter of the Air Force Association recognizes the value of such an undertaking. An *ad hoc* committee has been formed to further this cause. We solicit help in obtaining objects and information that illustrate the history of flight and airpower. We are particularly interested in the nose section/bombardier station of a WW II bomber in which to display the Norden bombsight. A fund is being established to purchase more expensive items.

If you can help with information, donations, or contributions, please contact:

Capt. Bill Sadler, USAF
323d FTW
Mather AFB, Calif. 95655
Phone: (916) 364-2557
AUTOVON: 828-2557

AFCC Anniversary

The Air Force Communications Command (AFCC) is coming up on its twentieth anniversary as a major command July 1, 1981. It will be celebrated throughout 1981 by planning projects such as displays, formal dinners, picnics, special newspapers, etc. We're looking for historical photos and information pertaining to AFCC during the past twenty years. Photos might include air traffic control, data automation, or base communications.

We're also looking for items of information such as people commissioned, born, transferred to AFCC, etc., on any July 1, particularly in 1961. If any of your readers, especially former members of AFCC, can help in either of these areas, it would be greatly appreciated. (If material is to be returned, it should be marked so.) Please contact:

2d Lt. Janet M. Wood, USAF
Hq. AFCC/PAW
Scott AFB, Ill. 62225
Phone: (618) 256-4396
AUTOVON: 638-4396

Major McGuire

I am doing research on Maj. Thomas B. McGuire, Jr., the number two ace of World War II and holder of the Medal of Honor.

I'm a native of Sebring, Fla., where Tommy lived as a teenager. I seek information to be shared with the Sebring Historical Society. Little is known about McGuire in Sebring because his mother died while he was in the Pacific and his father lived in New Jersey. McGuire was killed in combat during the first week of 1945.

I would like to hear from anyone who knew him at any time in the Army Air Forces. He trained at Corsicana, Tex., as a member of Class 42-B, and at Randolph and Kelly AFBs, was a member of the 56th Fighter Squadron in Alaska in 1942, the 9th Fighter Squadron, 431st Fighter Squadron, and 475th Fighter Group before he died.

Please send information to me at the address below.

Charles A. Martin
105 Canterbury Rd.
Mount Laurel, N. J. 08054

B-24 Crash in Chichester

I am in the process of painting an illustration of an American B-24 Liberator aircraft in flight. The aircraft crashed on the allotments at the rear of Long's timber yard in Chichester on Thursday, May 11, 1944, at 3:55 p.m. The incident damaged the Electric Laundry and the Food office in East Street and other buildings.

The American crew of nine bailed out and two were killed. The explosion caused nineteen casualties, leaving three unexploded 1,000-lb. bombs at the rear of Allman's Garage.

I need information concerning this aircraft, about the bomber group, the markings or numbers on the fuselage, if it had camouflage or nose paintings, and in which direction the aircraft was flying.

I would be very grateful for any information from readers.

Tom Sutcliffe
3 Sandringham Rd.
Chichester
West Sussex P019 2XJ
England

509th Composite Group

I'm collecting information on the markings of the fifteen B-29s flown by the 509th Composite Group during August 1945. Needed are photos, drawings, or descriptions for a set of side-view drawings on these aircraft. Would also like to obtain a copy of the *History of the 509th/Pictorial Album.*

Can anybody confirm the aircraft flown by Maj. James Hopkins during the Nagasaki mission?

All information and photos will be returned.

Delaney Hopkins
Rte. 4, Box 313A
Harrisonburg, Va. 22807

AIRMAIL

7th Signal Radio

Anyone who served in the 7th Signal Radio Maintenance Team (Aviation) at Showamae, Japan, between 1947 and 1949 is invited to contact me by mail or phone.

This unit was the GEEIA of its day, with the distinction that it was overhauling when it wasn't installing. The 7th was also vested with the responsibility for maintaining the radar and radio gear in General MacArthur's aircraft.

I would like to establish a clearing point where veterans of the 7th Signal could contact one another. I will build a roster similar to the one that was put together in 1949, and update the roster as time goes by. I will answer every communication.

Lee R. Bishop
5485 S. 2100 W.
Roy, Utah 84067
Phone: (801) 825-0595

Ditched Liberator Rescue

During World War II, I was in charge of Royal Air Force Rescue Launch No. 128, based on the island of Malta. On May 6, 1943, at 13:30 hours, we rescued three American airmen from a Liberator that had crashed into the sea near Malta on their way back to North Africa from a bombing mission on the Reggio area in southern Italy.

The members of the aircrew were Sergeants Hood (or possibly Hord), #39091360; Brown, #37186586; and Widinmier, serial number not known.

I would like to contact these gentlemen. Of course, they may not have made it through the war but one never knows, and it would be nice to hear from them. If anyone knows their whereabouts, please get in touch with me.

L. G. Head
34 Mill Rd.
Stokenchurch
Bucks, England HP133TT

55th SRW History

I am the historian for the 55th Elint Association and need help in assembling data on the 55th Strategic Reconnaissance Wing. The outfit was born in WW II as the 55th Fighter Group.

I need pictures (aircraft, unit, and personal activities, TDYs, etc.), news releases, manuals, significant events, or any other material that may be used in the unit history we plan to publish. Non-55th readers may be helpful as I need any material available on the following aircraft: RB-17, RB-29, RB-50, RB-47, KC-97, and RC-135.

The book will be printed in limited

UNIT REUNIONS

No. 1 Air Commando Association
Veterans of the 1st Air Commando Group, US Army Air Corps, March 5–7, Knott's Berry Farm, Anaheim, Calif. **Contact:** Bob Moist, P. O. Box 466, Broderick, Calif. 95605. Phone: (916) 372-6707.

5th Bomb Group (H)
Want to hear from former members, SWPA 1941–1945, to compile roster for use in organizing future reunion. **Contact:** Harold A. Hofmann, 1913 13th St. S., Great Falls, Mont. 59405.

9th Troop Carrier Squadron, 7th AF
Reunion will be held February 26–28, Mobile Ala. **Contact:** Robert R. Wells, 107 Spanish Main, Spanish Fort, Ala. 36527. Phone: (205) 626-1178.

Class 42-B
Trying to locate former aviation class cadets (primary) of Hicks Field, Fort Worth, Tex., to organize a reunion. **Contact:** Lt. Col. Henry G. Gendreizig, USAF (Ret.), 1401 Prairie Rd., Colorado Springs, Colo. 80909.

East Coast Fighter Pilots Association
Friday, March 6, 1981, Helena Room, Best Western Motel, Glebe Rd. and I-395, Arlington, Va., 5:00 p.m. **Contact:** "Doc" Broadway, phone: (703) 527-5082.

307th Bombardment Group, 13th AF
I would like to hear from anyone associated with the 307th Bombardment Group (S. W. Pacific, WW II) in regard to organizing a reunion. **Contact:** James E. Raysor, 5520 Hollings St., Ventura, Calif. 93003. Phone: (805) 642-3324.

335th "Chiefs"
The 335th "Chiefs" stationed at Seymour Johnson AFB, N. C., will have a reunion January 23–24, 1981. (The original date of December 5–6, 1980, had to be slipped due to an unscheduled exercise.) **Contact:** Maj. John Booker, 703 Lynch Drive, Goldsboro, N. C. 27530. Phone: (919) 735-6373 or 736-5611. AUTOVON: 488-5611.

340th Bomb Wing
Former members, Whiteman AFB, Mo., from 1951–1964 sought for September 1981 reunion. Attached units included. **Contact:** Lt. Col. Henry Whittle, USAF (Ret.), 11837 Petal Dr., San Antonio, Tex. 78216. Phone: (512) 344-8805.

436th Troop Carrier Group (ETO)
Anyone having information on unit reunion please **contact:** Ralph L. Dorff, 5348-A Algarrobo, Laguna Hills, Calif. 92653.

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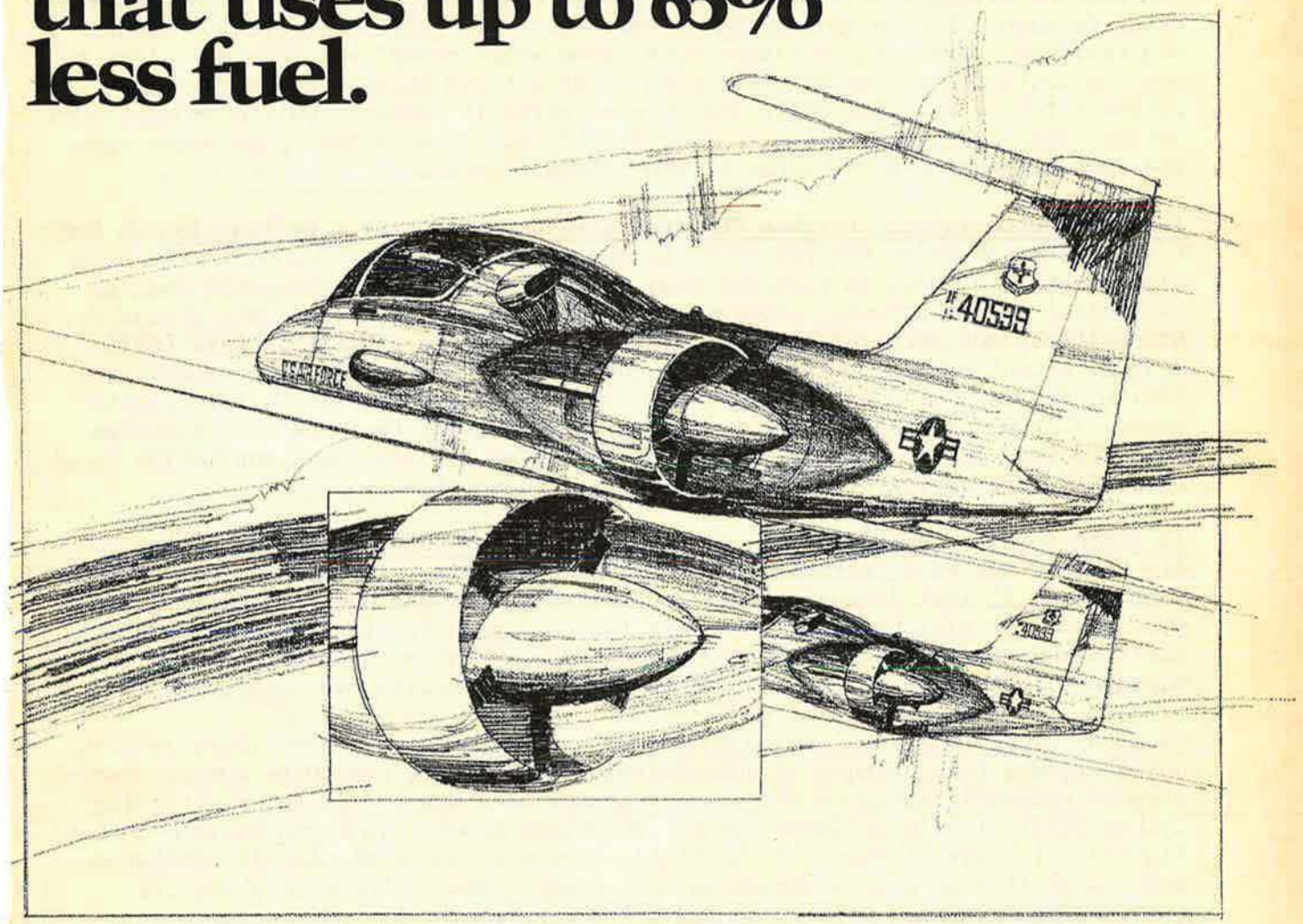

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The process that enables tree branches to obtain water may eventually be used for cooling avionics or other systems where fluid pumping against high-pressure heads or high g forces is required. Under U.S. Air Force sponsorship, Hughes engineers are developing a closed metal tube which moves heat from one place to another using direct osmosis, the passing of a fluid through a semipermeable membrane into a solution where its concentration is higher. Unlike conventional devices using capillary wicks to pump liquid, the osmotic heat pipe would operate regardless of gravitational or centrifugal forces.

Twelve minutes is all it takes for technicians to pinpoint a malfunction in the F/A-18 Hornet's radar and return it to operational status. The AN/APG-65 radar slides out on a built-in rack for easy access to all five replaceable modular assemblies -- the antenna, programmable signal processor, radar data processor, transmitter, and receiver/exciter. The radar also has a built-in test (BIT) system for automatic pre-flight radar checkout and continuous operational monitoring. In case of a malfunction, the BIT locates and identifies the problem area. This allows technicians to replace the unit and test the entire system with on-board power. Hughes builds the radar for the U.S. Navy and Marine Corps aircraft under contract to McDonnell Douglas Corporation.

Advanced computer software will be used to test the guidance system of the U.S. Air Force's new MX intercontinental ballistic missile. The software is an IEEE standard ATLAS test language compiler similar to the one Hughes created for the U.S. Navy. It will be used to prepare test programs for the guidance system's performance during manufacture and maintenance. Hughes is under contract to Northrop, integrator of the MX guidance system production test equipment.

Tactical cruise missiles can be guided to a target, despite electronic jamming, using signals from navigation satellites. Flight tests over nine months demonstrated extremely accurate midcourse guidance of a Navstar Global Positioning System (GPS) missile guidance system, which was mounted in a pod beneath an F-4 fighter. The system showed to be highly immune to enemy electronic countermeasures when it flew over a simulated high-power jammer without breaking its tracking lock. Tests were conducted by Hughes for the U.S. Air Force.

U.S. Army technicians and other key personnel who will serve as U.S. Roland instructors have completed their training on how to operate and maintain the all-weather air defense missile system. They are developing courses at the Missile Munitions Center/School at Redstone Arsenal, Alabama, and the Air Defense School at Ft. Bliss, Texas, for training U.S. Army Roland operator and maintenance crews. The all-weather, short-range U.S. Roland is the first major European-designed weapon system selected for production in the United States and deployment with the U.S. Army. Hughes and Boeing Aerospace Company are associate prime contractors. They are licensed to produce U.S. Roland by Euromissile, a joint venture of the system's developers, Messerschmitt-Boelkow-Blohm of West Germany and SNI Aerospatiale of France.

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Bruce M. Bailey
Rt. 2, Box 143
Brandon, Miss. 39042

B-29s in Korea

Many thanks to all the Mustangers who answered my call for help. *P-51 Mustang in Action* will be released on May 1, 1981. I hope everyone likes what they will see.

I'm now working on Volume II of "Airwar—Korea" and would like to hear from any B-29 air and ground crew members from the Korean War. I need photos and/or color slides of aircraft from the 19th, 22d, 92d, 98th, and 307th Bomb Groups, plus the 91st SRS and 43d ARS (Det. 4).

Anyone with information and/or photos from the above units please contact me.

Larry Davis
Squadron/Signal Publications
4409 12th St. S. W.
Canton, Ohio 44710

91st SRW

Any former members of the phased-out 91st Strategic Reconnaissance Wing (SAC) who flew the RB-45C Tornado, which served in such a valiant role during many UK and Far East deployments, please make contact with interest for a possible unit reunion sometime in 1982.

Col. Howard S. (Sam) Myers, Jr., USAF (Ret.)
1437 Five Hill Trail
Virginia Beach, Va. 23452
Phone: (804) 340-7375

Air Force Cross

I am doing research with hopes of compiling sufficient information to write a book on recipients of the Air Force Cross. Much of the information is no longer available from official USAF sources so I seek the help of your readers.

I am looking for any information whatsoever concerning winners of this decoration, including names, addresses, photos, and details of missions for which the AFC was awarded. Any help at all will be greatly appreciated.

Kent Kistler
12712 Portland Ct.
Burnsville, Minn. 55337

AC-130 Spectre Gunships

I am looking for pictures and information on AC-130 Spectre gunships used in Vietnam for model-building purposes. Types of armament and their placement most sought. I will return photos or other articles upon request. Please contact:

Tim Bosley
14101 Farley
Redford, Mich. 48239

Satan's Angels

I am seeking information on the 433d Fighter Squadron "Satan's Angels." My father was an AP machinist with this squadron during 1942–43. Any information on this unit would be greatly appreciated.

SSgt. Homer F. Cole, Jr., USAF
3103 "A" Liberty Rd.
Hill AFB, Utah 84056

Van Veen Squadron, AAS

We are seeking to locate all our alumni and need to get addresses as soon as possible. Alumni can send this information to me at the following address.

Erik J. Lichtenberger
Arnold Air Society
Det. 390, AFROTC
Room 158, North Hall
University of Michigan
Ann Arbor, Mich. 48109

Collectors' Corner

I am an obsessed collector of pictures, photographs, and posters of all modern military aircraft in service. In hopes of becoming a future pilot in USAF, I am always looking for anything affiliated with the Air Force. My collection so far is fairly impressive, and I am always striving for it to grow.

I am looking for anybody that has any photos, postcards, posters, and the like that they would be willing to sell, trade, or give to me. Any correspondence will be greatly appreciated.

I also am looking for one USAF flight helmet with the visor knob in the center. Will be willing to pay fair amount depending on condition.

Cadet 1st Lt. Jeff Bean
Kennett St.
Conway, N. H. 03818

Over the years the Air Force has had ninety-three active squadrons and seventy-six Air National Guard squadrons dedicated to air defense of the continental United States. I am interested in purchasing unit insignia patches of these squadrons. I realize that they are hard to come by, but I am willing to pay top dollar for them.

Jeff C. Alfier
5309 Riverdale Rd., #626
Riverdale, Md. 20840

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IN FOCUS...

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

Washington, D. C., Dec. 4

The Alarming State of the US Defense Industrial Base

The United States is now, and has been for some time, "slipping and sliding on a course toward the status of a second-rate industrial power [yet] cannot have a healthy defense industry without comparable health in US industry as a whole." These alarming symptoms of the "national industrial productivity disease, which must be addressed if we are to maintain our status as the focus of the free world's industrial, economic, and military strength," were the theme of detailed, eye-opening testimony before the Industrial Readiness Panel of the House Armed Services Committee by Gen. Alton D. Slay, Commander of the Air Force Systems Command.

Prefacing his sweeping review of the defense industrial base with a comparative assessment of US and Soviet forces and capabilities in being, General Slay said that "our military position vis-à-vis the Soviet Union has been one of gradual shift over the past twenty years [from] clear superiority to a position that is characterized by some as an equivalence of power with the Soviets and by others as something less than that."

Over the past ten years, he told the congressional panel, US declines in armed forces strength, weighed against concurrent increases on the Soviet side, caused a "net disparity in growth of sixty-five percent." During this ten-year period, Soviet defense spending has grown at an average of more than "five percent, in real terms every year, while each year US defense spending in real terms either declined or, at best, remained static," General Slay said.

The balance is skewed also in the most fundamental aspect of defense production, manpower, with the Soviets having three times as many engineers engaged in military R&D as the US. The Soviets, he said, are "outproducing us in every aspect of defense production [and] are now, and have been for twenty years, on a concerted military R&D and acquisition offensive . . . that has given them a momentum we lack."

Rejecting the notion that the US today could surge industrial production in the manner of the "heroic eleventh-hour effort" of World War II as "foolhardy," he pointed out that modern weapon systems "are infinitely more complex, our defense industrial base does not have standby capacity, and we would be caught flat-footed for even the basic materials from which defense materials are made."

A key problem is that the US, in terms of many critical materials, is a "have-not" nation. The US is more than fifty percent dependent on foreign sources for more than half of the approximately forty minerals of vital importance to national defense and the national economy. Last year, the US had to import more than $25 billion worth of nonfuel minerals, reflecting accelerating trends toward ever greater dependence on foreign sources. Reasons behind this increasing dependence on foreign minerals are that technological advances drive up the demand for exotic materials and that more and more legislative and regulatory restrictions are being imposed on the US mining industry, General Slay suggested. The result, he warned, is that the US is extremely vulnerable to mineral cartels, a situation paralleling this country's vulnerability to the OPEC oil cartel, which already has inflicted "price escalation, shortages, inflation, dollar devaluation, trade deficits, and economic stagnation."

Both in terms of production and reserves, the US depends principally on two areas of the world for critical materials: Siberia and southern Africa. The resultant strategic vulnerability is obvious, he said: "On the one hand, critical materials availability is subject to the political and economic stability of several southern African nations. On the other hand, our chief remaining source is also our major international rival—the Soviet Union. Although our strategic vulnerability is grim, it is even grimmer for our major allies. The NATO/European Economic Community and Japan are much more dependent on imports of vital minerals than we are."

The USSR, in marked contrast, General Slay testified, "has had the foresight to create natural minerals and resource strategies to assure adequate supplies [and] is virtually self-sufficient for most of its mineral needs."

The irony of the situation, General Slay brought out, is that much of the problem is self-inflicted. In many instances the US has both the needed mineral deposits and the technologies to extract and process them, but arbitrary regulations and laws prohibit mining of minerals or make it prohibitively expensive. This country has the option to reduce substantially or eliminate completely its dependence on foreign sources for minerals of crucial importance to the US economy in general and national security in particular, General Slay testified.

Citing as specific examples cobalt, chromium, gold, asbestos, zinc, and nickel, he told the congressional panel that of the 2,300,000,000 acres of the US landmass, only 6,000,000 acres, or about one-quarter of one percent, are used for mining. Of the 750,000,000 acres of public lands, about three-fourths are either closed or severely restricted to hard rock mineral mining activities even though they show huge mineral potential. Additionally, there currently are eighty different laws that are being administered by twenty different federal agencies that impede the domestic nonfuel minerals industry. These restrictive policies, the AFSC Commander warned, would have "disastrous" impact on the nation's economy and the defense industrial base "if our foreign supplies are cut off."

In recognition of this danger, Congress passed legislation to create a strategic and critical materials stockpile for emergency use in times of war. This stockpile, as originally planned, was to be used solely for national defense purposes. But, as Gen-

eral Slay pointed out, since 1946 "there have been frequent, and severe, shifts in stockpile objectives having little to do with defense." As a result of manipulating the stockpile in order to balance the national budget and to affect prices and inflation, serious "shortages and imbalances" in the stockpile were introduced.

Of the sixty-two material areas covered by the stockpile act, sixty percent do not meet the established goals, General Slay reported. The last major stockpile purchase was made in 1960, which not only contributes to depletion but limits the use of some stockpiled materials in many of today's sophisticated applications because of technical obsolescence. From the military point of view, stockpile deficiencies jeopardize availability of essential materials in times of national emergency and introduce grave production bottlenecks.

Exacerbating the problem of materials scarcity and the ancillary tendency to drive up weapon systems costs is lack of industrial capacity to produce finished items "at the rate we need," General Slay testified. A pivotal cause behind lagging production capacity is what he termed the "very ambitious" rulemaking by federal agencies in environmental and labor-related sectors. The result has been the closure of "literally hundreds" of foundries and higher production costs for those who managed to stay alive.

One of the crucial consequences of these supply and production capacity deficiencies, the AFSC Commander pointed out, are longer, often intolerable, lead times for weapon systems: "Engine lead times are up as much as ninety to 115 percent—or from nineteen to forty-one months. . . . If we go to war today, we don't have the ability to surge quickly or to quickly increase production rates above what we are already doing."

Consequently, "even if we go all out for mobilization of our resources, we won't be able to deliver significantly larger aircraft quantities in the first twenty-four-month period. A chilling example is that after nearly eighteen months under surge conditions, we could only expect [an increase] of twenty-two more A-10s and no additional F-15s and F-16s [over] the currently contracted delivery schedule. Obviously, with proper funding, we could greatly increase the output of these aircraft, but we would not begin to see significantly larger numbers flying for at least three years or more," according to General Slay.

Other syndromes of the malaise

IN FOCUS...

gripping the US industrial base—across the board as well as in the defense sector—are declining productivity and quality, General Slay testified: "Today many of our industries are no longer competitive with their counterparts in other Western industrialized countries." Even though the US industrial decline over the past decade has not been as severe in the aircraft industry than elsewhere, he said, "our world market share even there decreased from sixty-six percent to fifty-eight percent. . . . The continuing loss of market share has major security implications because the loss of markets also means the loss of capacity, capability, and skills that could be used during a national emergency."

The net effect of this comprehensive deterioration transcends national security and corrodes all aspects of the national vitality, with the US standard of living now ranking fifth in the world—down from the highest in the world in 1972, General Slay told the House Armed Services Committee Panel. The US, he said, "was once the envy of the world for its ability to find new ways to make things better with better quality and at lower cost. It is now dead last in increasing the amount of goods and services produced per employee when compared with other nations. This failure to improve our productivity growth is one major reason that our consumer prices are increasing at double-digit rates."

The dubious honor of being "dead last" among industrial countries also goes to the US "in investment in new and modern equipment as a percent of GNP and our slowdown in the rate of productivity growth has gone hand in hand with the reduced rate of spending, in constant dollars, for new and better tools for production," according to the AFSC Commander.

Clearly contributing to the deterioration of the US industrial base is that investments in R&D, as a percentage of GNP, declined "dramatically" over the past several years. "The ratio of national (military and civilian) R&D expenditures to GNP decreased nearly twenty-four percent from 1964 to 1978. In comparison, the growth in R&D spending as a percent of GNP for Russia during the same period rose by twenty-one percent. Their actual expenditures also exceeded those of the US," General Slay told Congress.

Aggravating the problem of lagging R&D investment is that "much of today's R&D is spent to comply with governmental regulations." Compliance procedures siphon off as much as forty percent of total R&D investments for some industries, the AFSC Commander reported.

Defense production capability suffers also because of increasing shortages in skilled production workers, with "many tooling and machinery firms . . . being forced to turn down defense-related work while machines sit idle because of the lack of skilled workers. Many tooling and machining firms are aggressively recruiting overseas for skilled help. They are filling American jobs with foreigners while national unemployment continues to rise—a truly sad commentary," General Slay reported.

Ensuing from the cumulative deficiencies cited by General Slay are slips in product quality, with grievous consequences to the national defense posture. A recent study of certain electronic components—memory chips of a specific type—that were supplied by three Japanese and three US firms showed that the failure rate "of the best American model was nine times higher than the best Japanese model," he reported.

The "quality disease" in defense industry is manifest in "such things as defective engine turbine parts, defective tubing, defective engine bearings and races, defective aircraft structures, defective welds, and the like. And all of these things cost us in productivity, in dollars, and in readiness," General Slay testified. Recent investigations and analyses by AFSC, including an assessment of how American labor performs in Japanese-managed plants, led to the conclusion that "the quality problem is not with American labor—it's with our [US] management and leadership. They [the workers] are capable and proud, but need the message from us that quality is, in fact, important," General Slay reported.

Increases in capital investment in aerospace plants, General Slay said, are imperative. Yet, the AFSC Commander told Congress, "there are many disincentives to capital investment. Inflation, economic uncertainty, and current depreciation policy are disincentives affecting all industries. The disallowance of interest as an allowable cost on government contracts and the instability of government funding as actually experienced by industry are further hin-

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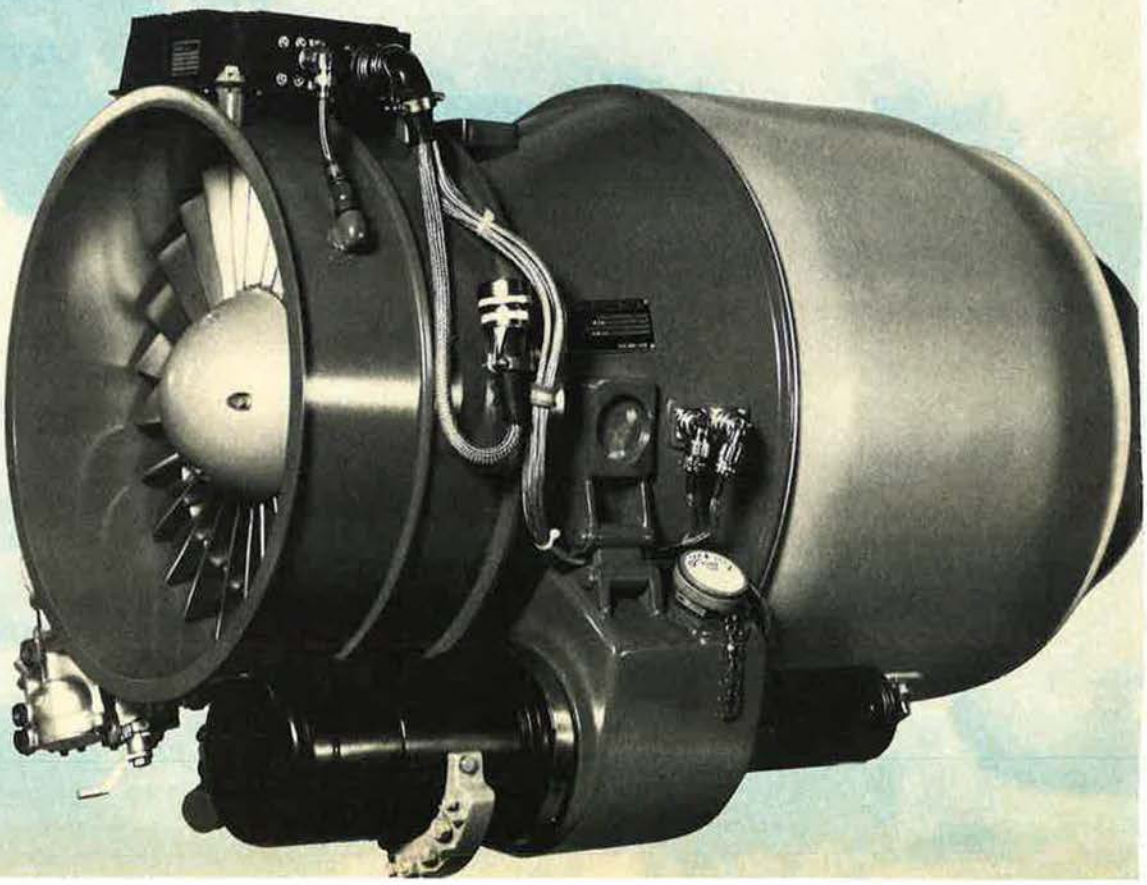

drances to adequate capital investment."

Among the range of managerial and legislative remedies for easing the defense industrial base problem recommended by the AFSC Commander to Congress, the "single most important" one is the use of multiyear contracts: "It is the key because it attacks so many of the problems . . . and because it attacks them so well." This technique, he explained, requires the government to commit itself to longer-term contracts to allow contractors to make more economical use of resources and to protect the contractor in the event the commitment cannot be honored.

"If we could do these two things on selected acquisitions, we could routinely save from ten percent to thirty percent of the contract price," General Slay said. The benefits of multiyear contracting extend from stabilizing the defense industry's work force and the supply of critical materials to boosts in productivity and capital investments. Citing six major weapons programs that are candidates for multiyear contracting, General Slay said such a step would cut their combined annual procurement costs of about $13 billion by $1.550 billion.

Culminating his plea for legislative relief—in effect a thirteen-point program—General Slay stressed that the "difficulties are national in scope, and if they are to be solved, have to be attacked on a national scale. . . . The ultimate key to our success or failure is going to be the degree of commitment the nation makes to these solutions."

Exhorting the nation to return to "our old tradition of hating to be second-best," he warned that "if we don't accept our responsibilities as the industrial leader of the western world, our way of life, and maybe even our freedom itself will eventually fade away and we will have only ourselves to blame." One can only hope that the new Administration and the new Congress will heed General Slay.

Mandate for Leadership

One of the telling clues concerning defense policies likely to be espoused by the new Administration is the Heritage Foundation's detailed study of Defense Department requirements, which is part of a government-wide analysis known as "Mandate for Leadership." As expected, the Foundation, a Washington-based conservative think tank with close ties to the President-elect, placed special emphasis in its study on "quick fixes" in the strategic sector by stressing that

IN FOCUS...

"rebasing the Minuteman III in a vertical MPS [multiple protective shelters, meaning a deceptive basing mode utilizing a shell-game approach] around and within existing Minuteman III sites might well be the most cost-effective and timely program, which could be implemented in two or three years." USAF experts privately express reservations about this scheme because of the extremely high costs and long lead times associated with reopening the Minuteman production line.

Not mentioned by the Heritage Foundation study but known to be under enthusiastic consideration by influential defense advisors of the new Administration is development of a small, 25,000-pound, single warhead ICBM that could be proliferated in as many as 20,000 shelters. USAF currently is studying the feasibility and merits of such a system.

Even though seemingly favoring initial deployment of about 100 Minuteman IIIs—and claiming that using between nine and eighteen vertical shelters per missile could be accomplished at a cost of about $2.2 billion—in an MPS mode, the Heritage Foundation study also considers the option of accelerating the MX program. Pentagon experts believe, however, that an all-out effort to speed up development and IOC (initial operational capability) of the system will at best only speed up first deployment by six months while sharply increasing cost and technological risk.

The Heritage Foundation's study stops short of a categoric recommendation to proceed with the B-1 as is, but recommends both "immediate development and deployment of a new strategic bomber, which will utilize the B-1 and advanced bomber technology [as well as] acceleration of the deployment of the air-launched cruise missile (ALCM)." The report also recommends a series of changes in how and where the bomber force is based in order to improve survivability and readiness, including development of "multiple aim point basing" by means of hardened aircraft shelters.

In general terms, the Heritage Foundation study points out apperceptively that "despite the change in national mood and growing threat and despite the mandate of the new Administration to bolster US national defenses, neither the American public nor the Congress will find it practical to support increases in defense spending as large as required. Independent estimates of additional real defense needs approach $50 billion to $100 billion annually, and even more if past shortfalls are to be made up. Practical and affordable defense increases in the near-years are more likely to be in the neighborhood of $30 billion to $35 billion annually over Carter projections."

The Foundation, therefore, recommended:

- An FY '81 supplemental request of $15 billion to $20 billion to cover the second half of the current fiscal year;
- A revised FY '82 Defense budget with an increase of at least $35 billion (over the Carter Administration's proposal); and
- A new FYDP (Five Year Defense Plan) for FY '82–87—or preferably an Eight-Year Defense Plan to cover the next two administrations. It would, the Foundation's study urged, "be highly desirable to establish a firm FYDP early on, and then make every practical effort to stay with it, so that the nation can also make reasonable long-range plans for its other pressing domestic and international problem areas."

An Airpower Lesson

One of the many puzzling aspects of the Iranian/Iraqi war is the Iranian air force's ability to sustain high sortie rates for its F-14s—which are used mainly as AWACS aircraft—while the sustain rates of the F-5s appear to be extremely low. The sortie rate of the Iranian F-4s is somewhere between that of the F-14s and the F-5s. Performance of the F-4s against heavily defended Iraqi targets—involving first-line Soviet air defense weapons—is surprisingly good, even though somewhere between sixty and eighty aircrews apparently have been downed and the purges of almost all senior ranks of the Iranian force have eliminated all vestiges of combat discipline. US analysts believe that the Iranian experience confirms USAF's position in the quality vs. quantity argument.

Another airpower lesson that is being learned by the Soviet invasion forces in Afghanistan is that loss rates of attack helicopters, even in relatively permissive environments, are unavoidably high. Even though most primitively equipped, the Afghan rebel groups are downing large numbers of modern Hind helicopter gunships. ■

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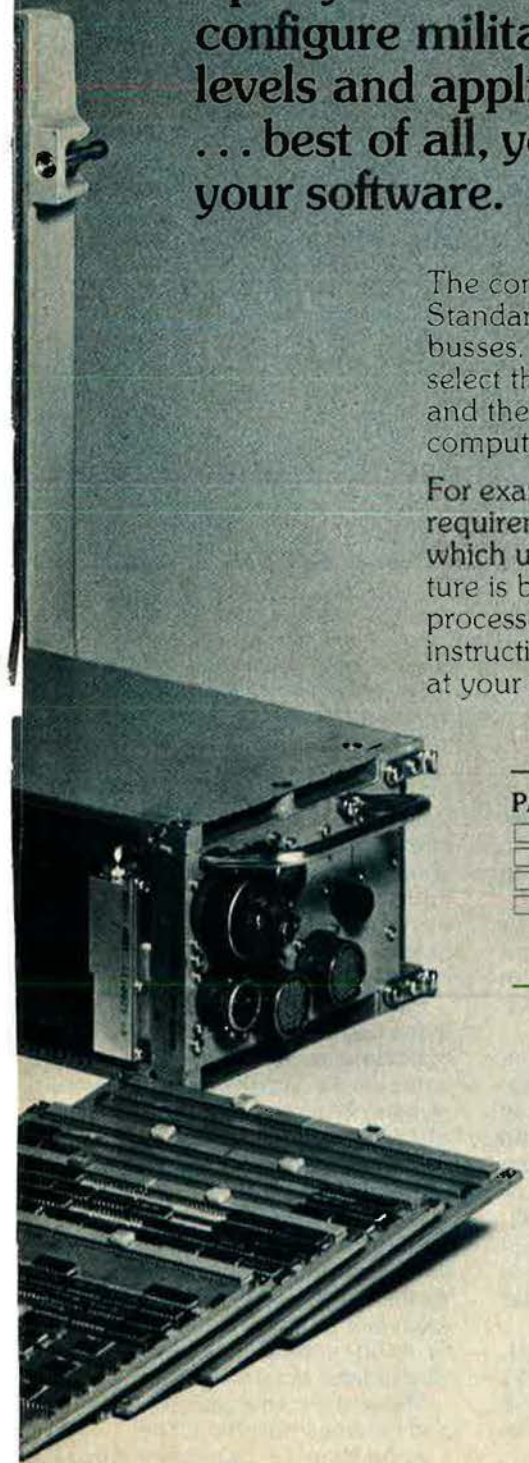

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SPERRY UNIVAC
DEFENSE SYSTEMS

AEROSPACE WORLD
News, Views & Comments

By William P. Schlitz, SENIOR EDITOR

Washington, D. C., Dec. 5

★ March 1981 will see the initiation of a program to install tail warning systems aboard SAC B-52G and H models.

The system consists of a rear-looking radar that will be mounted on the vertical stabilizer. It is designed to warn of the approach of both enemy aircraft and missiles from the rear.

Designed by Westinghouse Electric Corp., the system is a solid-state, pulse Doppler radar that can distinguish between missiles and aircraft and precisely time the release of both chaff and flare decoys to ward off radar- and infrared-guided missiles. The system also indicates whether the attack is coming from the right-rear, left-rear, or directly aft.

Within the next few months, SAC intends to test the warning system for operational effectiveness aboard a B-52G from Barksdale AFB, La. An Air Force fighter will launch unarmed rockets at the B-52 over the Eglin AFB, Fla., electronic warfare range. (The rockets will be fired from a distance to assure they do not come closer than 1,000 feet to the B-52.)

Also, a B-52H from Ellsworth AFB, S. D., has been fitted with the warning device to test electromagnetic compatibility.

The B-52 fleet should be fitted with the system by the end of FY '85. Installation aboard Gs will take place at the Oklahoma City Air Logistics Center and Hs at San Antonio Air Logistics Center.

For the future, USAF intends to install the device aboard F/FB-111s.

★ In future mass military casualty situations or civilian disasters, USAF physicians on the scene will be able to rely on help from another medical source: Air Force dentists.

Under readiness training ordered by Brig. Gen. Stanley C. Kolodny, Assistant Surgeon General for Dental Services, USAF dental officers will receive training as surgical assistants "with assigned duties consistent with knowledge and skill levels." There are about 1,500 dental officers in blue suits.

A UH-60 Blackhawk helicopter belonging to the 101st Airborne Division is offloaded from a MAC C-5 transport at Cairo West, Egypt, after a flight from Fort Campbell, Ky. Blackhawks and other helicopters were airlifted to the Mideast nation in November to participate in Operation Bright Star 81, an Egyptian/US exercise of the Rapid Deployment Joint Task Force. The desert exercise involved 1,400 Army troops and airmen as well as eight ANG A-7 aircraft from Kirtland AFB, N. M. Fifty flights by C-5s and C-141s were required to deploy the troops and their equipment.

The dental training is part of the No. 1 priority set by Surgeon General Lt. Gen. Paul W. Myers for the coming year: Air Force medical readiness.

Dental officers will also attend the Basic Life Support Course, be taught cardiopulmonary resuscitation (CPR), and be urged to take the Advanced Life Support Course.

Dental officers aren't to become medical officers, according to General Kolodny, but will be available to help in large-scale emergencies. The training will focus primarily on combat casualty treatment but will apply in other emergency situations as well.

Under the plan, dental officers will also learn sterile operating-room techniques and how to administer anesthesia.

In other Air Force medical matters, USAF recruiters are seeking 451 health-care professionals and 538 nurses, all to be awarded commissions in the next year.

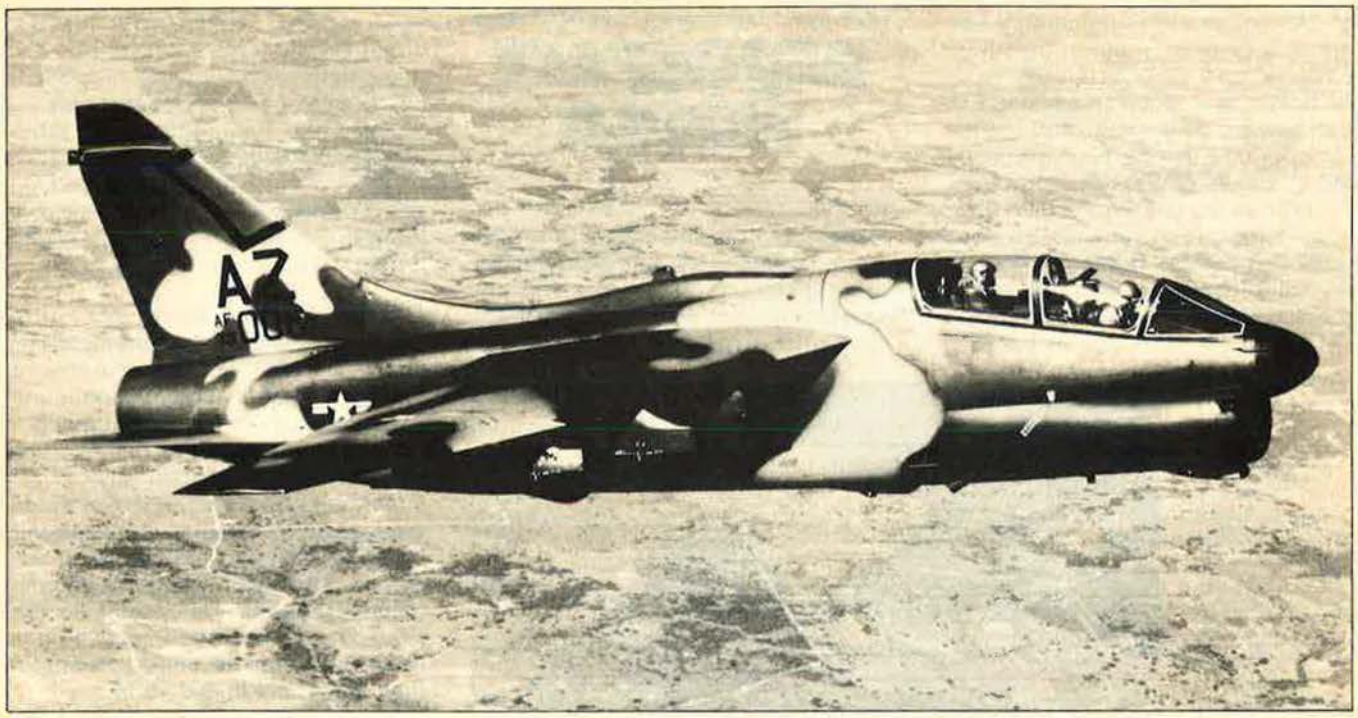
Openings exist for 208 physician specialists, 113 dentists and dental specialists, and thirty hospital administrators. Of the nurse requirement, 453 slots are for general-duty nurses and the remainder a wide range of specialists.

Finally, eight Air Force nurses were in the first class to receive certificates of completion recently from the newly established Environmental Health Nursing Program at the USAF School of Aerospace Medicine, Brooks AFB, Tex. All hold master's degrees in public health.

★ The scenario: an earthquake strikes a remote area and among the victims are many injured. Access roads are blocked. Relief helicopters fly in but without equipment necessary to treat severely injured.

The answer: an especially designed and modified hospital plane.

According to Lockheed Aircraft



Maiden flight of the first A-7K for delivery by LTV Corp.'s Vought division to the ANG. Twenty-four of the two-seat training version of the Air Force and Guard A-7D tactical fighter are now on order.

Service Co., Ontario, Calif., the company "has designed, engineered, built, and equipped the first self-contained airborne emergency hospital" for just such a task, "capable of providing all necessary medical treatment in remote locations for up to seventy-two hours."

HMS Invincible, *first of the Royal Navy's new class of antisubmarine cruisers, fires her first Sea Dart medium-range missile. Sea Dart, to provide area defense against high- and low-flying aircraft, also has surface-to-surface and antimissile capability. Harriers will also operate from the new cruiser. (Crown Copyright)*

The aircraft, a C-130 Hercules, is visualized as providing a "quick response to any medical emergency, particularly in remote desert and mountain regions such as those found in the Mideast," presumably because of the C-130's rough-field, short-runway-landing capabilities. Besides rapid deployment, the plane could be used to transport treated injured to conventional hospitals.

The aircraft is divided into four compartments: an admittance area entered through the rear ramp; an examination/lab room; an operating room; and a five-bed intensive-care unit, equipped with patient monitors and life-support systems.

The aircraft, according to LAS, has telemetry capable of transmitting medical data for computer diagnosis, and three radios to ensure communications.

Gas turbine units, fueled from wing tanks, power the hospital systems.

Besides disasters, and even disease outbreaks, the plane could be used in remote areas for routine medical care, LAS officials said.

Assisting in the plane's internal design were Dr. C. Joan Coggin and Dr. Elsworth Wareham of the Loma Linda University Medical Center.

★ While awaiting the debut of the Space Shuttle, NASA has continued to use expendable launch vehicles to put space payloads into orbit.

The space agency plans eighteen such space missions through the end

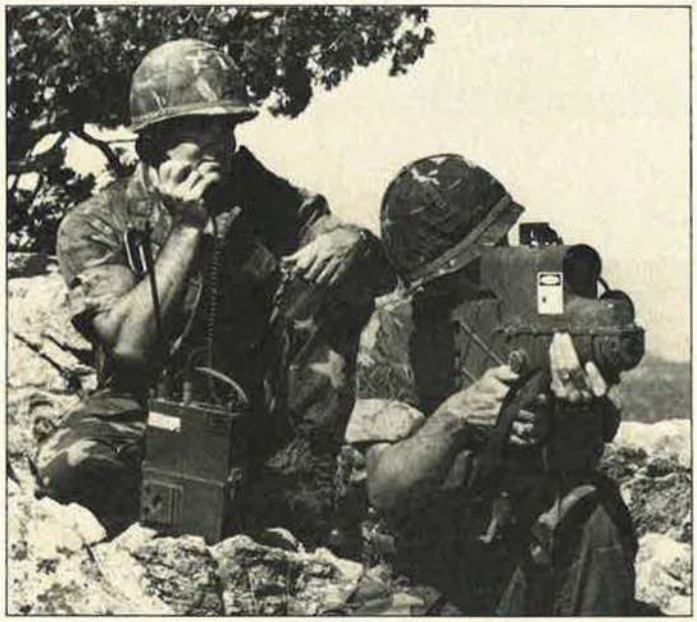
AEROSPACE WORLD

of September 1981, including a variety of scientific, weather, communications, and DoD satellites to be launched from Cape Canaveral, Fla., Vandenberg AFB, Calif., and the Italian-operated launch platform in the Indian Ocean off the coast of Kenya.

Seven of the missions will be flown atop Delta launch vehicles; an equal number on Atlas Centaur; three on the solid-fuel Scout; and one aboard the Atlas-F.

Two of the launches will involve NASA scientific satellites and the remaining sixteen will be conducted for other government agencies and private firms, which will reimburse NASA for launch expenses. These include three weather satellites for the National Oceanic and Atmospheric Administration and five DoD missions.

The eight commercial payloads include eight communications satellites for Satellite Business Systems, McLean, Va.; RCA, Piscataway, N. J.; and Comsat General Corp. and the Intelsat Consortium, both of Washington, D. C.



Air Force forward air controllers demonstrate a Laser Target Designator, a device enabling them to pinpoint targets for aircraft or laser-guided weapons, during test at Fort Carson, Colo. A-10s and A-7s at several installations are being used in evaluation of the LTDs.

★ With the recent launch of a fourth Navy Fleet Satellite Communications (FLTSATCOM) vehicle, a network providing global military communications via satellite is now in place.

The system will allow high-priority UHF relay links between Navy ships, submarines, and aircraft and selected fleet ground stations, between Air Force aircraft and air-to-ground terminals, and the Strategic Air Command. The system is specifically designed to accommodate small mobile units, and can be used to contact them anywhere in the world.

Not to be overlooked is that the FLTSATCOM provides instant communications between the President and military commanders.

FLTSATCOM 1, operating since February 1978, provides service from Hawaii across CONUS to the Azores and the Atlantic. FLTSATCOM 2, orbited in May 1979, covers the Indian Ocean area from Africa to the Philippines. FLTSATCOM 3, launched in

SAC's Strategic Projection Force: Training for Bare-Base Deployment

Training SAC's Strategic Projection Force is more than B-52H crews practicing long-range, low-level penetration of enemy defenses. It also includes practicing the ability to relocate an entire bomb wing's operating and support structure to distant, "bare-base" locations, and, once there, undertake sustained long-range conventional bombing missions. At the same time, the designated wings remain ready and capable of performing the nuclear-delivery role if required by the National Command Authorities.

In fact, for the B-52H aircrews of SAC's 57th Air Division, the delivery techniques in the conventional role are similar in many ways to the nuclear. But the logistics and mobility training of the rest of the force are more extensive than in recent years. The objective of recent mobility training of 57th Air Division personnel at Minot and Grand Forks AFBs in North Dakota (and associated units elsewhere) has been to build a "frame of mind." That is, a knowledge that everything is ready to go on short notice, and can be deployed—then operated—at a distant base. (This is everyday routine to TAC and MAC units. It used to be true for SAC in the early days.)

In a recent large-scale SPF mobility exercise, SAC deployed fifty aircraft, more than 1,300 people, and equipment from several home stations to the almost-deserted Whiteman AFB, Mo., runway. During Exercise Busy Prairie, the drill included launching B-52H aircraft of the 5th Bomb Wing (home base, Minot) from Whiteman on penetration missions into the Nevada range areas. Their night strikes on multiple targets followed low-level, single-ship, random inbound tracks to foil air defenses.

For aircrews, this exercise was not novel. However, their support personnel were exposed to new experiences. They lived and worked in general-purpose tents erected by Prime BEEF teams, ate in field mess halls operated by Prime RIB units, and relearned simple lessons of living in the field. For example, airmen who did not have sleeping bags in their kits (they hadn't been issued) discovered that Missouri nights get uncomfortably cold, to cite one example.

The B-52H aircraft of the 57th Air Division's 5th and 319th Bomb Wings have an unrefueled range of more than 10,000 miles as now configured. That is a major reason for their designation to the SPF. Their present conventional load in a SPF role is twenty-seven Mk 82 500-pound or Mk 117 750-pound high-drag bombs. Two major classes of modifications are planned for the two wings' aircraft: load-carrying and avionics. Each SPF aircraft is now able to strike targets within a 2,500-mile radius unrefueled, including low-level penetration of 500 miles. When all modifications are completed, the bomb load of these aircraft will be increased from twenty-seven to 108 Mk 82 bombs with bombing accuracies around 200 feet.

Meantime, the Strategic Projection Force exists right now. It can be used without the proposed modifications. Those mods are mainly expansions or refinements of existing characteristics. Right now, the SPF aircrews have the training and confidence to make the force a realistic, immediately deployable arm of national power. They can launch on a few hours' notice to produce powerful results halfway around the globe in short order. The training for all SPF members is yielding the confidence and experience factors that produce sustained conventional power projection from remote bare bases, either alone or as part of joint and combined forces.

—F.C.B., Jr.

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The FLTSATCOM satellites were built by the TRW Defense and Space Systems Group, Redondo Beach, Calif.

AEROSPACE WORLD

★ USAF plans to upgrade the computers at the Ballistic Missile Early Warning System (BMEWS) sites that guard North America from missile attack across the top of the world.

The BMEWS computers, designed for the threat of the 1960s, are incapable of coping with the numbers of Soviet missiles currently deployed. Increasingly difficult maintenance of the decades-old computers is also a factor.

Under the Missile Impact Predictor Program, to be directed by AFSC's Electronic Systems Division, Hanscom AFB, Mass., surveillance improvements will take place at Thule, Greenland; Clear, Alaska; and Fylingdales Moor, UK.

The replacement units at each of the three sites will increase computational capacity fivefold, as well as slashing software maintenance costs through use of a newer computer language.

The first computer replacement is scheduled for the spring of 1982 at Thule under a $26.1 million contract let to ITT's Federal Electric Corp., Paramus, N. J.

Prior to the computer modernization, BMEWS control rooms are to be equipped with new consoles that can be operated with fewer personnel. USAF also has under consideration a plan to upgrade BMEWS detection and tracking radar.

★ NASA and the American Society of Engineering Education recently completed a joint study examining space missions possible over the next quarter century.

The group workshop at the University of Santa Clara in California drew on research from such institutions as Stanford University, MIT, and Stanford Research Institute to develop conceptual space missions for the future. The space technology assessment performed by the group identified four key elements—robotics, artificial intelligence, automation, and remotely operated systems—as vital to the undertaking of such space projects as:

- A versatile satellite-based information gathering system for earth surveys that would be selective. Current systems record everything they "see," producing huge masses of data. The proposed system would respond to the specific needs of the user, such as surveying a certain crop and that crop only.
- A deep-space exploration system to combine the several missions of reconnaissance, exploration, and intensive surface study of planetary bodies. Thus, also combined would be such functions as orbiter, atmo-

William Tell '80 Results

A California ANG unit, the 144th FIW, Fresno, emerged victorious at William Tell '80, the biennial air defense competition held at Tyndall AFB, Fla. The 144th scored 33,871 points of a possible 40,000 to earn the General Daniel "Chappie" James, Jr., Fighter Interceptor Team award and F-106 Delta Dart category's Richard I. Bong Trophy.

Other category winners: the 347th TFW, Moody AFB, Ga., the F-4 Phantom; and Texas ANG's 147th FIG, Houston, F-101 Voodoo. These units' maintenance teams also were awarded trophies.

The 147th, due to convert to F-4s, also took overall "Top Gun" and "Top Crew Chief." Named for Maj. Gen. James L. Price, former Commander of the Air Defense Weapons Center, the Top Gun award went to Lt. Col. Maurice Udell, pilot, and Maj. David Miller, weapons systems officer.

Other Top Gun categories: 347th, Moody AFB, Ga., F-4s (Capt. Tim Rush, pilot, and Capt. Peter Tully, weapons systems officer). For the F-106, the ANG 102d FIW, Otis AFB, Mass. (Maj. Greg Beckel).

Overall Top Crew Chief was captured by Texas ANG's MSgt. Joseph Forrest. A1C John Wilson of the 347th and TSgt. John Ferrante of the 102d took honors in the F-4 and F-106 categories, respectively.

The California team also captured the overall "Top Scope" award, for the most outstanding weapons control team. Six weapons controller technicians from the 26th Air Division, Luke AFB, Ariz., were the "eyes" for the 144th and the only all-enlisted team competing in William Tell. The team of TSgt. Mike Quintero and SSgt. Dale W. Wise was presented this award.

The team from Tyndall's 678th Air Defense Group, controlling for the 147th FIG, won the F-101 Top Scope: 2d Lt. Paul Robinson and SrA James Jordan. The F-4 category was won by the 23d Air Division team, Duluth, Minn., controllers for the ANG's 191st FIG, Selfridge ANGB, Mich. They are 2d Lt. Randall Kuehler and SSgt. Leslie Slocum.

A SAC B-52 crew from the 379th Bomb Wing, Wurtsmith AFB, Mich., became the first to receive the Lt. Gen. Gerald W. Johnson "Best Bomber Crew" award.

The overall Top Avionics Award went to Texas ANG's TSgt. Jackie Murphy of the 147th FIG, also category winner for the F-101. Other category winners included TSgt. Gary C. Freeman of the 347th TFW, F-4; and SSgt. Lynn L. Hayes, 102d FIW, F-106.

The best overall Load Crew Award and F-4 category winners were the 191st FIG: MSgt. Michael J. Blasky, TSgt. Daniel J. McHugh, and TSgt. Anthony Consiglio. The best load crew for the F-101 category was from the 147th: MSgt. Robert L. Heinrich, TSgt. William E. Chapman, TSgt. Eugene H. Walleck, and TSgt. Bernardo K. Phua. Winning the F-106 category was the 5th FIS (TAC), Minot AFB, N. D. Team members are SSgt. Jeffrey A. Mercier, SSgt. Floyd O. Howe II, and A1C Gregory P. Miller.

The 144th FIW's "Golden Bears," victors at William Tell '80: from left, Lt. Col. Paul L. Carroll, Maj. Lawrence D. Cobb III, Maj. Alan R. Heers, Capt. Jan N. Pederson, Jr., Capt. Stephen D. Ishmael, and Maj. William S. Lucido. Captain Pederson was the team's "Top Gun," finishing fourth for individual overall honors.

spheric probe, and mobile surface exploration. "Such self-directed systems could be used to explore distant bodies within the solar system, the outer planets and their satellites, and comets and asteroids," the group said. One mission visualized could be to Saturn's planet-sized moon, Titan, which has an atmosphere and is bigger than the planet Mercury. The systems, the group said, would also be required for any future explorations of other stars' planetary systems, which because of time and distance preclude manned missions.

This past fall in the UK, USAF Vice Chief of Staff Gen. R. C. Mathis became the fourth USAF general in two years to fly the trinational, all-weather Tornado. He called the British Aerospace-built aircraft "a superb low-level attack airplane."

• A facility to process nonterrestrial materials from asteroids and earth's moon and the moons of other planets. The permanent, earth-orbiting station would initially engage in the "unique processing" of earth-supplied materials with "progressively greater use of nonterrestrial matter." Starter facilities and manufacturing techniques adaptable to space use are being identified, the group said.

• An automated factory on the moon that would use lunar materials in manufacturing and could even grow through "replication." Such a facility "has been of theoretical interest" for a number of years, and, during the joint workshop, proof-of-concept designs were developed, the group said.

AEROSPACE WORLD

★ "The flights of the *Gossamer Condor* and *Albatross* were only the beginning. Human-powered flight is possible, and its potential is only now being discovered."

With that statement, the American Helicopter Society, headquartered in Washington, D. C., announced its sponsorship of the Igor I. Sikorsky Human Powered Helicopter Competition. Named in honor of an early pioneer of vertical flight, the contest's grand prize is $10,000.

To compete, applicants must build a heavier-than-air machine that can maintain a hover for one minute, powered only by human muscle. The machine must keep a reference point within a ten-meter (32.8 square feet) square and at some point during the hover reach a height of three meters (ten feet).

For further information, write the Society in care of 1325 18th St., N. W., Washington, D. C. 20036. Phone: (202) 659-9524.

★ US Army Missile Command has awarded Honeywell, Inc.'s Defense Systems Division a $15 million competitive contract for a twenty-four-month advanced development phase of the Infantry Man-Portable Anti-Armor Weapon System (IMAAWS).

Honeywell's IMAAWS concept represents one of the first applications of millimeter wave technology in a weapon system. Its target-sensing capability allows an infantryman to fire a round and seek cover, without having to expose himself to enemy fire in guiding the missile to its target.

The two-man portable "fire-and-forget" weapon consists of a breech-fired recoilless rifle with a fire-control system mounted permanently on the tube and low-cost munitions that feature recent technological improvements to armor-piercing warheads.

★ The US Army is conducting a two-step program to improve its TOW antitank guided missile.

First phase is an improved five-inch

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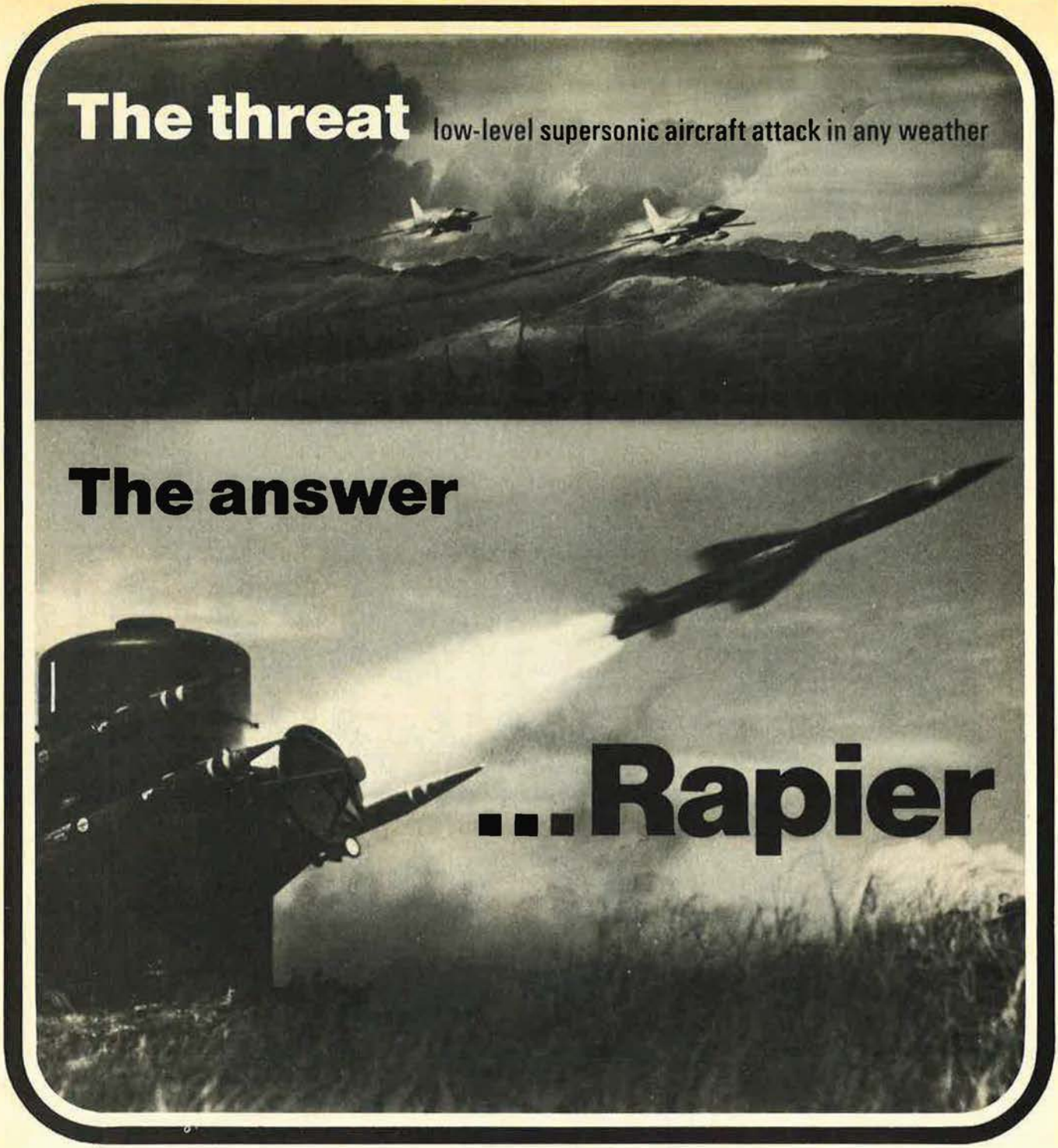

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ANG's SSgt. Yolanda Elliot, of the 202d Combat Communications Flight, Hawaii, recently won the 1980 US Amateur Surfing Association's women's championship. She's been in ANG more than six years.

diameter warhead to increase the missile's penetration of advanced enemy armor.

Second step, called TOW 2, is the development of a heavier six-inch warhead with even greater armor-piercing capability and improved guidance system.

The improvements will make use to the fullest extent existing elements in the TOW system, officials said. For example, the more potent five-inch warhead will fit all existing TOW missiles and will require no changes in launcher or guidance hardware, and will be applicable to all weapon platforms including helicopters and tracked vehicles.

The TOW 2 modifications feature a microprocessor-based digital missile guidance set for greater flexibility and precision. To compensate for the added weight, the flight motor's propellant is to be improved.

DoD has requested $105.2 million in FY '81 to purchase 18,000 new five-inch warhead kits for retrofit and $76.6 million for 12,000 new missiles with the improved warhead; some $20 million is being sought to continue TOW 2 development work.

TOW missiles with the five-inch warhead should be in the inventory by the early 1980s with TOW 2 weaponry later in the decade.

Supervising the program is Army's Missile Command, Redstone Arsenal, Ala. Hughes Aircraft Co.'s Missile Systems Group, Canoga Park, Calif., is prime system integrator.

More than 275,000 TOWs have been produced by Hughes for the Army, USMC, and the forces of thirty-two foreign countries.

★ **Olive Ann Beech,** the "first lady of aviation," has been presented the Civilian "Sands of Time" Kitty Hawk award for 1980. Mrs. Beech, co-founder and chairman of the board of Beech Aircraft Corp., also in December became the first woman and

general aviation recipient of the Wright Brothers Memorial Trophy, sponsored by the National Aeronautic Association. *(See December issue, p. 36.)*

The Military Award was presented to **Gen. Alton D. Slay,** AFSC Commander. Among other things, General Slay was cited for his 8,000 flying hours and 181 combat missions in Southeast Asia.

A Special Award was presented **Harry B. Combs,** president of Gates Learjet Corp., in recognition of his book *Kill Devil Hill: Discovering the Secret of the Wright Brothers.* The book by the avid history buff is in its fifth printing.

The 1980 Youth Award, a plaque and $2,000 check donated by Northrop Corp., went to Air Force Academy **Cadet Kenneth C. Wright,** CAP Cadet of the Year and AFA 1979 CAP Outstanding Cadet of the Year.

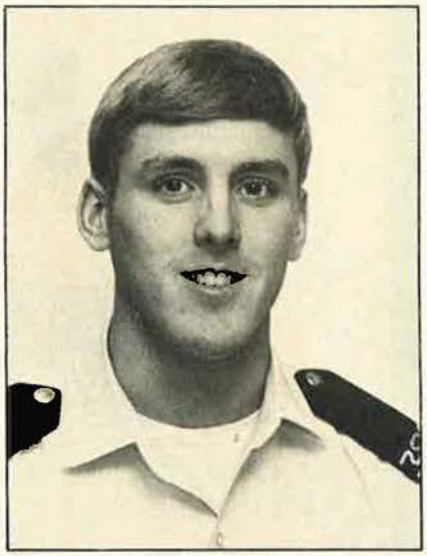
The annual Sands of Time awards are sponsored by the Los Angeles Area Chamber of Commerce.

★ **NEWS NOTES**—Aerospace industry **employment hit 1,187,000** in June 1980, the **highest since 1969,** but the Aerospace Industries Association predicts a rise of only four percent in 1980 over 1979 and less than one percent in 1981.

Air Force enlisted Reservists with at least twenty years of active duty are **now eligible to retire at any age,** under provisions of the recently passed Military Personnel and Compensation Act. Previously, Reserve enlisteds had to reach age sixty before retirement.

SAC has **received a new trophy** for presentation during its annual bombing and navigation competition. Named for **Gen. Curtis E. LeMay,** former USAF Chief of Staff and CINC SAC, the trophy was donated by **United Technologies** and replaces the Bombing Trophy. **Norden Systems,** a UT subsidiary, also donated to SAC **a WW II-circa Norden bombsight** for display at Hq. SAC, Offutt AFB, Neb.

AEROSPACE WORLD



Air Force Academy Cadet Kenneth C. Wright was presented the 1980 "Sands of Time" Kitty Hawk Youth award in December. See item.

Some 250 US firms participated in a **trade fair in November at Beijing, China's capital city.** Product exhibits for the fair were specifically chosen to assist China's growth in five areas: agriculture, power generation, textile and consumer goods machinery, petroleum exploration and extraction, and transportation. The twelve-day event was said to have drawn 200,000 Chinese officials and technicians, many attending the 150 seminars conducted by US industrial specialists.

During the first nine months of 1980, **173 general aviation aircraft were stolen** in the US, most from airports in Florida, the International Aviation Theft Bureau reports. Because of load capacity, the Cessna 210 is especially popular. The planes are being used **to smuggle dope.** Only thirty-two percent have been located or recovered.

The US Navy will build a **Trident Atlantic Coast Strategic Submarine Base** at **Kings Bay, Ga.,** to support a squadron of new subs armed with the Trident I follow-on missile. A similar base at Bangor, Wash., is to become operational this year.

The 4th TFS, 388th TFW, Hill AFB, Utah, **became the first F-16 Fighting Falcon unit to achieve combat-ready status.** The wing's 421st TFS is converting to the F-16 and should attain initial operating capability (IOC) in early 1981. Two other squadrons, the 16th and 34th, are pilot training units.

Died: Ralph A. O'Neill, World War I flying ace who pioneered commercial aviation in South America, following heart surgery in Redwood City, Calif., in October. He was eighty-three. ■

An Air Force KC-10A built by McDonnell Douglas hooks up with a C-5 transport over Edwards AFB, Calif., in the first test refueling of the tanker and the first test of the aircraft's advanced aerial refueling boom.

Flight ops aboard the Nimitz without the Nimitz...

because someone asked Sperry.

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This trainer will automatically establish problematical situations, monitor pilot performance and demonstrate proper operations.

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Sperry math modeling techniques are being incorporated in our design of the operational flight trainers for the CH-53 helicopter. Our conversion of U.S. Air Force B-52 trainers to the latest digital systems is a cost-efficient alternative to the design and construction of new trainers.

And we've developed a wide range of simulators for other applications—from improving the firepower accuracy of infantry and armor to assuring the combat readiness of shipboard crews, from enhancing the skills of commercial ship pilots to researching the behavior of deck officers.

This technology is making training more practical and less expensive—often at one-tenth the cost of actual exercises.

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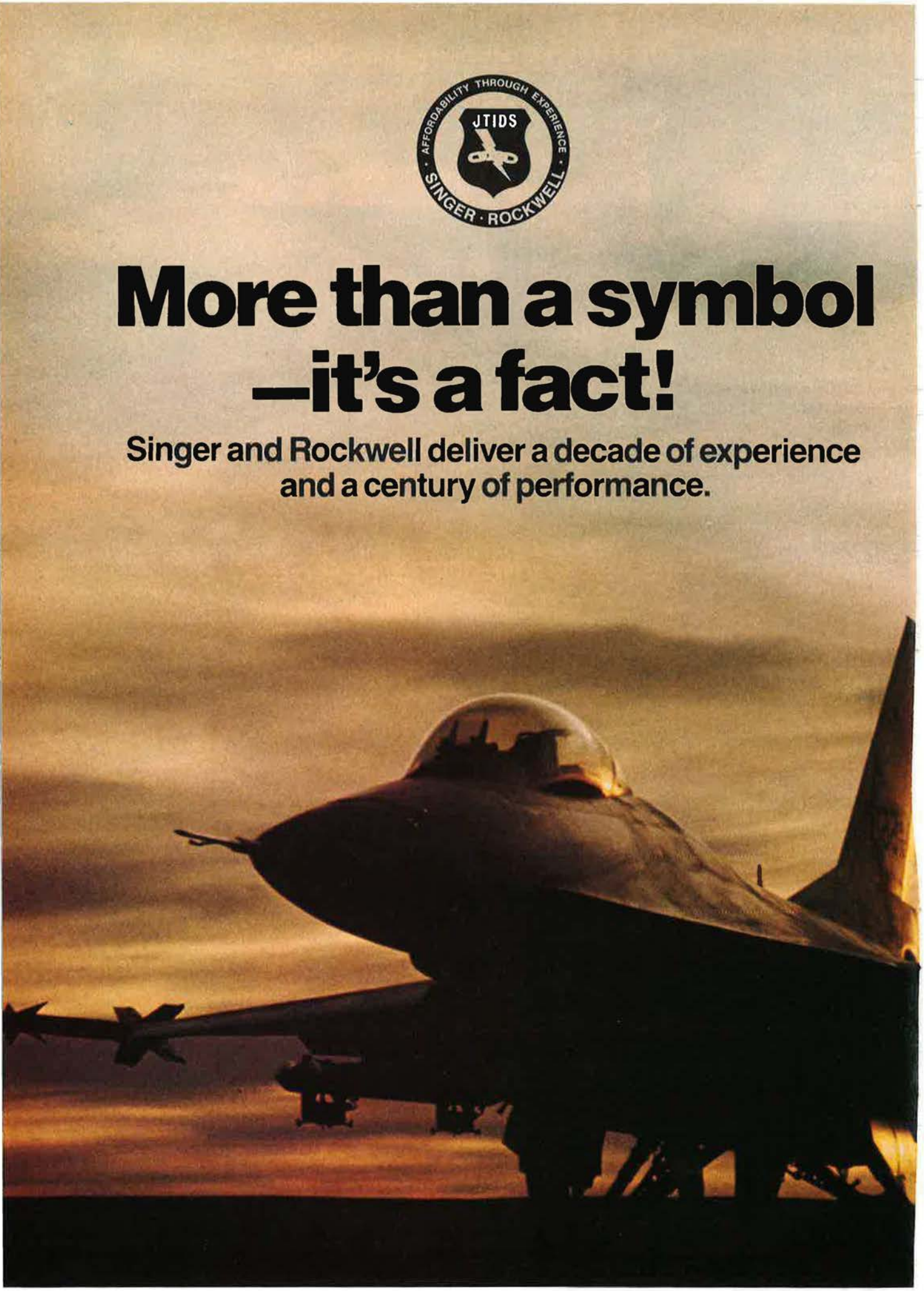
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The two partners now offering their JTIDS Class 2 terminal system have a combined 100 years of proven performance in the manufacture of airborne electronics equipment. For more than ten years Singer has been singularly successful with development and flight test of terminals that incorporate TDMA, relative navigation, and TACAN techniques.

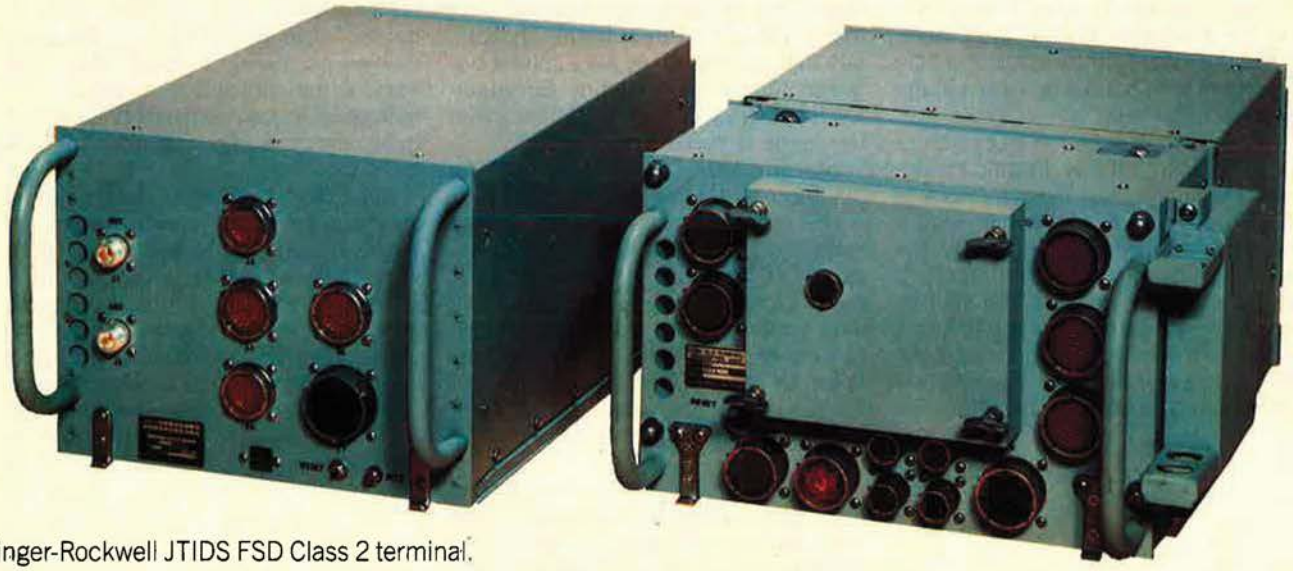
Rockwell International's Collins Government Avionics Division is deeply involved in the large-scale production of advanced R/F systems such as AN/ARN-118 airborne TACAN sets, AN/ARC-186 VHF AM/FM equipment, and receivers for the Global Positioning System.

This joint capability assures the success of their engineering and cost-effective dual-source manufacture of operational JTIDS Class 2 terminals.

The Singer Company Kearfott Division has delivered 16 ADM JTIDS Class 2 terminals that have accumulated more than 10,000 hours of in-flight and simulator tests. Terminals in a pod aboard a USAF F-4 are currently undergoing flight tests at Eglin Air Force Base. Singer also has more than 3,500 avionics systems now operational in a broad range of tactical aircraft.

Rockwell International Collins Government Avionics Division is producing GPS receivers and is system integrator for avionics to be used for Coast Guard medium-range surveillance systems and short-range recovery systems. Collins has delivered more than 13,000 AN/ARN-118 airborne TACAN systems to Department of Defense and commercial users.

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



Singer-Rockwell JTIDS FSD Class 2 terminal.

SINGER
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On Remembrance Sunday in England, the British honor the American dead of World War II as well as their own. Meager defense budgets prior to the war later resulted in American combat losses. The nation owes it to its young to provide in these dangerous days what we lacked then: Readiness . . .

A Fitting Memorial to Those Interred at Madingley

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

IT IS only a few hours but a very long way from the embattled Middle East to the English Midlands. Maybe the war in the Persian Gulf, and the threat of more war to come, brought memories of that war we fought almost forty years ago. Whatever the reason, I went back one cold and rainy weekend in November to a few of the old and once-familiar places.

The village of Grafton-Underwood has scarcely altered a brick or a shingle since V-E Day saw the end of the Yanks in that beautiful little corner of Northamptonshire. The airfield, a busy place where 3,000 of us lived, worked, and fought our war, has gone back to farmland. The runway that launched thousands of sorties against Hitler's Europe has been plowed up. A country lane now crosses the old base, as it doubtless did before we ever came.

There is, however, one bit of evidence on that country lane that we were once there. It is a modest little monument recalling the name of our group, its squadrons, and a single, if remarkable, achievement of the base at Grafton-Underwood. We dropped the first and last American bombs of World War II in the European theater from there. One of the nicest things about this little monument is that anyone in the village can direct you to it.

That weekend was the occasion of Remembrance Sunday, England's version of Veterans Day. The ceremony in the village church I attended was a moving example of how nicely the British handle affairs of this sort. The positioning of the colors at the altar by two grizzled but erect old soldiers; the reading of the names of those lost in the two great wars, followed by the clear and haunting notes of the Last Post; the distinguished-looking air marshal—too young to have fought in Hitler's war—who read the lesson: All this was more than just a memorial service. It was intended to stir up feelings of pride of service and patriotism, as was the nationally televised affair at Albert Hall the evening before, with the Queen in attendance. When an aging sweetheart of the troops of World War II sang the old songs, evoking visible nostalgia even among the young, and the Irish Guards in their red tunics performed with marvelous precision, the watchers forgot, if only for a moment, that England is no longer a great power.

Some British friends took me over to Madingley, the American War Memorial Cemetery near Cambridge, as a fitting conclusion to Remembrance Sunday. Despite the bitter, damp cold, hundreds of others had a similar idea that day. So far as I could tell, they were all British, come to pay respects to the Americans, mainly airmen, who died in that war so long ago.

Like all our war memorial cemeteries, Madingley both remembers the dead and the actions in which they lost their lives. The air campaign against Germany is depicted by a stirring mosaic, one that clearly draws the contrast between the Allies' last tiny European foothold, Great Britain, and Hitler's vast territories in those years before the invasion when only airmen were carrying the battle to the European continent.

The curving rows of crosses, punctuated by stars of David, tell part of the story. The long wall with some 5,000 or more names of the missing carved on it tells even more. We rarely had anyone to bury in those days. People simply failed to return. That, in fact, was the language the BBC announcers used: "Forty American aircraft failed to return."

Even though it all happened a long time ago, reading those names on the wall, and remembering faces forever young, was a moving experience. Probably it was a sign of age, for most of us in those days had little time for emotion when those friends went down. Or maybe it was a reflection on the futility of life's experiences to teach us anything. One of the reasons we have so many names on that wall in Madingley and so many aviators below those white crosses is that we were poorly prepared in 1940 for the war we would soon be fighting. A great many of those fellows in the Madingley cemetery went into combat with pitifully little flying experience, a penalty we paid for our eleventh-hour reaction to the threats facing us and the free world.

This January sees us with a new President and a Congress evidently dedicated to rebuilding our defenses. Presumably, we are going to see large new dollar figures applied to big-ticket items like the MX, a new bomber, and other pieces of hardware. All of which is fine, no argument about that. However, it is worth remembering that we had some pretty good hardware back in 1942. Where we were short was in experience and thus, in readiness. Like everything else having to do with national defense, true readiness also requires large dollar figures. Because they are not the sort of dollars that come home to industry and make a politician look good, these readiness dollars tend to be less competitive than they should be.

But, if the times are as dangerous as they appear to be, and we think our young should be equipped to sell their lives dearly if they are called on to fight, rather than lose them to inexperience, then some very large sums ought to be applied immediately to areas like flying hours, exercises, practice munitions, and spare parts. It is the least we can do in memory of those interred at Madingley. ■

We build a great multi-role bomber.

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April 18, 1942. In a classic example of a multi-role bomber application, sixteen North American Mitchell B-25s take off from the carrier USS Hornet for the historic Doolittle Tokyo raid.

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And that's a history worth remembering when considering any new long-range combat aircraft.

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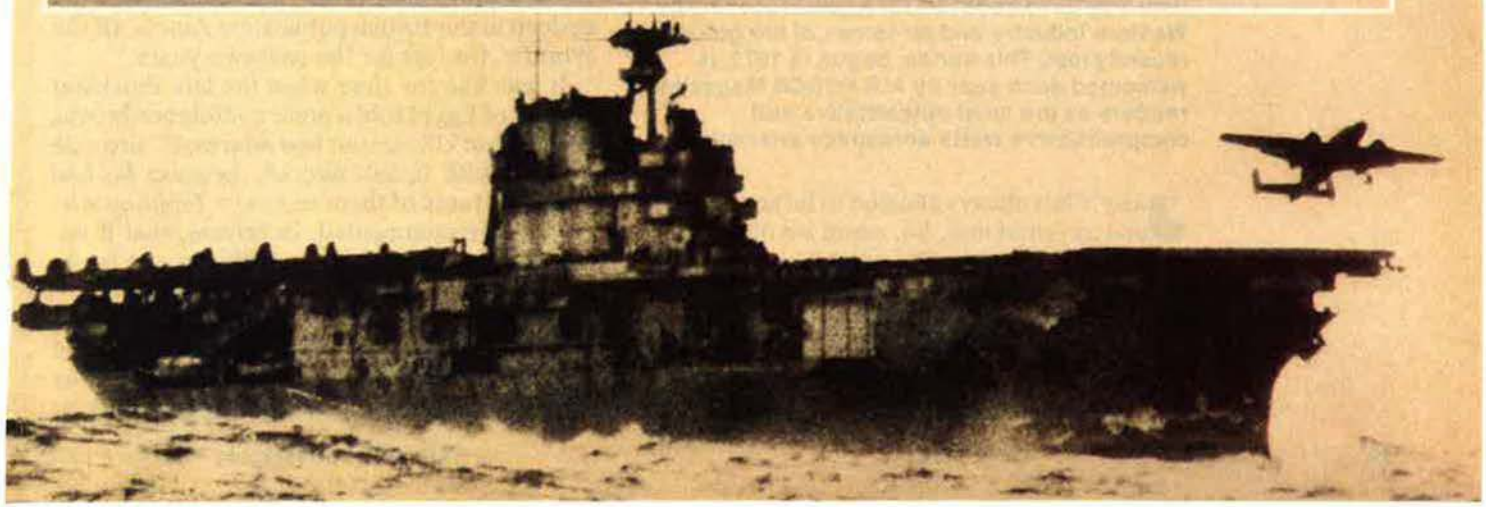


JANE'S AEROSPACE

BY JOHN W. R. TAYLOR, EDITOR, JANE'S ALL THE WORLD'S AIRCRAFT

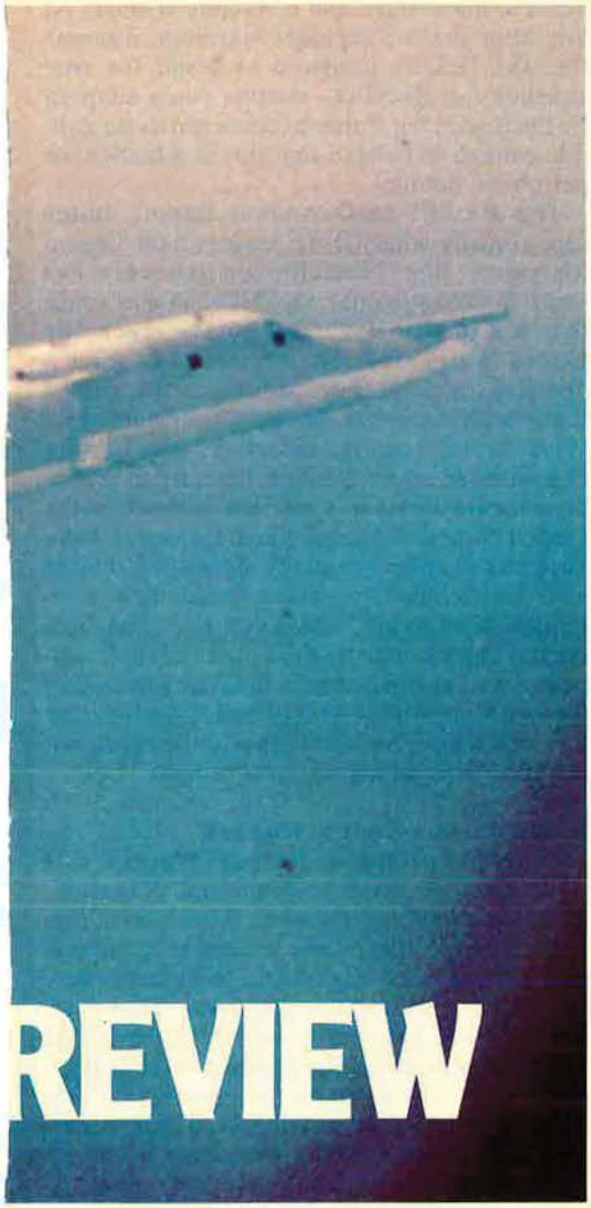
In this year's Jane's Aerospace Review, Jane's Editor John W. R. Taylor reflects on time lost in manned bomber development in the US, the accelerating pace of aerospace technological developments behind the Iron Curtain, and deals with the commercial and general aviation fields. The picture is not as rosy as popular headlines would suggest, and, in fact, too much time may have been lost for a quick recovery by Western industry and air forces of the ground recently lost. This series, begun in 1972, is welcomed each year by AIR FORCE Magazine readers as the most authoritative and comprehensive world aerospace analysis.

JANE'S has always claimed to be nonpolitical and international. So, when we opened our copy of the London *Financial Times* newspaper on September 6, 1980, it came as a surprise to discover that we appeared to be caught up in the American Presidential election campaign.

The paper's Washington correspondent told how Mr. Ronald Reagan had accused President Carter's Administration of deliberately leaking information on the so-called Stealth aircraft program, for political purposes, describing it as "the most highly secret weapons information since the atom bomb." This was said to have provoked a retort from White House Press Secretary Jody Powell that "development by the US of secret 'radar-proof' aircraft has been described in the British publication *Jane's All the World's Aircraft* for the past two years."

It was like the time when the late President Nasser of Egypt told a press conference he was certain that US aircraft had attacked Cairo side by side with Israeli aircraft, because he had "seen pictures of them in *Jane's Fighting Aircraft.*" We commented, in private, that if important people wished to publicize our book, they should at least get the name right.

Mr. Powell did *Jane's* a similar small injustice. Had he checked more carefully, he would have discovered that the first reference to the Stealth program appeared in our yearbook as



long ago as 1977. The wording of the entry has undergone little material change since that time, and appears in the current edition as follows:

LOCKHEED "PROJECT STEALTH"

In the so-called "Skunk Works" at Burbank, Lockheed-California is reported to be building, under a DARPA-funded contract from the USAF's Flight Dynamics Laboratory, a single-seat reconnaissance/strike aircraft, of which a primary feature is low radar, infra-red and optical signatures. The aircraft is said to be powered by two 53.4 kN (12,000 lb st) turbojet engines, and is believed to have flown for the first time in 1977.

At the time the original 1977 paragraph was written, the program was unclassified. Even now, it is difficult for anyone living 3,700 miles away from the politically charged atmosphere of preelection Washington to see a threat to anyone's security in what was published in the US press at the time of the Stealth program rumpus.

Back in 1974, during a visit to the Teledyne Ryan facilities at San Diego, the writer studied a fascinating little reconnaissance RPV prototype. The body shell, made of glassfiber, had no straight edges. Every part of its form curved in a manner more reminiscent of a young bride's first experiment in cooking than of the kind of structure that highly professional designers conceive at their drawing boards. This, explained the guide, was a structure virtually undetectable by radar.

A few hundred miles to the north, at Palmdale, a day or two later, discussion in the shadow of the then-unflown first prototype of the B-1 bomber had a similar theme. This impressive and curvaceous aircraft was, it transpired, intended to have a radar signature equivalent in size to a very small bird—if the defenses were smart enough to detect it, flying at high subsonic speed, a few hundred feet above the terrain.

SAC does not have the fleet of 244 B-1s that was planned at that time. It would be satisfying to know, as a result of the Stealth "revelations," that President Carter's 1977 cancellation of B-1 production reflected early progress toward the definition of an even more formidable bomber. In fact, all that we have are uncorroborated suggestions in the press that both manned and unmanned Stealth aircraft have been flight-tested, at a remote site in Nevada and elsewhere, since early 1978. Hundreds of millions of dollars are said to have been spent annually on the program, which has enabled a handpicked cadre of pilots to log scores of flying hours on the prototypes.

Backfire-B carrying a Kitchen missile, taken from a reconnaissance Viggen of the Swedish Air Force.

Nothing yet published has indicated the advanced shape of the Stealth aircraft, or described their structure in detail. We can be certain that they do *not* resemble the designs of which companies like Boeing have been permitted to release artist's impressions. The kind of equipment carried by Stealth aircraft is more predictable, on the basis of technological devices and techniques that became significant as the war in Vietnam dragged on through the late '60s and early '70s.

To reduce the toll of SAM-7 shoulder-fired infrared missiles, helicopters had their exhaust nozzles tilted upward; other aircraft began to add shielding around their "hot spots." Formations of attack aircraft were accompanied by strange variants of familiar types, festooned with antennae and bulges. Odd scraps of information suggested the use of avionics that could jam or confuse enemy radars, making the attackers seem more numerous, or less numerous, than they were, or miles away from their true location, or something different from what they really were. Experiments, as old as military flying, continued painting aircraft so that they would be less conspicuous against a back-

ground of high-altitude sky or zero-altitude terrain.

Add together all these well-publicized features, plus rumors of a new sandwich structure for aircraft skins, with a core that has much in common with the pyramid lining of an anechoic test chamber; and of exotic paints that absorb, deaden, or deflect probing radar signals, and the result is the so-called Stealth aircraft, as far as anyone has yet described it. The real secrets lie in the specifications of the "invisible paint," if it exists, the frequencies of the ECM/ECCM equipment, and shapes that would be revealed only by sharp, detailed photographs of the actual aircraft.

During 1980, Congress spent time debating the need for a new manned penetrator to supplement and supersede the B-52. Candidates for funding were a degraded, subsonic, fixed-wing B-1, the FB-111B/C stretched and reengined rebuild of in-service F-111/FB-111 airframes, and "something new" that now seems as if it could be a product of the Stealth program. One senior Pentagon official expressed a belief that ten percent of all USAF combat aircraft might be Stealth systems by the end of the present decade. But that could be too late.

Realities of Soviet Developments

Buildup of the Soviet ICBM force with new missiles has progressed so rapidly, with such formidable weapons, that no one doubts any longer that SAC's Minuteman force is vulnerable to attack. This does not mean that America's missiles have become unviable, as they could be dispatched before their silos were destroyed by an enemy first strike. The bigger worry is that they lack the punch to destroy Soviet ICBMs in new hardened silos.

By now, SAC was intended to have both the B-1 bomber and the MX missile to spearhead the NATO deterrent. It has neither, while the Soviet Union has large and growing numbers of Tupolev Backfire bombers and SS-17, SS-18, and SS-19 ICBMs. Quantitative advantage has been held by the Eastern bloc for some time. The West always prided itself on having the lead in terms of quality, but this may no longer be true.

While the USAF has been seeking a cloak of invisibility, via its Stealth program, the Warsaw Pact forces have felt such added confidence, through reequipment, that they have been more ready to publish photographs of their aircraft. However, the West has not yet been shown the very latest types, like the MiG air-superiority fighter in the F-18 class, the in-service '80s counterpart of the World War II *Shturmovik* ground attack aircraft in the A-10 class, or the big Mil helicopter known to NATO as Halo, which is in a class by itself.

Some consolation has been derived in the West from the fact that the expected big bomber replacement for Bear and Bison has failed to materialize; but is it really needed? At last, after years of repeated warnings, it seems that the DoD is prepared to admit the true capability of Backfire—despite ruses adopted by the Soviet Air Force to convince those gullible enough to believe that this is a tactical or peripheral bomber.

The FY '81 DoD Annual Report states categorically what USAF leaders have known for years, that "Backfire undoubtedly has some intercontinental capability in the sense that it can (for example) surely reach the United States from Soviet home bases on a one-way, high-altitude, subsonic, unrefueled flight with recovery in the Caribbean area. With Arctic staging, refueling, and certain high-altitude cruise flight profiles, it can probably execute a two-way mission to much of the United States." Almost identical words have appeared in *Jane's* annually since 1976. This is stated with modesty, rather than with any intention of implying "I told you so." The facts are too important to be the subject of such nonsense, and remind us of a favorite proverb of the late King Abdul-Aziz of Saudi Arabia, that "Your friend is he who tells you the truth, not he who keeps telling you you're right."

Nuclear Arms Control Needed

Since the two atomic bombs of World War II were dropped on Hiroshima and Nagasaki, strategic attack has threatened such terrifying consequences that it has tended to dominate military and political thought, as evidenced by the SALT I/SALT II negotiations. However, the inflexible destructive power of the ICBM is, in many respects, its greatest weakness. A hint of this was given by the commander of a Royal Navy Polaris submarine who commented: "If my missiles were ever fired, my home and family would already have ceased to exist." At that stage, his SLBMs would not offer any defense for his homeland, in the real sense of the word. They would simply be weapons of revenge, fired against cities, with little effect on an enemy's military might.

In contrast, those who have their fingers on the firing buttons of ICBMs, on both sides, have the dubious satisfaction of knowing that their primary targets (in theory at least) are enemy ICBMs. But would such peacetime intention survive the temptations of an all-out nuclear war—especially if it seemed likely that the enemy missiles had already been launched and were no longer able to be stopped? It must be clear that any ICBM launch would still, as always, represent the prelude to mutual annihilation.

For this reason, SALT II must not be allowed to die, even though its original proposals were dangerously wrong in terms of ensuring an East/West balance. The time has come for politicians to decide on the minimum number of missiles needed to keep the peace rather than

the number required to remove a large part of the planet earth, and all its living things, from the map.

Works of fiction, both books and films, have suggested that politicians who are normally opposed to each other might work together frenziedly to avert the destruction of even one city by a missile launched by accident, or under the control of an unbalanced person. A government-to-government threat to destroy a single target might be insufficient to avert a major war, at a time when feelings were running high; but how many *would* it take . . . Moscow and Washington, Leningrad and Chicago, Kiev and Los Angeles, Tashkent and Philadelphia? How far short of total destruction, with no victor, would be reckoned enough?

The answer must be a fraction of the devastation that would be produced by the 4,056 ICBMs and SLBMs currently at the disposal of America and the Soviet Union. It should also persuade the British Prime Minister of the stupidity of adding Royal Navy Trident submarines to the NATO overkill inventory at a cost of $12 billion that could be better spent on sorting out some of her nation's domestic problems.

Scaled-down forces of ICBMs and SLBMs should be an urgent first aim of a modified, acceptable, SALT II that would reflect goodwill on both sides. It would imply little risk for East or West—certainly far less than the increased missile strength authorized by the present version of the Treaty. The politicians could then concentrate on formulating SALT III, to reduce the threat of IRBMs and other weapons aimed at their so-far-forgotten allies in Europe.

Only politicians talk glibly of survival after a nuclear exchange. Military leaders, as a whole, still regard an exchange of strategic nuclear weapons as utterly suicidal for both sides; but they have no illusions where tactical nuclear weapons are concerned. It is, as it always has been, a basic principle of Soviet planning that a conflict on a major scale in Europe would involve use of every kind of weapon in the Warsaw Pact armory, including nuclear devices and the chemical weapons in which the East has a thoroughly proficient superiority.

Standardization and Power Ratios

It is difficult to envisage how any kind of planned bilateral scaling-down of weapons could be made in Europe until both sides start from a position of nominal balance. According to Britain's 1980 Statement on the Defence Estimates, the Warsaw Pact outnumbers NATO in central Europe by 1.2 to 1 in troops, 2.8 to 1 in main battle tanks, 2.8 to 1 in artillery, and 2.3 to 1 in fixed-wing tactical aircraft. Even this is only half the story.

While every Western air force likes to fly aircraft designed and built in its own backyard, the Warsaw Pact is standardized (in terms of basic types, if not detailed equipment) from top to bottom. With negligible exceptions, all combat aircraft come from the same production lines in the Soviet Union. In NATO, it is considered a major step forward that several of the latest combat aircraft can use the same 30-mm shells in their assorted guns.

A MiG-23 (Flogger-F) ground attack fighter of the Czechoslovak Air Force. Note the variable-geometry engine air intakes, distinguishing it from the Soviet Air Force MiG-27 (Flogger-D).

A glance through the Soviet section of the newly published 1980–81 *Jane's* will indicate how far the Warsaw Pact has progressed in replacing its standardized but outdated early-model MiG-21s, Su-7s, and Mi-4 helicopters with equally standardized but infinitely more formidable variable-geometry MiG-23s and Su-20s, and Mi-24 helicopter gunships.

No less impressive is the standard of equipment evident on the newer types. However, only the Soviet Air Forces normally have comprehensive fits of the most advanced equipment and the most efficient engines. For example, Soviet Frontal Aviation units are the only known operators of the MiG-27 (Flogger-D) with fixed-geometry inlets and a fixed nozzle for its R-29B turbojet, specially tailored for on-the-deck close support. Warsaw Pact allies have to be content with the MiG-23 (Flogger-F), which looks similar until one notices details like the variable-geometry intakes.

Mil Mi-24 Hind-D attack helicopter of the Czechoslovak Air Force.

The new single-seat Sukhoi Su-17 (Fitter-H) attack aircraft.

The Mi-24 has brought one notable exception to this policy of second-best for the supporters. When troop-carrying Mi-8s were distributed, the East Germans had to be content with the version known to NATO as Hip-F, armed with six wire-guided Sagger antitank missiles. Soviet Hip-Es each carried four of the more effective homing Swatters. Now that Mi-24s are being shared out widely, everyone is getting Hind-D, with Swatters, because Saggers would not be compatible with this high-performance helicopter.

The technology now being standardized on this helicopter, throughout the Eastern bloc, is well shown in an accompanying illustration of an Mi-24 of the Czechoslovak Air Force. All the equipment familiar from pictures of Soviet Hind-Ds can be seen, including the four-barrel Gatling-type gun, undernose turrets for radar and low-light-level TV sensors, and the probe that is assumed to perform the same function as US low-airspeed sensing equipment, to ensure optimum conditions for firing the aircraft's 128 57-mm rockets.

Another illustration shows a new version of the Sukhoi Su-17 attack fighter, known to NATO as Fitter-H. First mentioned in FY '81 budget documents of the DoD, this aircraft has progressed a long way beyond the original fixed-wing Su-7 Fitter-A. To swingwings are now added a slightly drooped nose, to give the pilot a better forward view, laser-marked target seeker in the intake centerbody, a deep saddle fairing aft of the canopy to house additional fuel, a taller square-tip fin and small ventral fin, and almost certainly an uprated engine. Two-seat combat/trainer variants of the same version have been identified, emphasizing once again how much additional performance and punch the Soviet design teams are able to add continuously to types that have proved themselves reliable in service.

Reliability, Readiness, and All-Weather Use

Reliability was once considered a prerogative of the West. Soviet turbojets were reckoned to offer pathetic times between overhauls. The West's better aircrew training and avionics were counted among the other factors that would enable NATO air forces to hold their own against numerically superior opposition. Events of the past year have tended to make such beliefs look dated.

At last, those who control the military purse strings have begun to appreciate that sophisticated aircraft and equipment are only superior to less exciting kinds if they can be relied upon to work round the clock, 365 days a year. Missiles like the TV Maverick may achieve unrivaled results in the sunshine of US firing ranges; if they lack the ability to operate in the poor weather conditions experienced all too often in Europe, they are unlikely to be of great value to NATO when they are most wanted. Even more worrying is the poor state of readiness of some elements of NATO air forces.

Official statistics released by Defense Secretary Harold Brown revealed that in Fiscal Year 1979 an average forty-two percent of US Air Force tactical aircraft were "not mission capable" at any particular time. The relatively unsophisticated A-10 Thunderbolt II came out best, with only 32.6 percent of the 243-strong force grounded on average through the year. At the other extreme, 65.6 percent of the eighty-six F-111Ds were normally not mission capable. Nor was the US Navy in a much healthier state, with an average 47.1 percent of its 292 F-14A Tomcats unavailable throughout the year, and unimpressive availability of its other five major combat types.

Taking such figures in isolation, with no combat readiness figures for other air forces against which to compare them, is probably unfair to military services with a great record of achievement. The intention is not to criticize, but to emphasize again how illusory might be any belief in continued Western superiority.

Growing interest in the proposed adverse weather version of the A-10 is good news, because far too high a proportion of NATO aircraft are fair-weather types. So is the fact that Congress has refused to let effort on the AV-8B die, despite Department of Defense coldness for the program. The unique V/STOL capability pioneered by the basic Harrier is one of the major assets retained by the West, emphasizing again the virtues of simplicity.

Many of the VTOL prototypes produced in large numbers and at high cost by US manufacturers have promised performance that would put the Harrier in its place as the Wright biplane of the V/STOL age. Most have failed because of the complexities and shortcomings of the techniques that were supposed to make them superior. There is merit in simplicity, provided it works, and does all that it is intended to do; but there *is* a limit.

Back in World War II, before the smallest armies began to get shoulder-fired SAMs and other advanced equipment, fighters like the P-51D Mustang ruled the air over the battlefields of half the world. To pretend that they could have the same success today, even with turboprop engines and updated equipment, is courting disaster. Letters in the *Times* newspaper in London have even suggested putting back into production and service, as an anti-tank aircraft, the Hawker Hurricane of Battle of Britain fame.

Both the Mustang and the Hurricane should be allowed to rest in peace, in their museums, as old soldiers which have had their day. To suggest that they could live over a modern battlefield represents the brainstorm of an economist who values saving pennies more highly than saving the lives of pilots.

This brings us back to the Harrier, because it is time to end the "shall we/shan't we?" talk that has gone on for too long, on both sides of the Atlantic. If the US Marine Corps is to get the versatile "bomb truck" that it wants, and the US Navy is to get a fighter that can be flown irrespective of narrow seas, wind direction, and other factors that affect shipboard operations, the only answer in sight is the AV-8B. It is a good airplane for both US services, but the RAF wants the rather different "Big Wing" Harrier for a different job, and should never be denied the tools that it considers essential. Nor must NATO overlook the Harrier's potential as a helicopter destroyer, resulting from its unique capability of thrust vectoring in forward flight, perfected by the Marine Corps as a combat tactic.

Grumman's design for the FSW (forward swept wing) fighter technology demonstrator.

Design and Cost Trends

Rejection of the idea of resurrecting old piston-engined aircraft as inexpensive combat types should not suggest lack of appreciation of the ever-increasing cost of combat aircraft. Unfortunately, it has always cost money to stay alive in a world full of people with weapons; and those with the best weapons tend to live longest.

Throughout the history of airpower, there have been many attempts to cut costs by building small, but few have been successful. The two fighters designed for USAF's Lightweight Fighter (LWF) program of the early '70s were regarded as outstanding examples of how expenditure might be trimmed by scaling down. To the credit of their designers, the F-16A and F-18 production versions of the LWF prototypes have evolved into good combat aircraft; but nobody will pretend that they offer major economies by the time they have been fitted with the full kit of equipment considered essential for performance of their assigned roles in the USAF and USN.

The Air Force is reported to estimate a total expenditure of more than $2 billion, in 1981 dollars, to add night and all-weather capability, night attack pods, ECM jammers, improved avionics, new missiles, Navstar satellite global positioning, and JTIDS equipment progressively to later batches of its 1,388 F-16 Fighting Falcons. The resulting fighters will be very good; but the growing need for economy, if presently available numbers of aircraft are to be maintained, is encouraging efforts to develop an even smaller, lighter, and more advanced type in the shape of the FSW (forward swept wing) fighter sponsored by DARPA. Grumman and Rockwell are competing for an order to build prototypes, which could be flying by the mid-1980s. Nobody will deny that they are exciting shapes; but those of us old enough to remember the wartime German love of revolutionary "wonder weapons" will remember also that the side that wasted too much time on theoretically superior swept-forward wings, helicopters with rotors that rotated around the

Marconi's new and very advanced ECM pod under the wing of an RAF Tornado. Known as Sky Shadow, the pod is typical of new equipment being developed for this key aircraft.

fuselage, and ramp-launched VTOL rocket-fighters, lost to the people who thought and built conventionally.

Another way in which designers are trying to effect economies for their military customers is by new concepts in multirole aircraft. Security restrictions prevent detailed description of the form the new aircraft might take. It is easy to imagine use of a common, large, basic airframe and powerplant for an aircraft that might serve in passenger and freight transport, AWACS, tanker, maritime reconnaissance, and ECM/elint roles. The concept gains in attraction if one can visualize such an aircraft flying lazy circles over somewhere like the Faeroes gap, between Iceland and Norway, keeping track of everything moving in the air or on the sea, carrying all the ECM equipment needed for its own protection, and a large number of air-to-air and air-to-surface missiles which could be fired in wartime from reloadable launchers against intruders of all kinds.

Design studies for such multirole aircraft already exist on the drawing boards of a dozen manufacturers in the West; but the funds to build them may never be provided, as NATO air forces in Europe are finding it increasingly difficult to maintain even the relatively small numbers of aircraft they already deploy. Last spring, there came a warning that the Belgian Air Force would virtually cease operations from September 1 until the end of 1980, unless it received additional funding for fuel. In July, Britain's Secretary of State for Defence announced that the number of RAF Buccaneer squadrons allocated to NATO was likely to be reduced permanently, because Her Majesty's government could not afford to repair fatigue cracks in almost half the force.

Commercial and General Aviation

It seemed right, in AIR FORCE Magazine, to concentrate mainly on the progress and problems of military aviation at this time. In many respects, the picture is even more gloomy when attention is switched to the commercial scene. The effects of deregulation in the US, and approval of low-fare operations in other parts of the world, may have delighted air travelers; they have caused havoc in the airline business, leading to mergers of major operators and the bankruptcy of some reputable smaller operators in the face of competition from short-term speculators flying cheaply acquired geriatric jets.

ICAO statistics show that world scheduled airline load factors in 1979 reached their highest levels in twenty years, but that operating profits fell from five percent in 1977 and 1978 to only one percent in 1979. Ultimately, correct fare levels for traveling in the best available aircraft, maintained to the highest professional standards, are in everyone's interest.

Boeing's domination of the airliner scene becomes progressively more apparent, with the new Models 757 and 767 taking shape as the successors to older types when sales of the latter begin to tail off over the next two years. Only Airbus Industrie seems able to make increasing inroads into the Seattle market.

It would be pleasing to see in the development of programs like Airbus the seeds of increasingly successful European collaboration in the aerospace business, but the largest of the industries involved continues to face problems that threaten its stability. The UK's present government is determined to return British Aerospace to partial private ownership. If the Tory Party should be defeated in the next general election, in 1984, the Labour opposition has suggested that it will not only return the lot to state ownership but will withdraw Britain's membership in the European Economic Community. It would take a brave man to predict with confidence the long-term effect of all this on one of the world's great industries, which earned nearly $2.4 billion from exports in the first seven months of 1980.

Plans to recreate a lightplane industry in Britain fell through when Shorts had to abandon the proposed manufacture of Piper Tomahawks in Belfast. Even the US manufacturers had a tough time in 1980. Bellanca encountered financial problems that brought to an end pro-

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duction of the Viking, Citabria, Decathlon, and Scout series. Rockwell ended manufacture of the Alpine and Gran Turismo Commanders, and the Commander 700 twin that it built in partnership with Fuji of Japan. Cessna dropped the "push-and-pull" Model 337 Skymaster, and on April 16 announced that it had laid off about 1,300 employees at its single-engine facilities, and 1,200 at its multiengine division, with 1,500 more temporarily furloughed during an inventory-reduction program. Piper closed three of its four manufacturing divisions completely for a two-week period in April, and announced that it would reduce its work force by 2,350 persons.

In an effort to promote sales, the newly appointed agents for Mitsubishi in Britain offered two free $15,000 Colt Sapporo motor cars to anyone who bought a Diamond 1 twin-turbofan business aircraft.

Fuel: The Pervasive Influence

The single biggest influence on almost everything that happens in aviation at the start of the '80s is fuel. It is at the heart of the latest war in the Middle East; has threatened to ground air forces because of its high cost; has wrecked the profitability of airlines, has led to the birth of a new ultralight flying movement based on powered hang gliders; is causing the mainstream manufacturers to devote ever-increasing efforts to devising techniques for fuel economy; and is beginning to make everyone think more seriously about alternative fuels of the future.

Lockheed is very much in the forefront of manufacturers that are applying thought to the problems and their solution. During 1980, it demonstrated that fuel consumption of its C-130 Hercules transport can be reduced more than three percent by the simple expedient of adding two ventral fins. It is studying the viability of an "all-electric" medium transport, without hydraulic or pneumatic systems, which is estimated to cost about $120 million less to build, operate, and maintain over its lifetime than a conventional aircraft. And it is continuing its detailed evaluation of various categories of aircraft fueled by liquid hydrogen.

Generally, however, the world industry is tending to veer away from such exotic fuels to a belief that flying will continue to rely on hydrocarbons well into next century, using coal as one of the primary sources until synthetic fuels are available in quantity.

In no way does the present view of world aviation development seem to offer a place for supersonic airline flying after Concorde. Yet it is inconceivable that, having sampled the benefits of Mach 2 cruising in the pioneer of a new age, businessmen will be content for ever to fly at less than half that speed. One day a new fuel like liquid hydrogen may make it routine to fly at Mach 6 when traveling long distances. Meanwhile, 1980 produced a fact about the greatest-yet international aviation product that should not go unrecorded.

A300 Airbus of Olympic Airways of Greece. (Geoffrey P. Jones)

In a talk to the British Business Association, British Airways Concorde Capt. John Hutchinson told his listeners that, on a three-and-three-quarters-hour flight from Singapore to Bahrain, Concorde covered more than sixteen miles to the US gallon of kerosene per passenger with ninety passengers on board. With only sixty seats filled, the fuel consumption was still 11.25 miles per gallon per passenger. "When you compare that with an American car, I think you will agree that it does not sound quite as horrendously uneconomic as people would have you believe," added Captain Hutchinson.

It had been suggested that Concorde really needed more fuel than it could carry on the Singapore-Bahrain run. Two days before this particular pilot gave his talk, he took on board ninety-seven tons of fuel at Singapore, and could have carried another eight tons had it been needed. Sadly, as part of British Airways' latest economy cuts, the Concorde service between Singapore and Bahrain has now been discontinued.

On the whole, therefore, 1980 was not a vintage year for flying; but it had its good moments. One of the better days was September 5, when Sikorsky President Gerald J. Tobias decided to end his visit to Britain's Farnborough Air Show with a unique high-speed homeward journey. With his wife and the company's vice president for marketing, he left London's International Press Centre Heliport at 9:00 a.m. local time, and made the journey to London Airport in eight minutes by S-76 helicopter. The three then boarded a Concorde for the three hour and twenty-one minute flight to New York's John F. Kennedy Airport. There they boarded another Sikorsky-owned S-76, which whisked them to Wall Street Heliport in four minutes. Overall time was four hours and twenty-six minutes, including fifty-three minutes required for ground transportation and customs clearance. Not the kind of journey we can all make; but our fathers thought the same about Charles Lindbergh's thirty-two and one-half-hour transatlantic time in 1927. ■

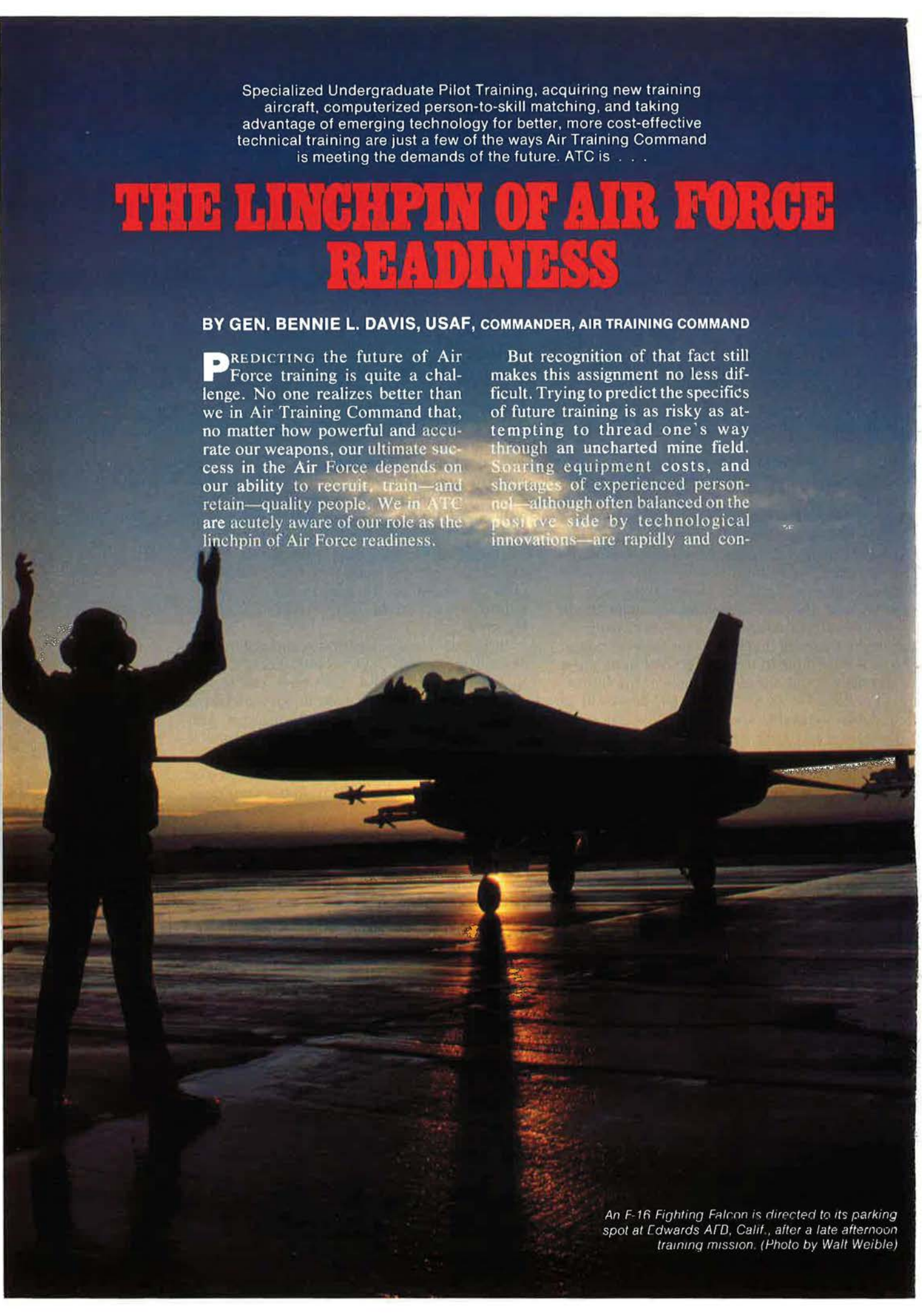
Specialized Undergraduate Pilot Training, acquiring new training aircraft, computerized person-to-skill matching, and taking advantage of emerging technology for better, more cost-effective technical training are just a few of the ways Air Training Command is meeting the demands of the future. ATC is . . .

THE LINCHPIN OF AIR FORCE READINESS

BY GEN. BENNIE L. DAVIS, USAF, COMMANDER, AIR TRAINING COMMAND

PREDICTING the future of Air Force training is quite a challenge. No one realizes better than we in Air Training Command that, no matter how powerful and accurate our weapons, our ultimate success in the Air Force depends on our ability to recruit, train—and retain—quality people. We in ATC are acutely aware of our role as the linchpin of Air Force readiness.

But recognition of that fact still makes this assignment no less difficult. Trying to predict the specifics of future training is as risky as attempting to thread one's way through an uncharted mine field. Soaring equipment costs, and shortages of experienced personnel—although often balanced on the positive side by technological innovations—are rapidly and con-



An F-16 Fighting Falcon is directed to its parking spot at Edwards AFB, Calif., after a late afternoon training mission. (Photo by Walt Weible)

stantly altering our training environment.

There are, however, some things of which we can be certain. First, we live in a world that will find it increasingly difficult to satisfy the food and energy needs of its people in the coming years. By the year 2000, for example, world population will have mushroomed from the 4,000,000,000 at present to more than 6,300,000,000—for every two people living on earth today, there will be three. Carrying this only a little further, by 2030 world population will have swelled to 10,000,000,000 people, which, according to some authorities, is the maximum number that our world can support with any degree of comfort and individual choice, even under the best of conditions.

But even as population skyrockets, world resources of every nature—arable land, forests, water, and that precious, nonrenewable treasure, oil—will be diminishing. According to some estimates, in fact, by the year 2000 we will have consumed half of all the oil remaining in our planet.

I don't necessarily believe that these grim predictions mean that the world we know today will end in just twenty years. Many of the problems can, and will, be solved, or at least ameliorated, by advances in technology—by development or discovery of alternate sources of energy, for instance.

But the point is that, even under the best of circumstances, we're facing a world in which tensions between nations will grow steadily as they compete for shrinking reserves of substances vital to life and well-being. The inevitable result will be a steadily building potential for international conflict as the industrialized nations of the world, as well as the less-developed countries, engage in this fight for survival.

At home, as our nation's manpower pool declines, it will become increasingly more difficult to meet our personnel needs. In just five years, for example, the number of eighteen-year-olds in our nation will drop by fifteen percent. By 1995, our primary market of seventeen- to twenty-one-year-olds will be only three-quarters of what it is today. What this means is, that by the mid-'80s, DoD will be in competition with industry and our colleges and universities for one of every three eighteen-year-olds in our country. Including reserve forces, it's one of every two.

ABOVE: Basic trainees at the Air Force Military Training Center, Lackland AFB, Tex., learn that customs and courtesies are an essential part of Air Force life. (Photo by Walt Weible) LEFT: Gen. Bennie L. Davis, now ATC Commander, headed Air Force Recruiting Service in 1974–75.

Innovations

Such pressures will undoubtedly generate increasing and more complex demands on our nation's armed forces in the coming years, demands that must translate directly into new requirements for military training. Some of those changes will undoubtedly be revolutionary. But to us who must adapt our training methods to the changing scene on a day-to-day, week-by-week basis, they will appear in a more evolutionary light. We're working right now on new programs that will be the first steps in continuing innovations that will lead us into the twenty-first century.

One such initiative is our Specialized Undergraduate Pilot Training (SUPT)—commonly referred to as "dual-track"—program. Under this concept, at about the mid-point of their flight training, student pilots will begin concentrating on either tactical (fighter/attack/reconnaissance—FAR) or the heavier (tanker/transport/bomber—TTB) aircraft.

SUPT is not a new concept; a similar system was successfully

employed in the Air Force through the late '50s. Now we feel that changing times and circumstances warrant its reinstitution and that it will improve the quality of our pilot training graduates, enabling us to respond better to the needs of our "users," the Air Force's major commands. Another most important consideration is that by initial estimates, SUPT could save as much as $50,000 for each graduate of the TTB track—$65.5 million annually, plus more than 30,000,000 gallons of jet fuel.

There is yet another, perhaps even more compelling, reason for SUPT: It will extend the availability of our T-38 fleet through the year 2000.

AIR FORCE Magazine readers won't be surprised to hear that for the past few years we've been losing pilots and navigators in record numbers as they chose far more lucrative jobs in private industry. These losses have made it necessary to expand our flying training programs. In FY '82, for example, we will nearly double our pilot training production of FY '78–79, from 1,188 to 1,900. But there's a major limiting factor: the availability of T-38 airframes.

We can meet our production requirements in FY '81 with some strong internal management actions, providing we're blessed with unusually good weather. But unless we make some alterations in our program, in FY '82 and beyond, it will become difficult to perform our mission with our current fleet.

When SUPT is in full swing in the mid-'80s, it will alleviate some of the burden on the T-38, since its use in pilot training will be limited to the basic trainer's role in the FAR track. The TTB track will be using a new aircraft that we must acquire. Due to time and dollar constraints, this will probably be an off-the-shelf business jet, with minor modifications.

The search is also on for a replacement for the T-37 jet trainer, currently used in the primary phase of Undergraduate Pilot Training. The T-37 has served us well indeed, but it can't provide all the capabilities we need today. We have several options, with cost, as usual, being a prime factor: We can modernize our current T-37 fleet; we can develop a

FROM ABOVE: CLOCKWISE: In basic training, airmen learn the foundation of a successful Air Force career. In technical training they learn job skills such as safe munitions-handling procedures, the intricate details of splicing communications lines, and firefighting. (Photos by Walt Weible)

new aircraft; or, as mentioned, we can buy a current off-the-shelf aircraft. All options are still being given full consideration under the Next Generation Trainer (NGT) competition.

But no matter which option is selected, we anticipate that ATC will save more than 465 maintenance man-years and another 28,000,000 gallons of JP-4 jet fuel per year as a result.

So at the present, it appears that implementation of SUPT, the acquisition of a replacement trainer for the T-37, and procurement of a TTB trainer will extend the lifespan of our T-38 through the year 2000. These actions should provide sufficient training aircraft to meet our pilot production needs for the remainder of this century.

International Training

An ATC project involving another new aircraft, the F-16, has unique international import. Early on, ATC was designated as the focal point for development and administration of all maintenance training for the entire project, for all countries involved (Belgium, Denmark, the Netherlands, and Norway). Our job was to train future maintenance instructors from the European countries. We did. Those instructors have returned home and are now teaching their own maintenance crews.

Today another international project with perhaps lasting significance is about to come to fruition after years of negotiation and planning. It is the Euro-NATO Joint Jet Pilot Training (ENJJPT) program. The purpose of ENJJPT is joint training of NATO pilots on a cost-sharing basis. The initial class—scheduled to start in October 1981 at Sheppard AFB, Tex.—will graduate 123 foreign and 110 Air Force pilots, plus ninety instructor pilots. By FY '87, the combined pilot total is planned to rise to nearly 280 a year.

Skills-to-Job Matching

But looking across the ATC training spectrum, if the various elements were portrayed in a segmented circle—the traditional "pie"—the largest slice by far would be labeled "technical training."

Technical training provides quality craftsmen—young men and women who meet stringent military and skill standards—for Air Force operational units. This is an infinitely complex task encompassing 350 specialties in forty-five to fifty career fields, including aircraft, missiles, intelligence, photography, administration, health care, and security police, among many others.

One key to our success has been, and will continue to be, our rigorous quality screening during the recruiting process. We spend a great deal of time placing our applicants in the right Air Force specialty, one that matches, as best we can, their abilities and desires to our Air Force needs. The actual "person-skill" match, as we call it, is worked through a computer-based procurement information system which links the Air Force Manpower and Personnel Center in San Antonio to each of the sixty-seven Armed Forces Examining and Entrance Stations throughout the country.

Most of our applicants enter the Air Force under the Delayed Enlistment option. This allows them to enlist up to twelve months before actually coming on active duty. This lead time gives us greater flexibility in placing them in the skill that best fits their aptitude and ability.

On the average, approximately sixty percent of our enlistees enter the Air Force under the guaranteed Training Enlistment program, which guarantees training and assignment in specific career fields. The remaining forty percent enlist without guaranteed specialties. On the sixth day of basic military training, these young men and women participate in a specialty classification interview. During the session they review available Air Force specialties and list five preferences of available openings. More than nine out of ten receive one of their skill choices.

More Demands on Training

In FY '79, we recruited approximately 68,000 young men and women for the Air Force. Last year, we brought nearly 75,000 on board. In FY '81, that goal will shoot up to nearly 84,000, increasing to 90,000 the following year. If retention and reenlistments don't improve significantly, we will have to sustain or quite possibly even exceed that level in coming years. To put all this in perspective, this year we're recruiting 10,000 more men and women than we enlisted in 1970, when our Air Force recruiting was aided by the Vietnam War and the draft.

It's a circular problem. Losses and separations create new requirements, which drive up recruiting goals, which lead to increases in our technical training schools. In 1970, the Air Force had almost 800,000 people in uniform, with 178 major installations throughout the world. Today we have only about 560,000 men and women, and we've inactivated forty-four bases. In spite of that, last year we provided initial and lateral skill training to more than 80,000 Air Force members, essentially the same number we trained in 1970.

Throughout the '70s, we were in a drawdown mode. We didn't have to replace all of our losses in craftsmen and instructors on a one-for-one basis as we do today, now that our numbers have more or less stabilized.

At the same time that the numbers of trainees are increasing, we're also under growing pressure to increase the depth of training as well. A number of years ago, we decided to shorten selected training courses by eliminating some of the theoretical underpinnings of the instruction. We in ATC would, in essence, train our enlistees for their first job, with follow-up training coming through on-the-job training in the field, and skill progression training after a reenlistment decision.

But the Air Force is now losing some of its best mid-level supervisors and managers, and it is becoming increasingly difficult for our major commands to provide this vital follow-on training. In fact, be-

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Gen. Bennie L. Davis is Commander of Air Training Command. A 1950 West Point graduate, he completed pilot training at Vance AFB, Okla., in 1951. He has flown B-29s, B-47s, B-52s, and B-57s. In 1968 he was assigned to the Office of the Joint Chiefs of Staff. He served in a number of personnel jobs before moving to ATC in 1979. He is a graduate of the Armed Forces Staff College and the National War College.

cause of our recent high loss rates, young airmen are themselves being called upon to fill critical jobs during their first assignment.

Fortunately, awareness appears to be growing in high governmental circles that losses of highly trained personnel who are being forced to leave the nation's armed forces because of inadequate pay and compensation are intolerable. The recent 11.7 percent pay raise would seem to be a concrete indication of this awakening. If this positive trend continues, these losses should be slowed significantly, if not stopped. (Also, we'll be in a far better position to compete with industry for recruits from a shrinking manpower pool, as discussed earlier.) But if this concern is not sustained through the coming years, we could easily find ourselves in an even worse situation.

Maintenance Simulation

In the meantime, it's becoming increasingly apparent that more Air Force dollars must go for instructors, facilities, and equipment in the training arena, even as we continue to search for every possible way to economize without affecting our mission.

One way lies in maintenance simulation. Already proven in flying training, simulation has many obvious advantages in technical training as well. First, a large, expensive piece of equipment—which the owning command didn't relish giving up in the first place—doesn't have to be immobilized just for training purposes, perhaps even damaged. In addition, a problem can be presented to a student time and again, until he or she becomes confident of the solution. Also, one instructor can sit at a station equipped with a visual display showing what several students are doing, and monitor all of them at the same time. Finally, a student can't harm himself, or the operational equipment, as he might do by improperly wiring a "hot" circuit, for instance.

The use of simulators in training is but one example of how emerging technology will be used to provide better training in a more cost-effective manner. Following that will undoubtedly come computer voice recognition and speech synthesis and who knows what after that?

In the actual work field, it has been predicted that of the 5,000,000 new jobs that will be available in 1985 and thereafter, at least one-third will be brand new—jobs that we've never heard of, can't even imagine now. Vague glimpses of the future are already becoming visible in the Air Force as we gear up to support such new weapon systems as the MX, air-launched cruise missiles, and the Space Shuttle.

In one sense, our continued success in the future will go beyond merely training effectively. We and civilian industry alike have found that merely placing a qualified operator at the controls of a good machine doesn't always produce optimum results. Even the most exotic machines are ineffective without committed people to operate them. As our national resources continue to dwindle (along with shrinking dollars), motivated, productive personnel will become even more of an imperative.

Air University Programs

One potent force we are using to produce the leadership that will foster this commitment is Air University (AU), Maxwell AFB, Ala. AU provides centralized management of an extensive professional education system for both commissioned and noncommissioned officers. One of my major goals as ATC Commander has been to make this important institution more viable and effective. *(See related article, "New Strides in Professional Military Education," p. 89.)*

The Air Force has changed considerably over the last several years. Our officer force is now much younger than it was just half a decade ago, and we're having to contend with severe shortages in our noncommissioned officer middle manager ranks. We've already made some changes at AU in response to these new challenges, such as earlier junior officer Professional Military Education and a reduction in Squadron Officer School course length to accommodate more students.

Also located at Maxwell AFB is the Community College of the Air Force, which offers enlisted men and women the opportunity to earn an associate degree in applied science while working at their Air Force specialties. CCAF participants register in an academic major, most often their Air Force specialty, and earn college-level credits for successfully completing Air Force training courses.

Air University has been a part of ATC since 1978. One of the major benefits of this union has been the enhanced ability to work major training and education problems jointly. For example, we've had difficulty in procuring sufficient engineers to fill our needs, partly because we haven't been able to match the salaries that new graduates are being offered in industry. It wasn't within our power to solve the pay issue, of course. So we decided to attack from a different angle: We developed an integrated strategy involving both Recruiting Service and Air University.

First, at our request, Congress added 740 Air Force ROTC scholarships, aimed primarily at engineering and technical students, to our authorizations, giving us a total of 6,500 spread over four years of undergraduate education. Next, we expanded the Airman Education and Commissioning Program, a major source of top-quality engineers and computer scientists, and instituted an in-house undergraduate engineering program at the Air Force Institute of Technology (AFIT), also administered by AU. Third, from a recruiting standpoint, we introduced a number of special incentives we believe will attract engineers to our Officer Training School. For example, one program allows OTS graduates to enter AFIT's engineering programs directly after finishing OTS.

Our latest engineer recruiting initiative is the College Senior Engineer Program, which will permit us to recruit junior-level engineering students at accredited US universities before competitors offer their starting salaries. After the students are accepted into the program, they will be placed on active duty in the grade of E-3, with attendant pay and benefits, and will be issued an active-duty ID card. Following graduation from college, they will attend Officer Training School.

These efforts won't totally resolve our problem, but they have already made a good start, brighten-

ABOVE: Maintenance specialists for the T-38 Talons at Randolph AFB, Tex., upgrade their skills through the base's Field Training Detachment. LEFT: An Air Force engineer studies laser-beam technology. (Photos by Walt Weible) BELOW: Officers receive undergraduate navigator training at Mather AFB, Calif. (Photo by Buster Kellum)

ing our long-term prospects in these areas tremendously.

Future Training

Anticipating the future of training is a risky business, with no guidelines, no outlines, seeing only dim shapes of technological marvels to come.

But I think it is more in the realm of probability than possibility that:

- Before too long computer networks, comprising advanced models of the present state of the art will talk to each other, making management and administrative decisions easier;
- Telecommunications will advance by leaps and bounds—there will be teleconferences and instructional networks beaming classes to Air Force bases worldwide;
- Recruiting stations throughout the US will be equipped with computer consoles that can query a master computer to ascertain job openings while a prospective recruit waits;
- The Air Force, which has always been deeply involved in space programs, will become even more so;
- Interservice cooperation will become more important as we share breakthroughs in training concepts and methods;
- As mass selection of persons who will operate and maintain many Space Shuttles becomes necessary, senior officials will turn to us, because no one in the world has more experience than we in ATC in taking huge numbers of young people from civilian life and turning them into skilled craftsmen; and
- Learning with the aid of computers, permitting self-pacing, will become more and more prevalent.

In ATC, we're not moving blindly into this rapidly expanding and changing environment. One bridge to the future we've developed is the Airpower Research Institute at Air University. This new organization will provide the Air Force with an internal think-tank capability, designed to enable us to better prepare for the future—to conduct research into the political, economic, and military issues that will surface in the coming decades.

Above all, I'm encouraged by a surge of enthusiasm I detect in Air Training Command, a sense of urgency that has permeated the ranks of our training experts. They are no longer content to just wait to see what happens, then react; they are having interdivision, interdiscipline meetings to try to begin to put "pieces of frame around blue sky."

It has been said that mankind is divided into three groups: those few who make things happen; the many who watch what happens; and the vast multitude who never knew anything had happened.

I feel extremely confident about our Air Force in the years ahead. Instead of sitting back and trying to interpret the future, the men and women of ATC are determined to create it. ■

Modern aerospace weapons are complex and expensive. To ensure they they'll fly and fight when called on, Air Training Command is preparing today . . .

Tomorrow's Maintenance Training Programs

By Maj. Jim Clark, USAF

Finis origne pendet (The end depends on the beginning) is the motto of a well-known preparatory school on the East Coast. It's also the unofficial motto of a small Air Training Command (ATC) squadron on the West Coast similarly concerned with preparing for the future.

ATC's 3306th Test and Evaluation Squadron (TES), located at the Air Force Flight Test Center at Edwards AFB, Calif., ensures that future maintenance training programs for selected new Air Force weapon systems begin with an early and thorough system analysis as a basis for defining training requirements.

Training support for such increasingly complex systems as the MX and the ALCM requires development of a comprehensive data base for training and training-equipment decisions. This required data is obtained by purchasing it from the weapon systems contractor, or through information gathered by the 3306th during testing and evaluation of the system.

An Air Force technician/instructor from the 3306th Test and Evaluation Squadron at Edwards AFB, Calif., checks the radar transmitter modulator on a B-52.

Instructional System Development

Until 1973, most ATC planning for training on new weapon systems was based on data purchased from the system contractor, supplemented by past ATC experience with similar weapon systems. In 1973, when the Air Force began emphasizing "fly-before-buy" testing (which resulted in longer test programs), ATC decided to improve the data base through more formal, structured participation in the test program. ATC participation in the B-1 program precipitated this decision. It had demonstrated that sufficient operational and maintenance data were recorded during this process to permit the use of Instructional System Development (ISD) methodology in training planning.

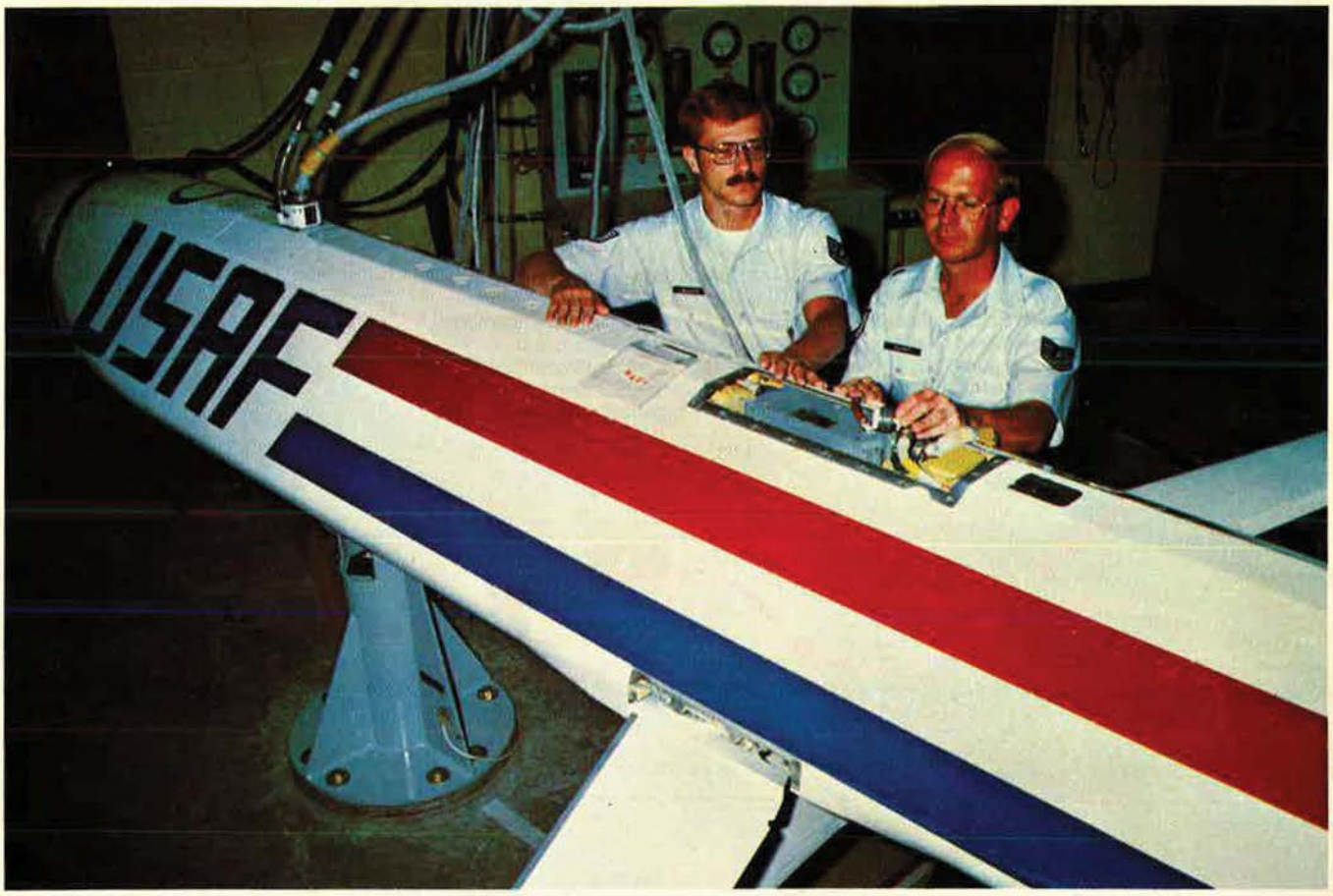
Use of ISD, a required, systematic procedure for developing training programs, had seen limited use in the development of training programs during the acquisition of new systems before 1973. The B-1 test effort indicated that the "fly-before-buy" test environment provided improved data for detailed training planning earlier in the weapon system life cycle than had been possible in the past. So, in May 1975, the 3306th TES at Edwards AFB was activated under the ATC DCS/Technical Training.

The squadron mission is twofold: To support the Command responsibilities in test and evaluation on assigned systems, and to conduct training planning on these systems, using ISD methodology. At the time it was formed, the squadron's responsibilities included planning for the A-10, B-1, F-16, E-3A, and Advanced Medium STOL Transport (AMST) programs. Programs assigned subsequently have included the KC-10, both air- and ground-launched cruise missiles, B-52 Offensive Avionics System, MX missile, Space Transportation System, EF-111A Tactical Jamming System, plus numerous smaller test programs.

Solid Training Base

Although most of the squadron's thirty-seven members are at Edwards AFB, not all the test programs it supports are located there. The 3306th has operating locations scattered from Kennedy Space Center, Fla. (Space Transportation System), to Norton AFB, Calif. (MX missile). At an operating location or at Edwards AFB, the job is essentially the same: Support the Command's role in the test program and, while doing so, get a firsthand, dirty-knuckle familiarity with the weapon system. This knowledge provides a solid base for training courses and equipment recommendations. This requires documentation of maintenance tasks and analysis of them to identify training and training equipment requirements. Then course documents are developed to be used in conducting training.

After higher headquarters approves the recommendations, the squadron analysts work with various Air Force and contractor agencies to ensure that training equipment is developed to meet identified needs. The analysts also continue course development and prepare to move to the field when the weapon system becomes operational. When ATC begins to conduct training to support the operational system, the squadron analysts assigned to it will move to a technical training center or to a field training detachment to form the initial cadre of system instructors. The air-launched cruise missile analysts, for example, will be moving to Chanute AFB, Ill., in early 1981 and will be the first instructors in the maintenance training program for that system.



Air Force technicians run through a checklist to evaluate and test maintenance training procedures on the ALCM.

Seeking New Approaches

The 3306th is an innovative and precedent-setting organization. For example, in working the F-16 program it recommended the use of computer-driven maintenance simulators in place of hardware trainers to support the maintenance training. This first wide-scale use of computer-driven simulators for maintenance training was a real breakthrough for ATC training.

In addition to performing its primary ATC function, the squadron is now working with such agencies as the Air Force Human Resources Laboratory and system contractors in searching out new approaches to training development. Its adaptations of the "by-the-book" ISD methodology have drawn favorable notices from educational technologists.

As weapon systems become increasingly complex and costly, the Air Force will necessarily be putting more emphasis on front-end analysis to ensure development of programs with the greatest return for dollars invested. Manpower and training are critical components of this analysis. The 3306th pioneering effort ensures that training programs for new systems are based on early and exhaustive system analysis.

It's just one way Air Training Command prepares to train tomorrow's Air Force. ■

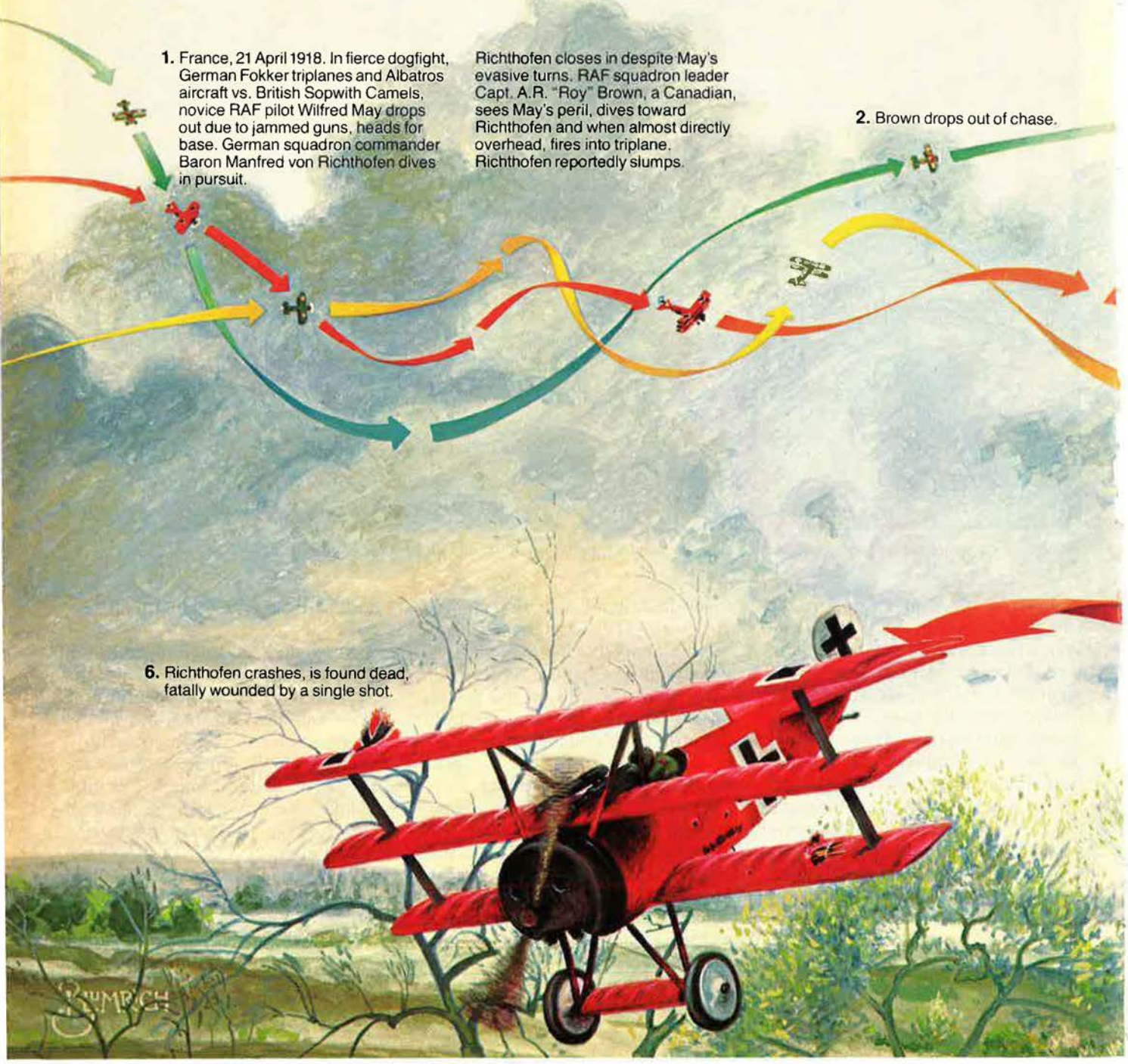
Camel overhead! Gunfire from below! As the Red Baron fell, a new concept of air combat was taking shape.

Who actually downed the legendary Baron Manfred von Richthofen on 21 April 1918? Even though RAF pilot Capt. A.R. "Roy" Brown received credit, did he really fire the fatal shot as he believed? If so, how could von Richthofen continue flying for more than a minute with a chest wound that should have been fatal in seconds?

If instead, a ground gunner did it, then which one? A rifleman? Antiaircraft artilleryman? Machine gunner?

The question may never be totally, positively answered. But there's no dispute that air warfare has changed greatly since that memorable World War I battle. Combat in the skies has become more tightly controlled and disciplined. And of course planes have grown larger, stronger, faster...able to perform a host of missions.

Hazards to flyers have changed too. Today, for example, an aircraft's very survival may hinge on its ability to pinpoint quickly, from a dense electromagnetic environment, those signals that come from enemy missile-guiding radar. This is an area where IBM expertise is demonstrated. Air Force F-4G fighters carry our AN/APR-38 Wild Weasel receiver system which can automatically detect, classify and locate hostile radar signals.



With this information, the F-4G fighter crew can then take appropriate action.

Other high-performance aircraft, too, gain increased effectiveness from IBM systems. The Navy's F-14 has one that displays navigation, target and weapons delivery information in an easy-to-grasp presentation. We're also aboard the Air Superiority F-15 Eagle, the F-111D and F, the A-7D/E Air Force/Navy craft, and others.

Complex projects like these benefit from IBM's special skill: our ability to marshal many specialized systems to a common purpose. We have also applied this skill to anti-submarine warfare, navigation, and electronic support measures, plus a wide range of other fields.

In fact, the more complex the task and systems are, the more IBM can help.

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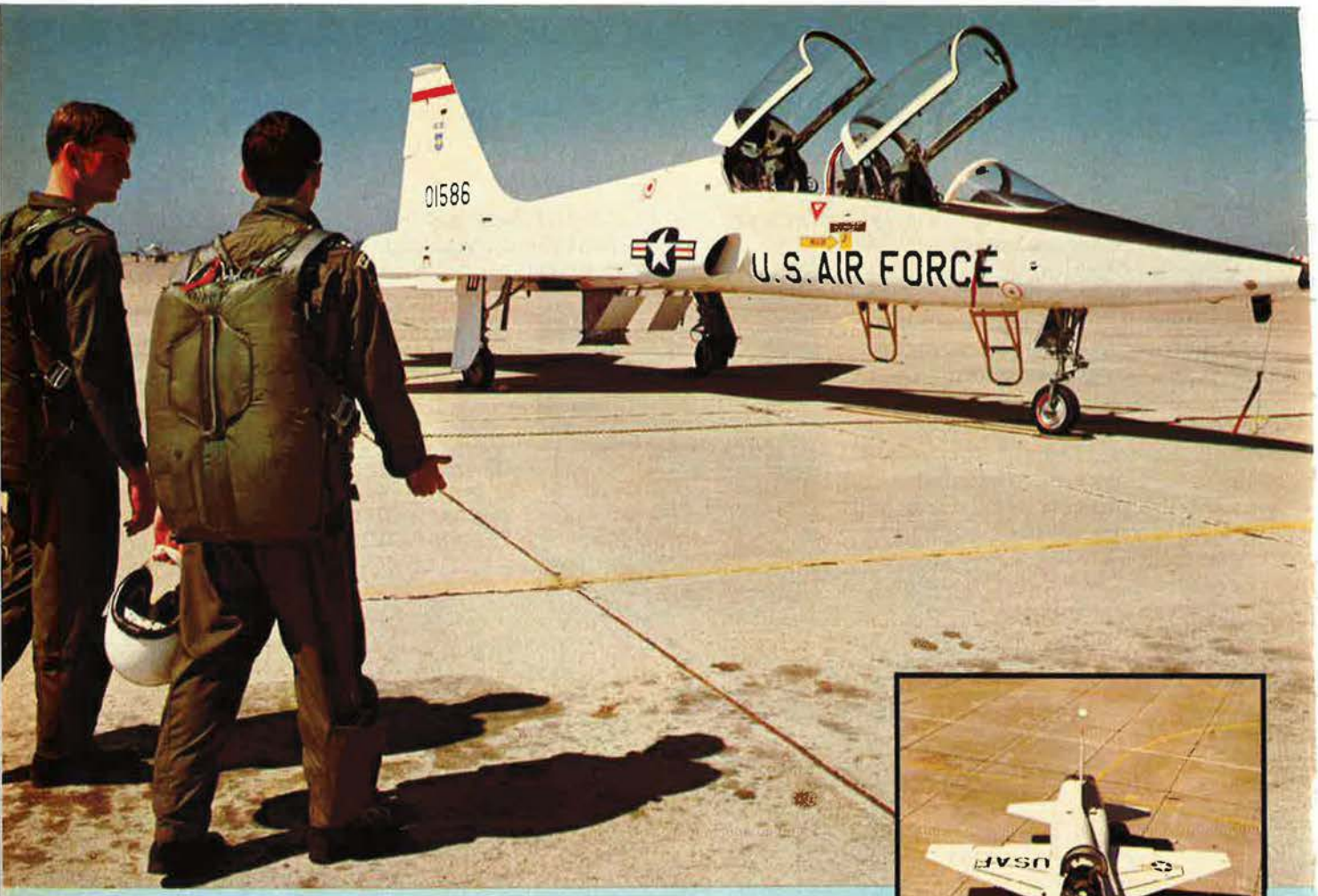
Federal Systems Division
Bethesda, Maryland 20034

3. Richthofen continues gaining on May, passing over fire from Australian riflemen, machine gunners and anti-aircraft batteries. Pieces of triplane reportedly break off.

4. May returns to base at Bertangles.

5. Richthofen's triplane turns unsteadily, swerves, heads downward.

This ad is one of a series.
Historical facts verified by Historical Evaluation and Research Organization.



Their work creates the pilots who fly and fight for the United States Air Force. Their planes aren't armed, but their skills and dedication do the job. They are Air Training Command's instructor pilots . . .

The Satisfactions of a T-38 Instructor Pilot

BY CAPT. SLIM CONNORS, USAF
Photos by Walt Weible

No matter how biased Air Force pilots are toward their aircraft, their missions, or the command patch on their flight suits, they all jumped into their aviation careers from the same springboard—Undergraduate Pilot Training (UPT). How well young men and women from a variety of backgrounds transition into any USAF aircraft rests on the people who teach them—the instructor pilots, or IPs, of ATC.

Every flying command in the Air Force must lend a specific number of pilots to ATC for IP duty. This helps ensure that UPT students are exposed to various command philosophies and gives a "real world" flavor to the UPT program. Additionally, ATC retains newly graduated pilots for IP duty to make up the balance of the ATC instructor pilot force. These first assignment instructor pilots (FAIPs) currently make up about sixty percent of the total IP force in Air Training Command.

Me? An IP?

My first impression on being selected to serve a tour in ATC was a mixture of anxiety, pride and anticipation, and wonder. I couldn't really understand why anyone should want to fly an aircraft that has no wartime mission (I remembered the old "fly and fight" saying). And how can a FAIP compete effectively with an F-4 driver coming to ATC with 500 hours of TAC experience? Further, what does one "butter bar" know about teaching another one how to fly? I sure had a lot of questions. But I was proud to

A combination of new pilot training graduates and experienced pilots provided by the major commands make up the ATC instructor pilot force. The T-38 Talon will celebrate twenty years of service in ATC on March 17.

be selected by my supervisors to stay to work with them. Even though it meant a three-and-a-half-year delay in becoming truly "operational," I was ready to get to work. But first, I had to finish my own last three weeks of UPT (including a challenging navigation check ride) without getting into trouble.

I managed to maintain standards, graduated from UPT, attended survival school, and returned to the "home drome" at Laughlin AFB, Tex., for Pre-Pilot Instructor Training (Pre-PIT), where the real preparation for an ATC tour begins.

The Check-a-Month Club

Pre-PIT is a locally run checkout program that initially qualifies crew members in the primary seat of either the T-37 or T-38. The course consists of ground training films at the base learning center, briefings by instructor pilots, simulator missions, aircraft sorties, and academic classes in aviation physiology, aircraft systems, and instrument procedures. Even though FAIPs and non-FAIPs complete the same program, course requirements differ slightly in each category, especially on the Talon side of the house where the FAIPs have just completed the T-38 phase of UPT.

The T-37 Pre-PIT "trainees" (nobody likes to be called a student after he graduates from UPT) complete an average of thirteen simulator sorties and eighteen aircraft sorties in the contact, instrument, and formation categories. The future T-38 "jocks" receive an average of eight simulator sorties and twenty aircraft sorties in the same categories. The number of sorties per category is designed to allow for a more flexible course for pilots with different backgrounds.

For example, a former C-141 pilot might require an extra sortie in formation, but probably wouldn't need all of his instrument time. On the other hand, a FAIP could probably qualify in contact after only two or three rides (especially in the T-38), but might need additional instrument sorties. The deciding factor, of course, is the individual. And that is what Pre-PIT syllabus flexibility is all about—tailoring the course (within reason) to the needs of the individual.

My IP tour didn't sound too tough until I walked into Pre-PIT the first day and was greeted by the wiry chief of the section. His "Cheshire cat" grin still lingers in my mind as I recall his first words, "Welcome to the Check-a-Month Club!" As I stood there shaking his hand, I began to realize what he was talking about.

The PIT instructors are absolutely tops—each one has at least a thousand hours in the air and is truly a walking encyclopedia on the training business.

The in-brief confirmed my suspicions that one check ride per month was about average for a first-year instructor pilot. I guess in ATC's fervor to ensure training excellence, a strict quality control system evolved to uncover any weakness or potential shortcoming in an instructor pilot. If a pilot were prone to "checkitis" (fear of check rides), ATC was definitely not the place to be. At least I had a lot to look forward to.

Four weeks, seventeen "first pilot" hours, and two check rides later, I finished the first hurdle of my ATC tour. Pre-PIT experience was good, and I would not forget the lessons learned. I felt more confident in the cockpit of the T-38, and beyond that I learned a lot about being a professional aviator. The enthusiasm, esprit, dedication, and professionalism of the Pre-PIT instructor pilots deeply impressed me. I had a long way to go before I could consider myself in their league, but at least I had a direction in which to "start truckin'."

Pilot Instructor Training

My next move was to attend Pilot Instructor Training at ATC's home, Randolph AFB, Tex. PIT was (and still is) a highly specialized, fast-paced, thorough introduction to the "ins and outs" of life as an ATC instructor pilot. The three-month program—designed to provide each trainee with the flying and instructional skills needed to make him a productive member of the IP force—isn't easy when you consider the various flying backgrounds (or lack of them) of the trainees.

Like Pre-PIT, Pilot Instructor Training is flexible. Each category of flying is divided into two separate areas—proficiency and instruction. Once a trainee attains the required level of proficiency in a specific category, he moves on to the instructional phase. Again, the program can be tailored slightly to better meet individual requirements. In this manner, each soon-to-be IP progresses through contact, formation, instruments, and navigation flying, and completes a check ride in each category. Additionally, a simulator check ride and comprehensive "general knowledge" ground evaluation are completed to ensure that the trainee really "knows his stuff." An average total of twenty-one simulator sorties and forty-nine aircraft sorties are flown at PIT.

But PIT does far more than merely teach how to fly the simulator or aircraft, perform maneuvers, and provide instructional techniques—it teaches trainees how to get the most out of themselves, their students, the aircraft or simulator, and the sorties. From the very first day on the Randolph flight line, you hear words like "optimize," "flexibility," "training effectiveness," "error analysis," "professionalism," and "officership."

The PIT instructors are absolutely tops—each one has at least a thousand hours in the air and is truly a walking encyclopedia on the training business. They realize how demanding today's UPT environment is, and they strive to instill in

each trainee an attitude of perceptiveness, involvement, and professionalism. Table discussions often center around what to expect from certain student "stress situations," common pitfalls to recognize on the ground and to avoid in the air, and how to ensure that your student gets the most training from his or her allocated sorties.

PIT instructors caution their trainees about "mother henning" their students, and stress the importance of letting the students make their own decisions when practicable. Since "air sense" stems from actual flying experience and current restrictive fiscal policies have limited actual aircraft sorties to an all-time low, it's amazing that today's UPT graduates are generally as well prepared as previous graduates. The most recent ATC feedback survey of major commands on the quality of UPT grads, and how their training could be improved, confirmed that today's graduates are indeed well prepared.

Hitting the Line

Getting started back at the home drome was as easy as one, two, three—three familiarization rides with the Standardization/Evaluation pilots, the people directly responsible for ensuring sustained high standards of the flying and instructing abilities of all ATC instructor pilots. This was just one more step in ATC's quality-control process. Stan/Eval stressed that the "fam" rides were designed merely to help orient recent PIT graduates to the local area. (But it was an amazing coincidence how "no-notice" check rides just happened to follow poorly flown familiarization rides!) Of course, I wouldn't have had it any other way.

My first day on the flight line shocked me into realizing that the job of an ATC instructor pilot was unlike any other flying job in the Air Force. I was assigned two students and a Buddy IP who, with the aid of the flight unit Stan/Eval member, the flight commander, and the other "old heads" in the flight, would help steer me straight while I learned the ropes. But the most exciting event of the day occurred when my name tag appeared on the flight schedule board. Time to start earning my keep! I had an hour to brief both my student and the solo student I was to take on my wing.

Suddenly I became very, very serious-minded. Pull the grade books. Have you completed the prerequisites for this mission? What do we need to get out of this sortie? Is either of you DNIF (Duty Not Including Flying)? In the "pink"? I'll sign out the airplanes and get the takeoff data. You fill out the sign-out log and figure out what mission requirements we have to get done today.

The session went fairly well. I had the students brief the sortie while I jotted down a few notes and briefed emergency procedures. Then I coolly tossed out a couple of "old head" techniques I'd picked up along the way, just to bridge any credibility gap that might have been created because I'd forgotten to get the takeoff data. "Meet you outside the chute room." I hustled back to "chute up" so I'd be ready to go before the students. (A common malady of rookie IPs is an extreme dislike for having students beat them out of the chute room.)

My mind was really in high gear, but one sobering thought kept coming back: I was directly in charge of three lives and a million and a half dollars worth of machinery.

During the walk out to the aircraft, I tried to review some of the lessons I'd learned in the past few months. Don't let them go farther than your own capabilities will comfortably allow you to recover. Don't talk too much. Always be aware of what your wingman is doing. Expect one of them to try to pitch into the other one. Don't ride the stick. My mind was really in high gear, but one sobering thought kept coming back: I was directly in charge of three lives and a million and a half dollars worth of machinery.

After the five-minute visual inspection, we had a few minutes to spare before climbing into the aircraft, because the solo student needed time to secure the unoccupied seat of his aircraft. I decided to ask my student a few questions about the work of crew chiefs. As our T-shirt-clad, suntanned young crew chief moved out of earshot, my student started talking. I could see that he wasn't fully aware of the vital importance of the work the crew chiefs do.

My solo student had to be enlightened about the work of crew chiefs, and I felt I knew how to do it. The next week we'd schedule an afternoon for an orientation of the flight line. We'd sit in the air-conditioned line shack for five minutes, then run outside for forty-five minutes on the 125-degree-temperature ramp to recover aircraft. We'd tag along with the crew chief during the through-flight inspection to wipe off struts, check hot hydraulic fluid levels, inspect canopies, and examine a myriad of other details to ensure the aircraft would be ready to fly again in an hour.

Smelling jet fuel fumes and getting "blasted" by the engine heat would give this student a new appreciation for the dedication of our crew chiefs—the pilot's best friend. Hopefully, a little insight into the great importance of our crew chiefs would also help the student realize that each support function on base provided a necessary service, without which no pilot could ever leave the ground.

It was then I realized that there is a lot more to being an ATC IP than simply teaching people how to fly. Some of my UPT classmates would be raising gear handles, ordering in-flight lunches, computing takeoff data, and saying "Blue Four" for the next couple of years, but I was going to be leading formations and teaching aviators "how to do it!" My fear of not being where the action is gave way to feelings of pride, self-worth, and accomplishment. Sure, my classmates were becoming "operationally ready," but I knew I was doing my full share for the overall effort.

The crew chief finished wiping off the windscreen as we secured our parachute leg straps and zipped up our G-suits. After a thorough interior inspection, my student turned on the solid-state UHF radio and directed the flight to "check in." "Two" was the response from our solo wingman. You can often tell how a ride is going to go by the way ground operations are performed before taking off. Operations were smooth, and the wingman sounded confident. He was ready, and there was no doubt that we were in formation. This was going to be a good one!

Taxiing out I didn't say much. The student completed a few more instrument checks. We lowered our canopies in unison, lined up for takeoff, and gave the run-up signal. One last check of the instruments: tachometers, exhaust gas temperatures, oil pressures, hydraulic pressures, fuel flows, total fuel, caution/warning light, emergency warning panel, canopy-locked light. Everything looked good. A final check of the wingman. Hack the clock. The head nod. Release the brakes and stroke the afterburners—we were on our way.

At first, I found it difficult to guard the brakes, throttles, and stick without actually applying pressure to them. I didn't want my student to know I was on the controls with him. PIT had taught me not to "ride the controls" while the student flies the aircraft, to avoid either flying the airplane for the student or having him feel extraneous control inputs. I settled into a position where I could softly follow the controls. You've got to be close to them if anything happens.

That first instructor pilot takeoff was truly exciting! I viewed every normal occurrence from a new vantage point. The throttles automatically moved into afterburner range, and I saw the nozzles swing to seventy-five percent open. It was reassuring to know that the nozzles were being metered to open sufficiently to keep the exhaust gas temperature from exceeding the maximum temperature of 645°C. The forty percent boost from the afterburners on General Electric J85 engines seemed a lot more obvious than it ever had before. (I guess I'd never really thought about having 5,800 pounds of thrust in a 12,100-pound aircraft!)

It seemed that the stick moved farther than normal before the nose of the aircraft lifted to a takeoff attitude at 145 knots. When the wingman broke ground at 160 knots, I felt the gear and flaps come up. I

Instructor pilots know there's more to UPT than just teaching others to fly. An important part of it is enlightening students about the work of the crew chief who makes sure the aircraft is ready to fly.

Capt. Slim Connors is a 1976 graduate of the Air Force Academy. He was graduated from pilot training at Laughlin AFB, Tex., in July 1977. Captain Connors continued at Laughlin as an instructor pilot, Pre-PIT Instructor Pilot, and Runway Supervisory Unit Controller. He is currently the Assistant Executive Officer of the 47th Fighter Training Wing at Laughlin AFB.

realized instantly that being an instructor pilot was more than being a passenger. Simultaneously, I had to mentally fly three separate aircraft.

The first aircraft an ATC instructor pilot mentally flies is the one he would fly if he were actually on the controls. (What would I be doing right now?) The second aircraft is the one the student pilot is flying. (What is he doing? What is he thinking? And what will he probably do next?) The third aircraft is the "correction" aircraft. (What does the student need to do to get from where he is now, to where he needs to be or should be?)

Combined, these three aircraft tell the IP how well a student is doing, how much instruction the IP should provide, and when the student has gotten so far "off track" that the IP should assume control of the aircraft to get back within reasonable flight parameters.

Three airplanes really keep an instructor pilot busy, but they also ensure that the situation never gets so far out of hand that nobody can recover the "real" aircraft. I discovered that trying to fly three separate airplanes when you're in 87° of left bank, 20° nose low, at 400 knots with a solo student only three feet from your right wingtip is a pretty demanding exercise.

Even though the entire flight profile was ordinary and the sortie uneventful, when we landed I found myself totally drained. Staying painfully alert for an hour and fifteen minutes was far more demanding than I'd imagined. But taxiing back as a wingman, with the solo student leading the formation, I felt we'd really gotten some good training accomplished, and I was glad my student was in the front cockpit so he couldn't see the smile on my face. (Rookie IPs also don't like to let people know that they really get a "charge" out of flying with students!)

In four short months (and after two check rides) I was off the Buddy IP program, a program designed to allow a more experienced instructor to fly with my students to make sure I was teaching them the things they needed to know. Finally, I was a "genuine" ATC instructor pilot!

Another Chance to Excel

In ATC, you can stay "low profile" by just flying aircraft or simulator sorties for nine or ten hours a day and then go home. Or you can volunteer for additional duties to gain more experience and expertise. If you volunteer, you can't help learning even more about flying and dealing with other people. The old adage that "Nobody learns more than the teacher" is alive and well in ATC.

I went for it. During the first year and a half on the line, I held assorted jobs from gradebook officer, computer products officer, publications officer, emergency procedures officer, ground and flight safety officer, to flight scheduler, flight unit Stan/Eval member, Runway Supervisory Unit (RSU) observer, and RSU controller.

Some of the additional duties are interesting and some are less so, but all of them get you more involved in the training business. And the more involved you are, the more productive you become. Once you've demonstrated productivity, the door to bigger and better jobs is opened. Willingness to accept responsibility is the key.

Company grade non-FAIPs are frequently offered assistant flight commander or flight commander jobs. (The flight commander is directly responsible for the supervision of approximately fifteen instructor pilots and thirty-five student pilots while they're on the flight line.) Field-grade officers fill most of the remainder of the supervisory positions, including assistant section commander, section commander, assistant operations officer, etc. Additionally, there are flying jobs with Pre-PIT, check section, squadron ground and flight safety, squadron scheduling, student squadron, and standardization/evaluation as well as several one-person flying slots outside the squadron. The student squadron is home for most IPs with an additional duty outside the squadron.

Student Squadron (or "Sturon") is divided into two primary areas: student branch and academic branch. The student branch consists primarily of non-FAIP class commanders responsible for an entire class of up to seventy students during a particular phase (T-37 or T-38) of training. Class commanders monitor every facet of each student pilot's progress through UPT and are the first link in the student's chain of command. They fly with the students in their class, counsel students who exhibit unacceptable or substandard performance, generally guide the class through each phase of UPT, and help conduct the graduation ceremonies.

Other IPs volunteer (and are selected) to become academic instructors in aircraft systems, flight planning, instruments, navigation, or weather classes. Each instructor attends a three-week course, Academic Instructor School (AIS), at Maxwell AFB, Ala. Following completion of AIS, the IP completes a home-base checkout in a particular academic subject. All instructor pilots with additional duties outside the squadron fly nearly as many aircraft and simulator sorties as their flight line counterparts, so they really stay hopping!

Nowhere Else but ATC

It's been more than three interesting years since my first student sortie. And now with more than 1,300 hours in the air, I still look forward to each sortie, still feel a tremendous sense of responsibility when I direct the formation to "check in." And I learn something new every day. I'm thankful to have had the opportunity to hone my flying and instructional skills in an environment as progressive, demanding, and professional as the one which exists in Air Training Command, but I'm ready to move on. (I still want to "fly and fight"!)

Because of my experience in ATC, I'll have something to contribute. I should be picking up my assignment any day now, but have no idea where I'll be going or what I'll be flying. However, I do know one thing: when the talk begins to settle around "who does it best," you can bet I'll tell them that "ATC pilots taught them all how to do it!" ■

Sperry's helping the Air Force teach an old bird new tricks.

Sperry's controls and displays subsystem for the B-52's new offensive avionics system is giving the venerable bomber a new lease on life.

Working with the Air Force's Aeronautical Systems Division and Boeing-Wichita, Sperry is developing the major control center for the OAS. The Sperry subsystem, including two 10-inch cathode ray tube multi-function displays, a display electronics unit, digital radar scan converter, video recorder and two integrated control keyboards, will give the B-52 state-of-the-art electronics.

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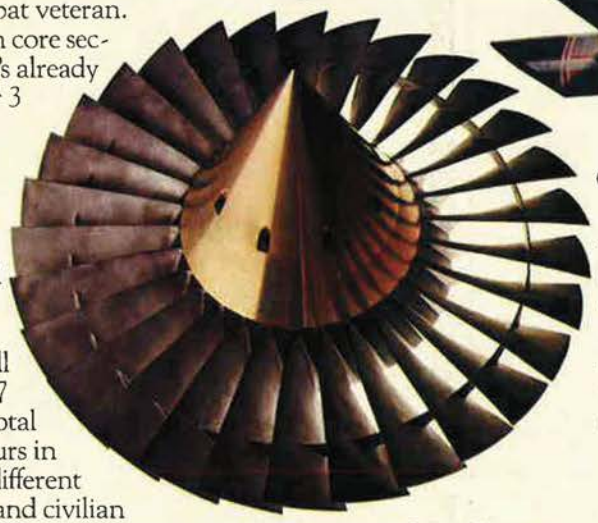
Because it's the only candidate engine with the heart of a combat veteran. A proven core section that's already seen over 3 million hours of military action in the Rockwell OV-10 Bronco.



As well as over 17 million total flight hours in over 50 different military and civilian aircraft. (That's twice as many hours as the NGT will accumulate in 20 years of operation!)

The TFE76's core section already has the design maturity and production experience of some 8,000 engines behind it. Which eliminates the high risks associated with the development of an engine which has never been in production.

OV-10 Bronco

A medium-bypass, 1,200 to 1,500 lb. thrust turbofan, the core of the TFE76 is based on Garrett's extremely successful, fuel-efficient turboprops: the military T76 and the civilian TPE331. What's more, the TFE76's fan uses the advanced aerodynamics of our latest TFE731 turbofan, the engine that powers 14 of today's leading business jets. Which means you'll benefit from the latest, most cost-effective design concepts.

The adaptability of the TFE76's turboprop core to a highly efficient, rugged military turbofan has already been proven in a demonstration engine program begun back in January, 1979.

Unlike the complicated axial compressors of other candidate engines, the TFE76's rugged centrifugal compressors are

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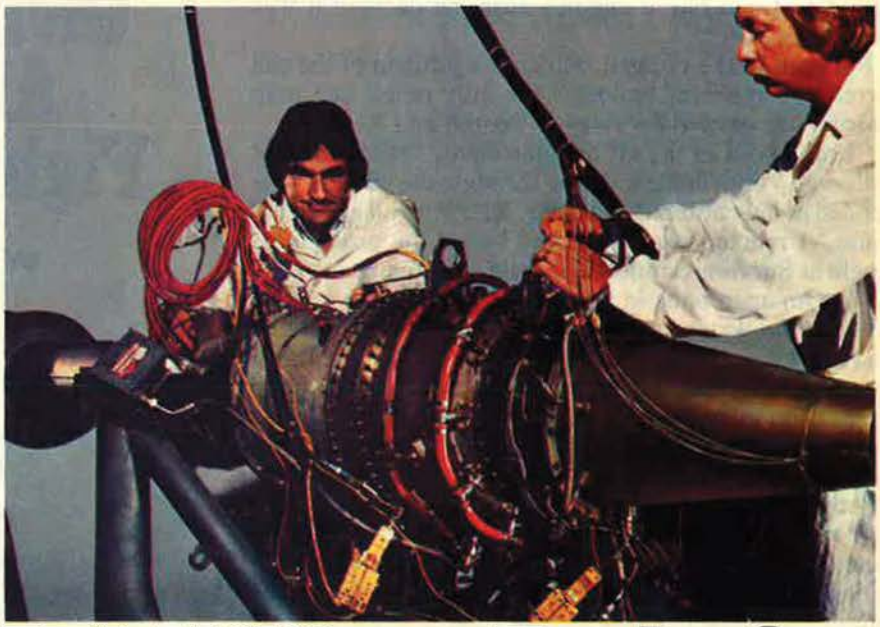

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Garrett's TFE76 Military Turbofan.

Recommended types of survival shelters: above, a snow trench covered with an inverted "V" of ice blocks for quick relief from the elements. Right, a parateepee built Indian-style with poles but with sections of parachute cloth instead of hides.

When Gen. Curtis E. LeMay's SAC crews began flying over every type of terrain the globe had to offer, he saw difficulties for them if forced down in wilderness environments. So he set up specialized training at what has become . . .

USAF's SURVIVAL SCHOOL: Giving Downed Aircrews a Fighting Chance

BY WILLIAM P. SCHLITZ
SENIOR EDITOR

THE cell of three B-52Ds had hit a target north of Vinh on the Vietnamese coast that night in January 1973. During the engagement, one B-52 was damaged by a SAM near-miss.

The B-52s headed out over the Gulf of Tonkin on their prearranged course. The crew members of the stricken aircraft knew they had a good chance of being rescued by friendly forces if a bailout and "feet wet" became necessary.

The tail gunner aboard the damaged B-52 was MSgt. Chuck Killgore, who had lost communications with the rest of his crew after the missile explosion. Sergeant Killgore noted the aircraft's continuous descent and, with No. 1 and No. 2 engines afire, he decided it was time to get out.

Forward in the cockpit, Killgore's jettison of the tail turret and apparent bailout were duly noted and map coordinates plotted for relay to Search and Rescue.

"I rolled out of the aft compartment," said Sergeant Killgore, "and floated down through the clouds suspended in my parachute harness. Knowing I had a 'good chute,' I relaxed somewhat and began the procedures taught at Survival School. The training all came back, as if I had an open book in front of my face. When it came time for the water landing, the inflated rubber raft and survival kit were suspended on a lanyard below me. I heard the kit splash—it was pitch dark—pulled the quick releases on my parachute harness, and went in. I didn't know where the chute went, but I wasn't tangled in it. So far, everything the instructors had told me had gone strictly as advertised.

"Once aboard the raft, I hauled in the survival kit and examined its contents in the little light available. After failing to raise anyone on either of the two emergency radios, I then made myself as comfortable as possible, as I had been instructed.

"About an hour later, I saw a rotating beacon about

five or six miles away and figured they were looking for me. I fired two flares from the survival kit's pen gun and the Navy helicopter came and hovered over me. I got out of the raft and into the water as I had been taught, but had a hard time with the horse-collar hoist lowered from the helicopter because of the ten- to twelve-foot swells. Finally made it on the fourth try.

"In a short time I was aboard the carrier *Saratoga* being examined by a flight surgeon. Just some scrapes and bruises and a little water in the lungs. That afternoon, a Navy courier plane took me to Da Nang, near where the other members of my crew had bailed out and had been picked up after water landings. My rescue is a picture example of what is supposed to happen."

And a classic example of an application of basic survival techniques as taught at the Air Force Survival School at Fairchild AFB, Wash.

History of USAF Survival Training

Formal survival training in the Air Force was the brainchild of Gen. Curtis E. LeMay, Commander of the Strategic Air Command during the late 1940s and most of the '50s, and later Air Force Chief of Staff.

Curt LeMay had read the diary of the pilot of a B-26 that had crash-landed in Labrador in 1942. Three of the pilot's crew launched a dinghy to seek help and were never heard from again; the remaining four huddled together in the aircraft fuselage and, over a two-month period, starved to death after consuming their limited foodstuffs. The irony was that their bodies were found by Eskimos from a village only an hour and a half away by foot.

LeMay, while lauding the men for their courage and endurance, was struck by the fact that they didn't do more to help themselves. He applied the lesson of the tragedy to his SAC bomber crews, flying over every type of terrain the globe had to offer. He resolved to give his crews a fighting chance if forced down, regardless of the environment they found themselves in.

LeMay pulled together a team of outdoor experts, and they set up shop in 1949 at then-Camp Carson, Colo., teaching SAC aircrews to survive in the wilderness by actually undergoing training in the field. Soon, other commands also were sending flying personnel to Carson for survival training. In 1950, an instructor course was instituted. The school was relocated to Stead AFB, Nev., in 1952, its curriculum constantly revised to meet changing circumstances, a process that continues to this day. In 1966, the school moved to its present location at Fairchild AFB, Wash.

Currently, running the US Air Force Survival School is the responsibility of Air Training Command's 3636th Combat Crew Training Wing at Fairchild, where a cram course in survival in a global environment is taught, along with four other related courses.

To the Survival School are channeled, in pipeline fashion, graduates of the various Air Force flying specialties: pilots and navigators, of course, and loadmasters, tail gunners, and the like, including Air Force Reserve and Air Guard personnel and OTS and AF-

Carved from wood, goggles have been improvised to protect from snow blindness, a constant danger in ice fields. Survival instructors apply their motto "That they shall survive" universally in teaching survival in all environments.

ROTC graduates. The twelve-day course is also taken by a smattering of flying personnel from the other services and from other countries. In all, 3,115 people graduated from the basic survival course in Fiscal Year 1980.

A squadron of the 3636th CCTW is also located at Homestead AFB, Fla., where it conducts a water survival training course. Some 2,763 persons graduated from that three-day course in FY '80.

Besides the water segment of the basic course conducted at Fairchild's Survival School, another water training session, a two-day, nonparachute course, is taught there. It graduated 1,501 in the last fiscal year.

Up north, at Eielson AFB, Alaska, is located Air Training Command's Arctic Survival School, run by Detachment 1 of the 3636th CCTW. Some 550 graduated from its five-day "Cool School" course in FY '80—about half US Army personnel and a number of civilians such as National Park Service employees.

The Corps of Instructors

The administrators of USAF's survival courses in general and the Survival School at Fairchild in particular are from its corps of junior and senior Survival Instructors, of whom there are about 250 in the Air Force.

In a certain sense the Air Force's Survival Instructors are born and not made, and their selection for this specialized service is more by design than chance.

Posted especially at Hq. ATC, Randolph AFB, Tex., are two old survival hands: 2d Lt. (former TSgt.) Noah Gibson, with twelve years' experience, and SMSgt. K. P. Jensen, with twenty-six. Sergeant Jensen is Senior Manager for the Survival Instructor career field and a top advisor on all matters pertaining to Air Force survival training. These two act as liaison with the Military Training Center at Lackland AFB, Tex., to screen incoming recruits for appropriate backgrounds to become Air Force Survival Instructors.

Those signing up for the instructor course during basic

At Homestead AFB, Fla., aircrews learn the basics of open-water survival, including "hands-on" experience with the business end of helicopter hoist equipment and the procedures involved in manning life rafts.

military training are then given a grueling five-and-a-half-month workout, which can quite accurately be termed an ordeal, in learning to cope with global environments. The theory—based on sound logic—is that the Survival Instructor must be experienced in survival techniques himself before being deemed capable of teaching others. Despite students being hand-picked, the twice-yearly Survival Instructor course has had an attrition rate of thirty-five percent over the last three years. Forty-four people graduated from the course in FY '80.

Even after successfully completing the course, the fledgling Survival Instructor is not home free. Because he will be responsible for student safety under field conditions that could quite likely prove hazardous, his performance is carefully monitored by a seasoned instructor before he is left to his own devices in shepherding his student charges.

Thus, the Survival Instructors are a rare breed and are more or less in friendly rivalry with that other Air Force elite, the Military Airlift Command's PJs, the pararescuemen of the Aerospace Rescue and Recovery Service. Like the PJs, many Survival Instructors are jump qualified, and, like the PJs, retention and reenlistment rates among the Survival Instructors are high. Graduates from the instructor course are eventually posted to all the Air Force's survival courses.

The Survival Instructors of the 3636th's Detachment 2, stationed at Nellis AFB, Nev., perform a special task. During the realistic combat flying training under the "Red Flag" program there, certain aircrews are selected to be "shot down," as the principal figures in several scenarios. They may be required to "walk out" in applying their desert survival training, or perhaps called upon to vector in rescue helicopters.

"Some selected aircrew members are taken to nearby Lake Mead for a 'feet wet' scenario. This simulates a combat situation in which an aircrew member has ejected or bailed out over water. The Aerospace Rescue and Recovery Service crews who participate in Red Flag exercises are provided with 'real-world' experiences in searching for and recovering these crew members in a realistic combat environment," said TSgt. William B. Cowan, a Survival Instructor with four years' experience at Nellis.

In any event, the performance of the crew members is observed by Detachment 2 Survival Instructors to provide feedback, so that the wing can modify its training program or suggest continuation training at an individual's home base.

Ideally, Survival Instructors would like to see more jungle training. Currently, only a small block of instruction, as part of the basic survival course at Fairchild, is given. Since the drawdown in Southeast Asia, jungle overflights by USAF aircrews have dwindled to the point where dedicated jungle schools like those that once were operated in Panama and the Philippines can no longer be supported by the Air Force resources presently available. "Every day, with the retirement of

Survival School Exhibit Laboratory

A visitor to the Air Force Survival School at Fairchild AFB, Wash., is dissuaded from using the word "museum" to describe the Exhibit Laboratory there. But, as do museums, the Exhibit Lab has a definite teaching function. In fact, it is considered an essential instructional tool by Survival School staffers, providing a bridge for students between class instruction and work in the field.

The lab was furnished as a volunteer project by Survival School staffers. They are currently redesigning the 11,340-square-foot display area to make the lab an even more effective teaching aid.

In the Exhibit Lab are displayed concrete examples of the ability to improvise to survive in the wild. Among the most graphic exhibits are the life-size "dioramas" that depict the various global environments: arctic, desert, temperate, jungle, and seashore. Set up on these landscapes are appropriate survival shelters. For example, arctic snow shelters (simulated in Styrofoam). Students are informed that, contrary to popular myth, the Eskimo igloo is *not* the most efficient shelter to erect for survival in a cold clime (it takes too much time, skill, and expenditure of calories to build). One of the best shelters for cold and temperate climates alike is the parateepee, fashioned from parachute panels, insulated with double folds of parachute cloth, and carpeted with balsam branches. (For quick shelter on the arctic snowcap, a trench big enough to hold one or two men and their equipment covered with an inverted "V" of ice blocks is recommended.)

Among other things, students touring the lab are shown how various types of animal snares and deadfalls are built and work.

More grim are two replicas: a bamboo cage and cell of the type American POWs were confined in during the war in Southeast Asia.

Also on display are tools and other items ingeniously improvised by American POWs during World War II.

A mandatory tour of the facility by various "elements"—a class divided into groups of six to eight students—and their Survival Instructors bolsters the learning from classwork. The Survival Instructor can explain the exhibit functions in detail and answer questions from the students on a one-on-one basis.

Of special interest at the lab are the exhibits of various types of survival kits and their contents. It is pointed out that having a tool that makes tools is better than having a tool.

A simple snare to trap animals is one way of acquiring food in the wilderness. Of the more than 300,000 classified plants that grow on the planet, some 200,000 varieties have edible parts. Example: the common marsh cattail.

senior Survival Instructors with training in actual jungle environments, we're losing twenty, thirty years of irreplaceable experience that isn't being made up," one Survival Instructor added.

With focus on the world's desert regions, ATC is reviewing the possibility of conducting desert survival training. The need for such is underscored because desert conditions are so different from the other global environments and because desert areas make up one-fifth of the earth's land surface. To meet contingencies, Survival School has available a "canned" desert presentation should the need arise. "Deserts are not all drifting sand dunes as many people think. Many have vegetation and animal life we could teach people to make use of," a school staffer said.

The Survival School instructors would like to see the twelve-day basic survival course expanded to a seventeen-day minimum, with a day of that set aside for student rest. "We give students the rudiments of global survival in the time allotted, but are afraid some key points won't sink in because of the course's fast pace. Also, students don't have much time to practice on their own," a Survival School staffer points out. With more time available, course material could be expanded.

(The Navy, whose flying personnel stand a fair chance of facing an open-water emergency at some point, runs a *five-week* basic survival course at Pensacola NAS, Fla., that emphasizes water survival. For example, if nonswimmers are among the students, the Navy teaches them to swim. In USAF water-survival courses, nonswimmers are simply identified as such and closely watched.)

Community Relations

At Fairchild and in Alaska, the Air Force survival people conduct some of the most extensive community-relations programs undertaken in ATC. Their skills are greatly appreciated by people who are surrounded by the great forest areas of the Northwest US or Alaska's vast wilderness. Survival specialists in both areas are frequent guest lecturers. (One ironic story concerns the Eskimo group that called on the Alaskan Survival Instructors to teach its children outdoor fire-building techniques.)

Local broadcasting stations near Fairchild carry spot "winter hints," survival tips prepared by the 3636th.

In recognition of this service, last year the wing was presented the Washington State AFA Community Services Award.

Each year, representatives of USAF's flying commands attend a top-level conference, to thrash out revisions in the Survival School curriculum. While the basic package of instruction is not likely to change drastically, it is easy to understand how PACAF, for example, might argue for greater emphasis on open-water survival training. On the other hand, USAFE, operating as it does in Central Europe, might bid for an extension of moderate climate and cold weather survival training.

In any event, once decided, it is then up to 3636th Wing planners to tailor the curriculum to specifications. Instructor input is important, as are inputs from those who have experienced real survival situations. These two have a large impact on the curriculum.

As an example of how the curriculum can evolve, prior to the growing US involvement in the war in Southeast Asia little was taught about the techniques downed aircrews must use to vector in rescue helicopters. As the SEA problem unfolded, such techniques, including security arrangements for radio contacts, were added to the course and are still being taught.

Each of the flying commands dictates what basic items go into the survival kits aboard its aircraft; lower echelons have some leeway on additions. The Survival Instructors would like more voice in this process.

Of the twelve-day basic course at Fairchild, eight days are spent in class, in "hands-on" training with various types of equipment, and in a tour of the Survival School Exhibit Laboratory *(see box)*. Four days are spent in the field.

"Hands-on" is a phrase very much in use at Survival School. Capt. Cathy Wilds, a recent Survival School graduate and a navigator bound for an assignment on Guam—which is surrounded on all sides by large bodies of water—was particularly keen about the "hands-on" open-water survival training she was given at Fairchild. "It's not easy evacuating a group of people—perhaps some injured—from a ditched aircraft," she said. "We practiced that from a simulated fuselage at the base pool and using the twelve-man rafts. We also practiced individual simulated helicopter water hoists."

Exiting an aircraft by parachute is taught elsewhere, but once in their chutes or on the ground, the well-being of flying personnel is the responsibility of Survival School as far as survival techniques are concerned. This extends to teaching students to contend with all global

Practical "hands-on" work at Survival School entails familiarization with such equipment as helicopter hoists and parachute harnesses. Anyone in the Air Force may face a situation where knowledge of its use is crucial.

environments. (One segment taught—also developed from the SEA experience—is "hands-on" work with the lowering devices built into many parachute packs. This equipment was developed so that downed airmen could descend safely after parachuting into the high jungle foliage. "But," said a Survival Instructor to his class, "you might not know what's at ground level. You may want to stay up there and have Rescue pluck you out of the treetops.")

In the Field

The four days in the field at Survival School can present something of a challenge to those newly acquainted with survival techniques. Said Captain Wilds, "The Survival Instructor pointed out that grasshoppers are a source of nourishment. He showed us how to tear the wings and legs off a grasshopper so it wouldn't get stuck in the throat when swallowed. Then he ate it.

"He also taught us to eat ants, first removing their heads so they don't bite inside the mouth. Ants are not so good, though, because it takes an awful lot of them to make a meal," said Captain Wilds.

"The Survival Instructor picked up an earthworm, brushed off the loose soil, and popped it in his mouth. I could eat worms if I had to," said Captain Wilds somewhat tentatively, "but they'd have to be boiled first."

Students are taught that almost anything that walks, swims, crawls, slithers, or flys can provide food. Students are shown how to weave fish traps from parachute suspension lines and how to rig animal deadfalls and set snares. Instructors like to quote that ancient proverb—"Hunger is the best sauce"—in teaching foraging for food in the wilderness. Their rule of thumb for surviving: three weeks without food; three days without water; three minutes without air.

In the greenery department, of the more than 300,000 classified plants that grow on the planet, some 200,000 varieties have edible parts. Instructors refer to the Chinese botanist conscripted into service by the Japanese during World War II. Isolated with his unit in the Philippines, he kept sixty men alive for eighteen months strictly on a diet of wild plants. Students are shown generally what to look for in plant food. (For example, the spike and young shoots of the common marsh cattail are edible when boiled.)

In the field, each group of six to eight students, or "element," is given an actual parachute, surveyed from the inventory because of age, to work with. They know from class that it can be put to an almost endless list of uses: clothing, footwear, pack harness, shelters, and so forth. In the field, students use parachute panels to build various types of shelters to sleep in.

In another application of "hands-on" field work, students cut their beef ration into narrow strips to smoke- or sun-cure jerky as a demonstration of food preservation.

During the four-day field trip, the students are taken on long marches carrying heavy packs to test endurance. On these forays, they are given basic instruction in terrain navigation and evasion techniques. In the field, each student is given a chance as "element" leader, under the watchful eye of his or her instructor.

"On about the fourth day in the field, the survival scenario goes from basic survival to survival in a tactical situation. It is during this phase that the students receive instruction and an opportunity to practice (while instructors pose as aggressors) camouflage and evasion, group movement, and shelters," said senior instructor TSgt. Elmer Greesow.

Survival Instructors urge their charges to put together personal survival kits and suggest various items for inclusion. Most Survival Instructors carry a bare minimum of essential survival articles with them at all times, such as waterproof matches, snare wires, and a miniature compass. "But the most important single item," said Survival Instructor A1C Doug M. Seals, "that is a 'must' in any environment, is a knife with at least two good blades."

"The best thing an aircrew member can do beforehand is to be mentally and physically prepared, know the terrain he'll be flying over, know his survival kit and its contents, and add extra items as he sees fit for personal benefit," said Survival Instructor A1C Patrick Dwyer.

Survival as Military Doctrine

Survival techniques at Fairchild are shaped by military doctrine *(see box, "The Survival Training Manual")*. For example, the advice during the normal course of survival events involving nonenemy environments is for the aircrew to stay at the crash site at least seventy-two hours. Chances of being located and rescued are better. However, this is not the case if the plane goes down in enemy territory. Then, the downed aircraft is likely to become the object of intense enemy interest. The advice: Get as far away as fast as possible.

This philosophy is an expression of the military point of view, the goal of which is not only survival but survival *and return to friendly forces*.

Thus, evasion techniques that fly in the face of conventional survival advice are stressed in both class and

The Survival Training Manual

Air Force Manual 64-3, *Survival*, is the bible of USAF's survival community. An inch thick and heavily illustrated, it is a sort of super Boy Scout manual that goes far beyond how to tie knots or make a fire in the woods.

An almost encyclopedic accumulation of outdoors lore gathered through the years, 64-3 is blunt and down-to-earth in a distinctly military fashion, as in this somewhat chilling passage:

"In time of war, the welfare of several cannot be jeopardized for the good of one. Thus it may be desirable for a survival party to abandon an incapacitated member rather than risk capture of the entire group."

Stern advice like the above is rare, however: the text is presented in a folksy, no-nonsense manner rife with old-fashioned horse sense, as in:

"Water is one of your first and most important needs. Start looking for it immediately. *You can get along for weeks without food, but you can't live long without water. . . .*" Sobering insight for urbanites who have never been far from a water faucet.

In its philosophic introduction, AF Manual 64-3 stresses the one essential that is required of any pilgrim in the wilderness—the will to survive—and then gives an example that stretches credulity a bit:

"One man, stranded without food or water on a vast stretch of Arizona desert for eight days, traveled 150 miles in daytime temperatures as high as 120 degrees. The lack of water caused him to lose twenty-five percent of his weight (a ten percent loss is often fatal) through dehydration. He crawled the last eight miles completely naked, *and the doctors found his blood so thick that the lacerations he suffered did not bleed until after he had gotten a large amount of water in his system* [italics added]. . . . He had wanted to survive and he did survive, through nothing but willpower."

No matter; the point is well taken. True stories abound of people who came through against impossible odds.

AF Manual 64-3 approaches the subject of survival in a comprehensive, global way—an infinitely more detailed complement to the instruction at Survival School at Fairchild. For the school, that presents a dilemma, because the twelve-day training schedule is too tight to squeeze in reading assignments from 64-3. Students are encouraged to study the manual on their own following graduation.

Those who do so will be amply rewarded. As the manual points out, practically everyone in the Air Force is fair game to face an emergency situation where survival skills will come into play.

Beyond that, however, Air Force Manual 64-3 is not only instructive but entertaining, excepting such sections as those dealing with emergency amputations and the treatment of burns.

The manual offers literally thousands of tips on how to contend with the environment—be it arctic, desert, temperate, seashore, or tropical. The enjoyment lies in living vicariously through 64-3's pages, whether rappelling down a cliff or building a raft. In so doing it stimulates a dormant primeval instinct, the urge to gather up a minimum of necessities and try one's hand against humankind's oldest adversary—nature.

Spin-offs of 64-3 are condensed versions prepared for inclusion in aircraft survival kits. The manual itself is being edited for revision by CMSgt. Delbert S. Ray, 3636th CCTW Superintendent of Operations. "We hope to incorporate much of the knowledge and skills that have been lost with the rewrite of many related manuals. It is our intention to get away from specific equipment that changes with time and deal with principles and techniques of coping with survival environments," said Chief Ray.

AF Manual 64-3 is on sale at the US Government Printing Office, Washington, D. C. 20402. Price is $8.

Rappelling, an easy technique for descent in steep terrain—once the student is given a few pointers.

field work at Survival School: Stay off the trails, go hungry rather than risk capture, don't light fires. In short, experience discomfort—and worse—to perform the mission.

The rule of thumb, then, is if in enemy territory, evade; if captured, escape; when in captivity, resist. This last brings the students smack up against the US Military Code of Conduct and all that implies in terms of the experiences of American POWs in World War II, Korea, and especially Southeast Asia.

Students are taught in their Resistance Training, which caps the Survival School course, that captivity is simply an extension of the survival experience; many of the techniques of self-care can be applied, and although the body may be captive, the mind isn't. Also, similar to survival in general, a captive must face down his fear of the unknown—a strong tool of the enemy—and one method of so doing is to stay active. (The use of the tap code in Southeast Asia is cited as one technique American POWs employed to circulate information, keep up morale—and resist.) The basic objective in captivity, then, is to survive and *return with honor*.

In fact, the returned Southeast Asia POWs added much content to the Resistance Training (RT) program, and generally have approved it.

Much of the RT program is classified, but students do undergo intensive interrogations at the hands of specially trained personnel at Survival School to give them some indication of what it is like to experience captivity. Students are warned that interrogation methods aimed at extracting information have become very sophisticated over the years. They're cautioned to be always courteous and polite with their captors and be on guard against cultural offenses that may induce harsh treatment.

In a related matter, the 3636th Wing has recently been designated by presidential order as the US government's official repository for survival documentation, including tapes of the Southeast Asia POW's debriefings and their transcriptions.

As for Capt. Cathy Wilds, she gives high marks both to the Survival School and her Survival Instructor: "I have greater confidence in myself now," she said, "and in my equipment." ■

A PILOT REPORT

THE WONDERFUL 'SIX'

BY JEFFREY L. ETHELL

"LISTEN, kid, if you can fly the T-6, you can fly anything," said the sage. I was in awe at his pronouncements, being a teenager in love with anything that had wings. My deepest longings centered around flying the fire-breathers of World War II. Being impressionable, I filed this indispensable piece of advice away in my brain, realizing at the time that if I pursued it, regardless of the obstacles, the key to the great prop-driven monsters I loved would be placed in my hand. I kept this marvelous secret within myself and vowed to fulfill my dream.

The first aircraft I could recognize by type was the P-51 Mustang. My Dad, Erv Ethell, was commander of the Mustang-equipped 39th Fighter Squadron at Johnson Field, Japan. He would take me out to the flight line, and I would sit in and walk on these marvelous machines. Dad had also flown P-38s in combat, then P-61s and Mustangs, F-80s, his favorite the F-86, and other fighters as I was growing up. By the time I was thirteen, he was teaching me the fundamentals of being a fighter pilot through the Air Force Aero Club T-34 at Quantico, Va. Aerobatics became more natural than learning to drive.

There was only one course of action to both of us—a military flying career—so I prepared for an appointment to the USAF Academy. In the process of going through the motions, my vision was discovered to be off enough to disallow my becoming an Air Force pilot, and our mutual dream was dashed. But in no way would I be stopped from flying, so I embarked on my journey toward wings through saving money here and there to put myself through

civilian flight training. Beneath that civilian-trained exterior, however, there lurked the fighter pilot trying to find a way out—he would have to be patient . . . it would take money and time.

First the Stearman

I flew solo at eighteen and pressed on to gain the usual raft of ratings, but it was not until the Boeing Stearman PT-17 biplane appeared on the scene did the lurking fighter pilot within begin to find some means of concrete expression. Here was the initial portion of the Primary—Basic—Advanced training system of World War II. I was determined not to short-circuit the system, and planned to follow it as closely as I could. Through the good offices of former RAF Spitfire pilot Parke Smith I began to fly this significant piece of aviation history, and it was certainly very different.

For an airplane that is supposed to introduce zero time students to flying, the Stearman is imposing to say the least. The thing weighs almost 3,000 pounds and it is big. Looking at the large wings and tires, it doesn't take you long to see that a built-in ground loop lurks within its structure. There is also a significant difference between American and foreign training philosophy reflected in the Stearman. Whereas the RAF taught its primary students to fly in docile Tiger Moths, the USAAF and USN expected its students to make it or break it in the larger and more demanding Stearman. One system waited to introduce big flying machines to its pilots while the other dumped them straight in to get them ready for the advanced trainers and fighters and bombers.

No doubt about it, the Stearman could wash students out with ease. Motivation had to be paramount to master the beast, and I was no different. When the Stearman "awarded" me with a nice three-point landing, I felt grateful to it. Often a landing that looked great would turn disastrous in a flash. My feet would be all over, on the rudders, pushing, shoving, and hitting the brakes to get it back on centerline. In all the time I flew the Stearman, never did I feel I had mastered it. Most of my hours came through the generous opportunity to fly with Steve Hoffmann's Barnstormers Airshows—this gave me weekly contact with the machine, majoring in low-level aerobatics.

In the meantime, I was begging and borrowing as much T-6 time as I could get. No question, it was a real step up. Since I did not have access

Author Jeff Ethell taking off in a Navy SNJ-5 featuring the World War II tricolor paint scheme of a carrier-assigned aircraft.

to the BT-13 "Vibrator," I went straight into the Advanced portion of the system.

Into the T-6 at Last

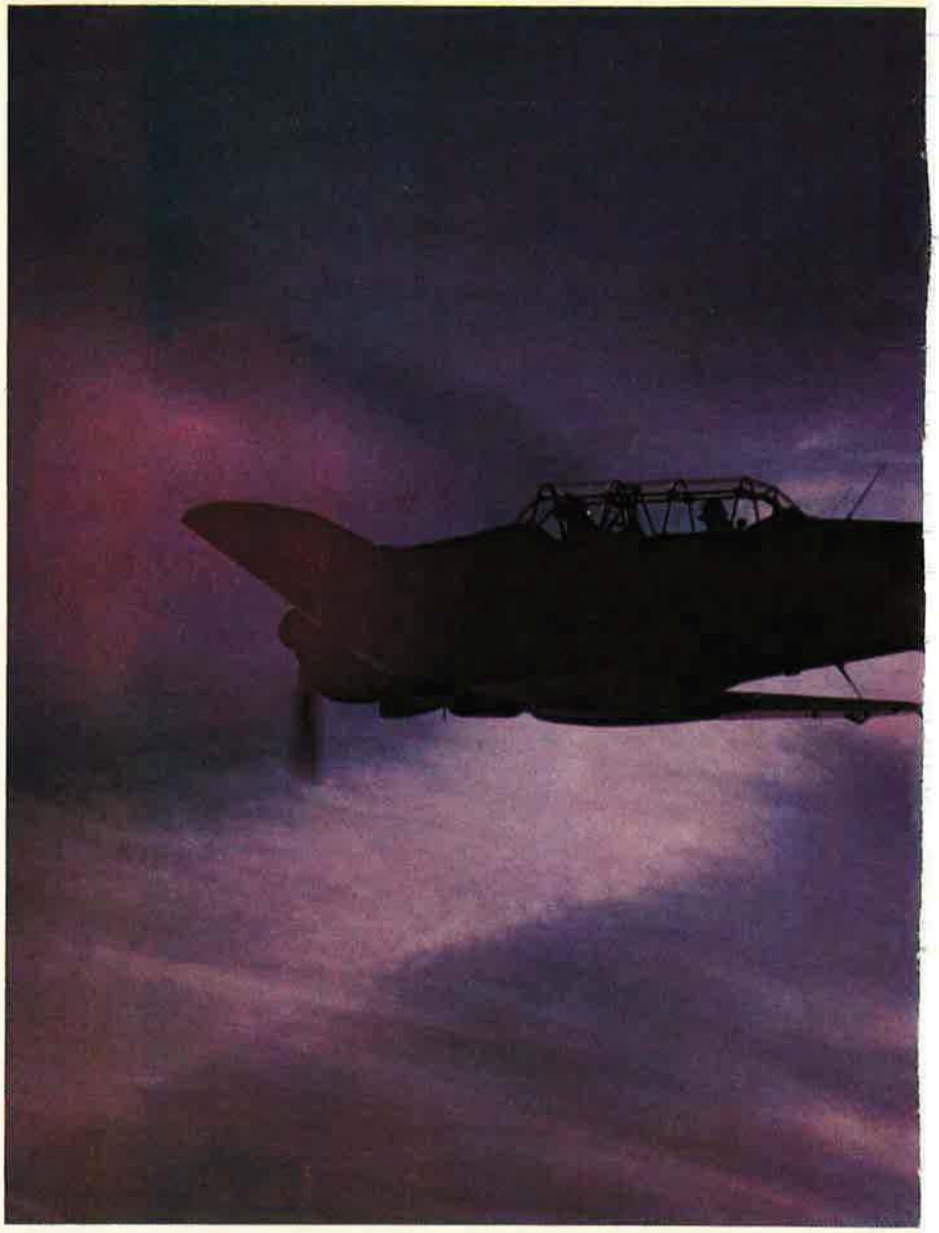
North American built well over 10,000 versions of the AT-6 and founded its reputation on this aircraft. No wonder things worked out for them. The Navy called it the SNJ, the AAF the AT-6, the RAF the Harvard, and somewhere along the line it acquired the name Texan, although that never stuck. It was always the "J-Bird" or the "Six" here in the States. Here was a trainer that looked like a fighter and, more importantly, handled like a fighter. The small amount of backseat time I managed to get only whetted my appetite for some intensive training in the bird.

The opportunity came through a close friend familiar to AIR FORCE readers. Keith Ferris, aviation artist and genuine human being, had a friend who owned an SNJ-4 and a T-6G. The fighter pilot in me pressed in for the kill. Would Keith make some overtures about my being taught to fly these aircraft? Before long, former Navy fighter pilot Don Contant and I were talking about getting together at his place in Santee, S. C. Don's goal was to put me through as much of the military style of learning as possible.

My first front-seat ride was in the T-6G, a remanufactured version that saw USAF service in the early 1950s, particularly as a Mosquito forward air control aircraft in Korea. After some initial familiarization, I would go to the SNJ since the two are significantly different.

The T-6 cockpit is compact and businesslike, and does it ever look like a fighter in there! The view out the front is beautiful, particularly with the canopy open (there are no limiting speeds for flying with the canopy open). Moving from the back to the front is like moving out of the Black Hole into the sunlight.

My first task was a thorough understanding of the Pilot's Manual. There is no substitute in flying military aircraft, and by the time I made it to Don's, I had almost



Top: The love affair starts when handling the Six's wonderfully harmonized controls. Far left: Follow the sequence carefully and the 600-hp Pratt & Whitney R-1340 engine starts with ease. Left: The compact businesslike cockpit appealed to the fighter pilot lurking inside the author. Above: Pilot Jackie Dankos enjoys the superb front-of-the-wing view as he taxis out for takeoff. (Photos by William Ford)

memorized it. Don and I spent some time with the checklist I had made up, then proceeded out to the dirt strip.

Preflight of the T-6 is involved and careful due to the complex nature of the systems as compared with earlier trainers. The plane is big, with a wingspan greater than the P-51. Climbing up to the cockpit and settling in, one realizes that not only is the view out the front superb, but the seat is quite a distance up from the wing. What an impression!

After the cantankerous engines of the earlier trainers, the 600-hp Pratt & Whitney R-1340 starts with ease if the sequence is followed carefully. The prop must be pulled through seven blades to pump the oil out of the lower cylinders (to avoid hydraulic action that may damage the jugs). As the engine is primed three or four strokes, one must pump up fuel pressure manually with the left hand while priming with the right. Battery on, throttle cracked a half inch, foot pedal forward to build up inertia on the flywheel, then heel down to engage the starter. After four prop blades pass in front, magnetoes to both. When the engine fires, continue priming until it smooths out. Under no circumstances should the throttle be pumped since that much raw fuel being dumped in the cylinders can start a fire.

A few cylinders catch and pop, blue smoke everywhere swirling around the cockpit, then a rich, settled rumble. The sound is intoxicating since it's the first real taste of unrestrained horsepower for most students. I was absolutely enthralled with a rich and heady sensation that appealed to that cramped fighter pilot lurking inside me. He was ready. But now, I was fully aware of the step I was taking and that it would be a challenge. Don in the back was all grins, ready to have at it, so no backing out now.

A little power and we're off. Taxiing in the T-6G is no problem at all since it has a steerable P-51-type tailwheel system that is connected to the rudder pedals. One can feel, however, the full weight of 5,000 pounds pushing to get loose in a ground loop and as soon as a rudder is pushed to go in one direction, long before getting around, the opposite rudder has to be applied to stop the inertia.

Run up at 1,600 rpm, elevator trim at 11:00 o'clock on the big wheel, and rudder trim at 2:00 o'clock (these trim controls are located on the left side of the cockpit). Fuel on the left tank, and there is nothing left to do but get on with it.

As power comes up, the noise is deafening, mostly from the prop, both intimidating and exhilarating. All the stories about torque seemed to be exaggerated since the rudder is effective almost immediately and one can keep the nose right down the middle. Almost before it's time to check thirty-six inches of manifold pressure for full power, a little forward stick gets the tail up and we are off, rumbling away. Quickly back to thirty inches and 2,000 rpm for climb out and landing gear up.

I was so busy that I was not aware of my surroundings until Don said, "Look out at your left wingtip. See the star and bars? You are now flying a military airplane." All those years of wanting to fly military airplanes as pilot in command were being drawn into this moment, and I found the joy hard to contain.

Precision Flying Demanded

Don was not one to wait. Hard bank out of the pattern and let's fly this thing like a fighter, not a Cessna. He wanted positive control inputs from the beginning, exact airspeeds and altitudes. Yes, sir!

The Six has wonderfully harmonized controls, and this is where the real love affair starts. No stiffness at all, just put the stick and rudder where you want to go and it goes there. The ailerons are boosted with servo tabs. I could not wait so

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Jeff Ethell, son of an Air Force officer, has been around military aircraft from his earliest years. He has been writing about aviation since 1967 and is a Commercial Pilot with Instrument and Multi-engine Ratings, as well as a Certified Flight Instructor. He regularly flys with USAF, USN, and USMC, in addition to flying older aircraft such as the P-51 Mustang. He is currently working on his sixteenth book, a history of the AT-6/SNJ. He would like to hear from any of you who flew the Six in service by writing him at 2403 Sunnybrook Rd., Richmond, Va. 23229.

when I got up to our maneuvering altitude I did a roll. Unbelievable! Nothing should handle this well since it can be habit-forming. I proceeded to explore the entire aerobatic spectrum under Don's able instruction. This loosened me up for some serious work.

Down to slow flight for an exploration of what the airplane can do at low speeds. Everything is fine until a stall with gear and flaps down. The left wing drops and it wants to half snap roll! It was quite a jolt, and Don gave me a wizened look from the back. Here is where students were killed in World War II, most of the time with their brains down and locked. The T-6 needs a good 1,000 feet to recover from an inverted position with gear and flaps down. If recovery is initiated before enough speed builds up, then it enters another stall and does the same thing. Letting the aircraft get too slow cost the lives of students who were not paying attention.

That situation can be prevented with the rapid application of rudder. One can actually keep the wings relatively level. However, if instinct takes over and one uses aileron to lift the wing, it only stalls deeper and aggravates the problem. Aileron has to stay neutral until enough speed builds up. An accelerated stall produces the same result. This time the thing snaps in the opposite direction of the turn with a good jolt.

The bottom line, as I found out further in loops and Immelmanns, is the rapid loss of altitude. Awareness of airspeed is paramount.

Back to the field for some pattern work now that I knew how to kill myself. Very stable and the view is outstanding. Downwind at 110 knots, gear down, mixture rich, and twenty degrees of flap. Base at eighty-five knots, check that the pins that lock the gear down are visible through the little Plexiglas windows on the top of each wing, full flaps. Final at eighty knots, prop full rpm. Don's lasting piece of advice, which has solved any landing problems in the Six since then, came over the intercom, "Keep the bastard straight." That is all that is left to do.

Power off over the numbers and bring it back for a three-point, which the Six does with ease. The tail does not come down as low as the Stearman so things are quite comfortable. Slight, quick rudder inputs keep things in order with the steerable tailwheel, and there is not nearly as much shoving and pushing as in the Stearman to keep it going straight.

Off the active, flaps up with the flat of the hand (palm up). The gear and flap handles are very similar, and one can easily pull the gear up instead of the flaps, unless using this simple system, since the gear handle cannot be grasped with the palm up.

Flying the SNJ Variant

Intoxicating. The Six feels every bit a fighter. More practice and it's time to move to the SNJ and the real challenge. During World War II, AT-6s and SNJs did not have steerable tailwheels but a locking swivel system. The tailwheel was locked for takeoff and landing, unlocked to full swivel for turns on the ground. This meant no steering to keep the aircraft straight, only rudder and brakes.

Everything was fine until I started to taxi. The airplane became downright rude, going where it had a mind to go instead of where I wanted to go. First, it would not steer, so I unlocked the tailwheel. A touch of brake to start the turn, and it went wildly off to the left; immediate opposite rudder did nothing! There was an entirely different airplane beneath me. Not until I hit right brake did it start to respond, then it went violently to the right with abandon. I had to punch both brakes and stop to get my bearings.

At last I had met the real World War II AT-6/SNJ! After some dancing with my feet for several hundred yards, some semblance of order began to emerge. Don would not let me lock the wheel to taxi since he wanted me to get a full dose. I found that I did not need brake if I was quick with the rudder and a short blast of power to get air over it. Soon I was settled enough to get out on the runway and do some flying. The hardest thing seemed to be remembering to unlock the tailwheel to make turns. Don got a big charge out of letting me struggle to turn with a locked wheel. He let me

Top: Flying the T-6 could become habit forming. LTA-137, owned by Bob Barnes of Ocean City, Md., was flown as a FAC aircraft in the Korean War. Above: During WW II neither AT-6s nor SNJs had steerable tailwheels. Right: The SNJ, background, owned by retired Navy Capt. Walt Ohlrich, is lighter on the controls than the LT-6G. (Top photo by Jeff Ethell; others by William Ford)

learn every quirk on my own, much to his credit, and as a result the lessons stuck.

No problem on takeoff with the tailwheel locked since the rudder is immediately effective with power. Once up to play around, I found the SNJ much lighter on the controls and noticeably different in feel. Don wondered if I would be able to tell; when I mentioned it he was clucking with pride in his student. The earlier versions of the aircraft did not have the heavier equipment and armament racks installed.

Landing could not be put off forever, so down we came. The checklist has a noticeable addition in the 1940s-era Sixes, "Tailwheel—LOCKED," in red. Another three point this time, and the aircraft settled nicely. As soon as the tailwheel was on the ground, we started drifting. Polite motions on the rudder were now no longer effective. Finally, I was all the way to the stop, and the drift still hadn't been corrected. A quick tap on the brake and we were going the other way. I found myself full stop on the other side, in need of brake. I had to make myself stop the pilot-induced oscillation by giving a burst of power to get rudder authority back; it worked like a charm. Even the slightest amount of power seems to get the rudder back.

The lesson to be learned is immediate response to drift. If one is quick enough, the brakes can be left alone for the most part, but the feet sure fly. The bottom line? It's a lot of work to master the airplane. It is not all that hard to fly, even to land, if one stays on the ball, but as soon as the mind drifts the airplane proceeds wildly to do what it wants.

While hard work, the rewards are that much more gratifying. The Six likes a pilot to fly her, not drive around from point to point. She demands continual allegiance to the slightest quiver, and pilots have quit her in disgust at being such a demanding partner. The rest find that the love for this machine only grows with time.

When Don allowed me to solo his prized SNJ, I felt like a king. I had worked hard for the privilege. Up off the runway, gear up, power back, and push the nose back down to hug the deck and build up speed. At the other end of the field, I pulled

gently into a steep right turn out of the pattern. What a view back from that open cockpit! Up to altitude for some aerobatics, then over the field, still high, to do some rolls (victory rolls in my mind's eye). Then a tour around the Santee Reservoir, canopy back, to wave at the boaters. They had to feel the exhilaration as I rocked my wings. Everyone looked up with a smile and a wave.

Back to the field for a low pass, World War II-style, pitch up to bleed speed, gear down, flaps down, mixture rich, prop forward, fuel on Reserve; all as a 360-degree turn is made back onto final. It works like a charm, and the Six is a fine teacher. Flare, power off, settle into a three-point attitude, and when we touch down, there is some work to be done in keeping it straight, repeating Don's phrase over and over again. Slow down and try to turn off the runway, try harder, try some brake! Nothing! A look around the cockpit in confusion and there is the locking handle in the locked position! Hope Don hasn't noticed (he has because he is sure laughing about something), and taxi in.

Prop back in full decrease to pull the oil from the prop dome and then shut down. Before the prop has stopped I let out a big yell of joy, and Don joins in the feeling. It is never to be forgotten, flying solo in the AT-6, particularly when it has made you work so hard for the pleasure.

I had been bitten so bad that in just a month's time I found myself in California buying one! A group of us in Richmond, Va., pitched in together and bought an SNJ-5 as Warbirds of Virginia. I had the joy of flying it back from Los Angeles to Richmond over the Rockies, without navigation radios. It was flying at its best. Since then I have gained as many hours as I can afford in the aircraft. I never get tired of it. Every minute is something to be savored. ■

Flying solo in the T-6 is something never to be forgotten. Every minute is something to be savored. (Photo by William Ford)

It Lives—Formation Flying as It Used to Be

After getting just a few hours in the T-6, I discovered an entirely new, yet old, world. I had been a member of the Experimental Aircraft Association's (EAA) Warbirds of America, but I had never been able to participate in their functions with a World War II aircraft that I could fly as pilot in command. Flying back from California with the newly acquired SNJ, I came through the annual EAA get-together at Oshkosh, Wis., to fly in company with well over 100 World War II aircraft.

Warbirds was formed in 1964 to "Keep 'em Flying" in safety. The World War II birds were disappearing and pilots banded together to keep them in the air, adopting the old motto of the war years. Now the organization has more than 1,000 members, flying everything from the PT-17 to the B-17. When I arrived there were probably fifty AT-6s, SNJs, and Harvards on the field.

Much to my delight, the Sixes would perform every day in mass formation flybys just like the ones at Randolph and Pensacola in the 1940s. I had just enough formation experience to get a spot in the qualifications, so up we went in flights of four before the watchful eyes of Jerry Walbrun and his team of judges. We were ragged, but enough flights were qualified to get twenty aircraft in the air at one time.

Then the kicker came: Not only would we be flying in four-ship sections, but each section leader was to form on the section in front with the same clearance between aircraft so that those on the ground saw one large formation of aircraft, all equally spaced. And I was going to be in the middle. I had heard of and seen photos of those huge graduation flights in the '40s, but never dreamed I would help duplicate one.

Walbrun was all business, demanding discipline and competence of those being briefed. There was no room for sloppy flying. It would be done in military fashion with military precision or not at all. Thanks to the good sprinkling of former military pilots in the group, everyone had a good leader. Now we wingmen could quake about our jobs.

Takeoff was impressive in flights of two, spaced seconds apart. By the time I got off, the propwash was incredible, but I hung on my leader, bouncing for all I was worth and fueled by pure adrenalin. Tucking in, our flight of four formed up quickly, each of us cutting off the other's turn with our leader cutting the turn off the formation ahead of us. In one sweeping turn, the twenty of us formed up into a diamond of diamonds. What an incredible sight! Now back to learning, since I had some very small limits within which to fly.

I was discovering the AT-6 all over again as we flew around in this mass gaggle. It is a superb teacher for tight formation work because it makes you work so hard to stay in position. There is not an excess of power to keep the ship where it should be so that has to be made up with proper technique, with eyes glued to one's leader for position changes.

By the reviewing stands a curious thing happened. As we swung out and got ready to fly past the crowd of more than 150,000 people, most of us were all over the sky overcorrecting and fighting like mad. Once we neared the people, the formation shrank and set itself in glue for the twenty seconds it took to go by. Once past the show center, the formation loosened up again and all of us were fighting the aircraft and looking sloppy. What show business will do!

As we got on the backstretch, Jerry called for echelon left. The blob changed into beautiful strings of airplanes, all connected by their leaders. Back across the center of the field and the magic tightening again for the break. At two-second intervals, twenty rumbling monsters made hard-right breaks and then landed on the same runway, each alternating sides and turning off into the grass, the first section landing long. Again I fought propwash back in the formation but we got down. Good thing, too, since my legs were jumping on the rudder pedals in spasms. I had no idea I was pushing the rudders so hard, I was fighting myself.

As the week went on, we flew each day and, by the fourth day, it was incredible to see the improvement. We were getting a glimpse of what it must have been like thirty-five years ago to do this every day until it was done right. None of us wanted to go home; just fly T-6s for the rest of our lives as one big happy family.

Warbirds of America is unique in providing the opportunity to put up this many airplanes from World War II, flying as it must have been taught and experienced. May we never forget the men and the machines that made those days so significant. As the Warbirds motto says, we'll "Keep 'em Flying" as long as we can, and I will be ever grateful being a part of it all.

—J. E.

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Leather jacket flapping in the breeze, goggles and helmet in hand . . . Learning aerial maneuvers, formation flying, Morse code, and the Link trainer . . . For months before US entry into World War II, the Army Air Corps Flying Cadet Program was turning out pilots in 200 hours using three types of planes. It was . . .

A Rare Time To Be Flying

BY COL. LESTER J. JOHNSEN, USAF (RET.)
Cartoons by Jack Tippit

SINCE the Wright brothers started it, with the first US Army contract to train pilots, there has been nothing that's more constant than "change" in the training program for military pilots. The 1940–41 period was a rare time to be in flying training. The Army Air Corps was trying desperately to train an acceptable number of pilots to man the P-40s, B-17s, B-24s, A-20s, and P-38s that were coming off the assembly lines.

On November 27, 1940, I entered the Army Air Corps Flying Cadet Program at Cal-Aero Academy, Ontario, Calif., and finished in July 1941. About seven months did the job. Two hundred hours total in three types of planes—the PT-13 Stearman; Vultee's famous BT-13 Vibrator; and then the AT-6, the Cadillac of trainers.

Coming right out of Stanford University with no military training or exposure, it was a shock to me to be marched around the area and yelled at at every turn. The sudden change in my lackadaisical lifestyle was eye-opening! I had always been in awe of the military, so for me there was no need for the screaming and yelling: "Pick up those bags! Pull those shoulders back! What's the matter, don't you know your left from your right foot!" Making the bed was a chore—square corners, blanket so taut a dime would bounce on it. So why tear it apart every day? Just sleep on top of the darn thing. What a waste of sheets. I'll bet no one ever slept between those Cal-Aero sheets for the years the school was in existence!

The Commander at Cal-Aero was Army Capt. Robert L. Scott and his deputy was Lt. T. Coulter, both later to become general officers. The instructors were civilians, but the check pilots were military. The basic rudiments of flying, aircraft construction, and aircraft engine characteristics were given by civilian instructors—competent, capable old-timers.

Cal-Aero buildings were like a motel. Porches all around, two to a room, and two rooms joined by a bath. Rooms had to be ready for inspection at all times, so we didn't spend much time there. No one wanted to be at home when an inspector came by—whether an upperclassman or an officer. I was never caught, and I don't think they inspected very often. There just wasn't time enough.

There was a small cafeteria and a club you could go to if you were an upperclassman. I can't remember ever going there as there was just too much to do. We had one parade while at Cal-Aero. Everyone thought it was neat, but I'll bet it was a bit ragged, because we never practiced, and good marching takes practice. A dance followed, with girls brought in from the surrounding towns. A truly nice affair.

Off to the Races

One day someone gave the word that we had to have athletics to go with the rudiments of flying—so why not some foot races? We did just that on the tarmac with everyone out watching. I had been a trackman at Stanford, so I cleaned up on all the events. Henceforth, I was known as the fastest man in 41-E—whatever that meant in that day!

Most of my classmates were from Texas and Oklahoma. A swell bunch of guys. Came the day that we were to mount the "Blue Peril," the PT-13. There wasn't much said.

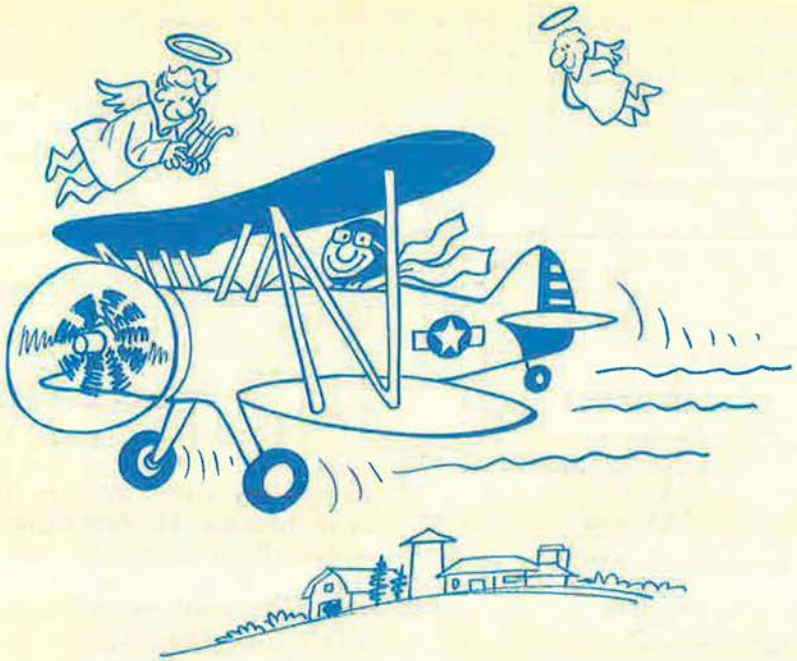
"Did you ever fly before?"

"No. Never even been in a plane."

"Well, you push the stick forward and the nose goes down, pull the stick back and the nose comes up. Left stick, right stick, left rudder, right rudder, etc. Get it? Now, you take it, coordinate left rudder and left stick, lay those wing wires on the horizon and it will make a normal turn."

This went on day after day—

"I had been a trackman at Stanford, so I cleaned up on all events."



"Very few things in this world can compare with the first solo!"

figure eights, ninety-degree turns, eighty-degree turns.

"You don't know what you are doing, do you? Let me show you once more."

Well, it got better and better, and then one day there was more than normal landings, and the guy got out of the front cockpit.

"Let me see if you can do it by yourself."

What a wonderful feeling to be doing this flying thing by yourself. Very few things in this world can compare with the first solo! Well, the first jet flight was a thrill, too, or the first Mach 1 ride!

From then on, better things came, but the saddest were the guys who were washed out, wounded for life, couldn't hack the course. But that's the way it was. I still don't understand how an instructor can tell so soon in a pilot's career that he doesn't have what it takes. Of course, I have never been an instructor at that level. I just hope they didn't make too many mistakes. A lot of those men went on to become navigators, armament officers, and maintenance officers, but I'll bet many of them felt they were shortchanged.

Awards, class standings, and the like were never made at that time, as far as I can remember. We were just glad when the list came out transferring us to the next level of flying. As time went on, military Reserve officers were transferred in from civilian life as tactical officers, check pilots, and adjutants, and I suppose the paper work increased accordingly.

Primary was pretty much straight flying. About the time the instructor demonstrated the numerous maneuvers and you got a chance to practice them solo, and do some unfamiliar field landings on a satellite field, primary was over. Basic was a big step forward. A bigger, noisier plane, only one wing, and even a radio. We also got to fly at night and in formation, even made formation landings night and day.

Snappy Blue Jacket

The uniform at Cal-Aero was a snappy blue zippered jacket and bluish gray pants with black shoes. Now we wore the blue Air Corps cadet shirt and jacket, and of course the leather jacket. Moffett Field was our home. We worked out of the world's largest hangar, which once housed the giant airships—the *Akron* and *Macon*. They claimed that it would cloud up and rain in the hangar, it was so large. We had to learn and receive Morse code, and they even told us what our pay would be if we graduated.

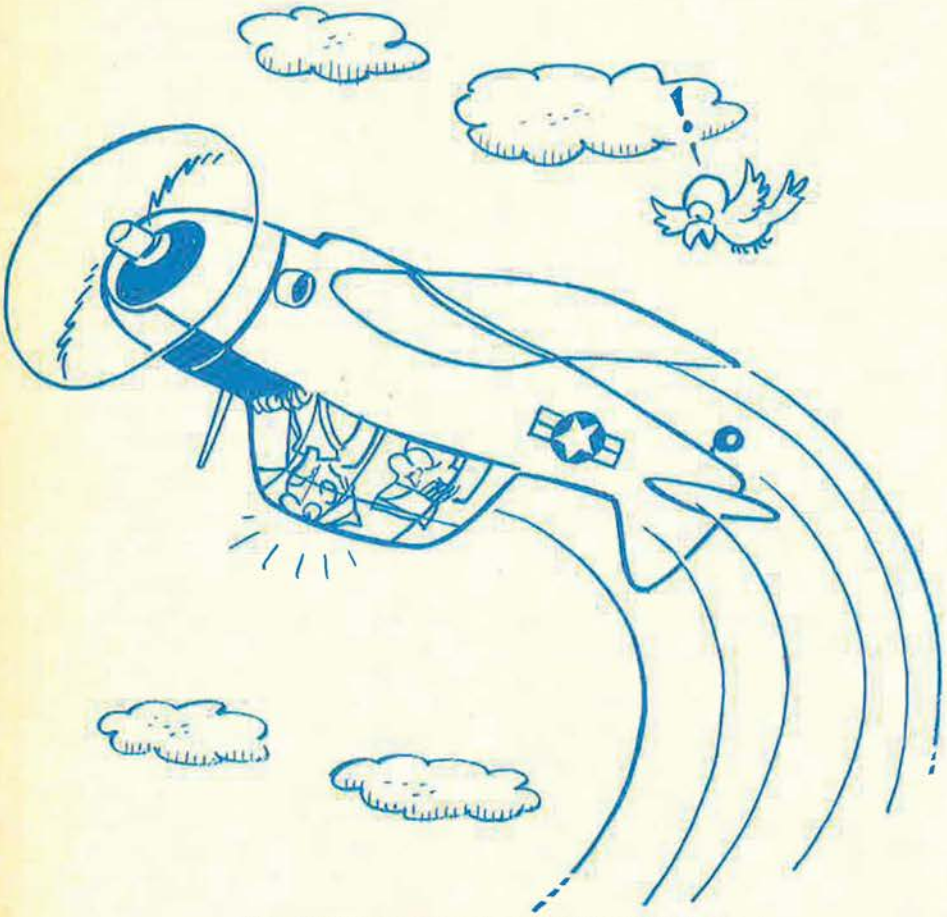
Basic was very exciting as now we were on a real military base, with a big parade ground. We lived in large bays, and it was fun being with the guys from all over the US. Your individual weaknesses soon came to light, so beware not to expose your bad side! Ground school became a little more technical. We flew night and day, so there wasn't much time for marching. I think we had one Saturday inspection during the whole stay. It was fun to land at 11:00 o'clock at night and stroll from the flight line to the barracks. No one to bother you, leather jacket flapping in the breeze, goggles and helmet in hand. Wow, what a feeling! The end of the day, after maybe three flights, a clean sack—GI cot—waiting, and good roommates to ask how it went!

Check rides were few and far between. There just weren't enough check pilots. If you had a good instructor they trusted him to do the chore. I received one check ride the whole seven months. Wouldn't you know that the check pilot was a lieutenant for whom I had arranged a date with a coed at nearby Stan-

"Wow, what a feeling! The end of the day, after maybe three flights, a clean sack—GI cot—waiting . . ."

ford—my alma mater. He said I was a "steady pilot." When I told my instructor that, he grumbled, "He doesn't care what he says, does he?" My instructor was a West Pointer, and I guess what he put out was all good for me. He sat in back of the BT-13, and while I was but-

Col. Lester J. Johnsen, USAF (Ret.), a Christmas tree farmer in Washington state, flew P-40s in Java, Australia, and New Guinea in 1942. Later in the war, he flew P-47s with the Royal Norwegian Air Force in Belgium and Holland. During his USAF career, he commanded the 321st Fighter Squadron, 4th Fighter Group, 84th Fighter Group ("Geiger's Tigers"), and the 51st Fighter Wing. Readers will remember his contribution to the September AIR FORCE *Magazine, "You Men on Java Are Not Forgotten."*



"The AT-6 was a great plane, and if you had a good instructor, you could do some hairy things."

toning in he was telling me how lousy I was. Of course, he did it to everybody. I went to see him one day many years later when we were both colonels at the Pentagon. He didn't know me from Adam.

Loops and Rolls

Advanced flying training at Stockton, Calif., was the ultimate of flying. The AT-6 was a great plane, and if you had a good instructor you could do some hairy things. We would loop and do barrel rolls in formation, split S's, and in-trail acrobatics. Some of the best fun was cross-country navigation. From Stockton we could go north or south up the valley at night. With the light line you always knew where you were. But here they added that monster, the Link trainer, to give us some ground time on instruments. It took some doing to fly that! Even our instructors didn't really believe in this instrument business!

As in primary and basic, advanced was a business of mostly flying, with a minimum of ground school and drill. We would form once a day for a roll call, and even then a great number would be flying or in the Link. My first flight was with the flight commander, and that was it. A few times our instructor flew with us; otherwise it was solo with cadets flying together and in formation. Our flight had a wild instructor. He would lead us through rat races that were great. One day he buzzed one of his students and cut his tail off. They both had to bail out.

Accidents were very few. The only ones I remember were from flying regulation violations. All our flying was from grass fields, which is so different from landing on an abrasive concrete runway. That was going to be a big surprise later at Hamilton Field, Calif.

When our total flying time reached 200 hours, that was it. We sat until graduation. The graduation speaker was Col. Ira Eaker, Commander of the 20th Pursuit Group, Hamilton Field, who was to be my commander a week later. And that was it. All in seven months. A full-fledged pilot! Assignment: P-40 pilot, 79th Pursuit Squadron, commanded by Lt. James Ferguson. ■

"Our flight had a wild instructor."

Shaping Airlifter Technology

Creating the airlifter cockpits of the future.

Today, the pilot of a large aircraft confronts a complicated array of switches, panels and displays. But new developments at Lockheed-Georgia point to a time in the not-distant future when pilots will have an easier time during their cockpit hours.

More and more, they will control their aircraft with the help of computers. More and more, they will use electro luminescent displays, liquid crystal displays or cathode ray tubes to communicate with the computers.

But these displays will be unlike those most people have ever seen. The pilot will simply place his finger on a display to call up easy-to-read information. In some cases, he will talk with the display, which will be able to recognize voices and synthesize speech.

The display you see above is a touch panel. If, for example, the pilot wants to change destinations during flight, he lightly touches the panel. It gives him his options, tells what fuel consumption will be, indicates the communications channels to use.

The picture above is deceptively simple. That display represents the linking of many technologies—the computer software specialists, the electronics and controls engineers, and display experts.

These displays will make the pilot's "office" a lot more efficient. They also will save a lot of money, both in original installation and maintenance. Forthcoming advances, such as these in cockpit technology, are what you would expect from the airlifter experts at Lockheed-Georgia, the people who have more experience, by far, than anyone else in creating and building airlifters.

Lockheed-Georgia

In a realistic training exercise to test readiness and mobility, A-10s of the 354th Tactical Fighter Wing, Myrtle Beach AFB, S. C., introduced two new twists to a simulated wartime deployment dubbed . . .

THUNDERHOG II: Flying from the FOLTA and the DOLs

BY WILLIAM P. SCHLITZ, SENIOR EDITOR

"THUNDERHOG!" snorted the Air Force captain at the Pentagon with equal traces of scorn and admiration. "Only TAC fighter jocks could dream up a name like that." The young officer was referring to an event about to get under way at Myrtle Beach AFB, S. C.

Dubbed Thunderhog II and conducted by the 354th Tactical Fighter Wing, the occasion was the second in a succession of annual base-wide training exercises aimed at testing readiness and mobility. "Thunderhog" is derived from a combination of USAF's official name for the A-10 close-support aircraft, the Thunderbolt II, and Warthog, as it is known on the flight line.

The largest wing-planned and -directed exercise within TAC, Thunderhog II had the objective, among other things, of compressing a month's flying training into ten days.

Thunderhog II kicked off on Monday, October 20, at 6:00 a.m. with the recall to duty stations of some 3,200 wing and base personnel. From then until the conclusion of the exercise, all would work twelve-hour, or longer, shifts.

At the base, more than 500 persons quickly underwent processing for an overseas deployment the first day, with round-the-clock processing of a total of 1,386 in a three-day span.

The wing contingency support staff had devised an elaborate scenario for the exercise. It featured two mythical NATO/Warsaw Pact-like blocs that were being drawn into conflict. When enemy forces attacked the US's allies, the 354th was ordered to respond.

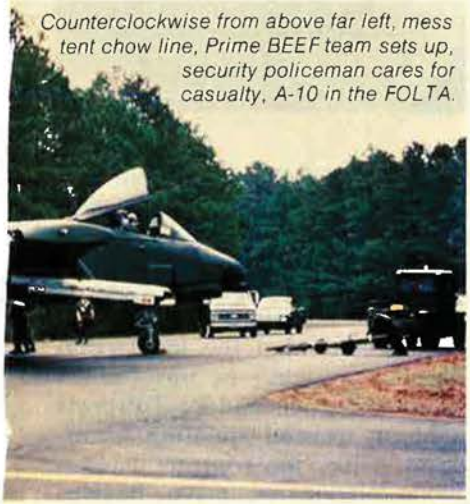
The wing was not caught flat-footed, though. Wing intelligence had followed closely the buildup of tension between the two adversaries and had issued daily advisories. As hostilities became more certain, the wing prepared for a possible wartime deployment. It trimmed back training sorties of its A-10s to maintain readiness. Essential equipment rigged as palletized cargo was loaded aboard (simulated) MAC transports. Pilots and other personnel tagged for possible deployment looked to their personal gear. When the order to "go" was given, the wing was ready.

In a deployment sortie, the initial phase of the exercise, the wing's three squadrons of A-10s in six-ship formations flew a five-hour circuit that took them down over the east coast of Florida for an aerial refueling and a run over the Eglin AFB, Fla., electronic warfare range for an evaluation of the A-10s' electronic countermeasures (ECM) and radar homing and warning equipment (RHAW). Then a return to Myrtle Beach AFB, where the three squadrons settled in "behind the ropes." That is, they were isolated from the rest of the base and were required to fight the simulated war with the equipment previously palletized as air transportable cargo. The idea was to align the exercise as closely to actual combat conditions as possible. They fought with what they brought.

In terms of the scenario, the wing's 355th Tactical Fighter Squadron (the Fighting Falcons) was assigned to attack the enemy from "Country Alpha," where its

Top, mess tent sign in German listing meal hours adds touch of authenticity. Above, loading ordnance.

The A-10 standard attack formation is a "two-ship," consisting of a flight leader and his wingmate operating in concert.



Counterclockwise from above far left, mess tent chow line, Prime BEEF team sets up, security policeman cares for casualty, A-10 in the FOLTA.

A Training Tragedy

The Thunderhog II training exercise at Myrtle Beach AFB, S. C., had gotten under way and a hangar area assigned as a squadron ready room swarmed with A-10 pilots in olive-drab flight suits.

In a quiet corner, Capt. Greg Roberts discussed flying safety procedures with a visitor.

"Many pilots here requested an A-10 assignment. We like actually flying the plane and not just zipping through the clouds punching black boxes. But by its very nature our close-support mission—flying just above ground level—is extremely taxing. So we fly on the conservative side of safety. We operate under the general theory that the ground has a perfect P_k—probability of kill.

"In routine training, when we're flying over a range somewhere and the weather closes in, the flight leader will size up the situation and say, 'Okay, that's it. Let's go home.'

"Flying training is structured so that newcomers get more and more experience flying at lower and lower altitudes with confidence.

"We don't encourage our less-experienced pilots to push themselves to their limits, not even in simulated combat such as Thunderhog II when the sortie rate can number in the hundreds. (For this reason, we have a higher pilot-to-aircraft manning rate than other units.) In these exercises we try for realism but within safe limits. There are some things that we combat-rated pilots will do that we don't expect of newcomers. In war, however, it would be different. Regardless of fatigue or relative experience, if the ground troops needed help we'd go. It would be a max effort.

"The bottom line on safety is that we don't want to lose people needlessly. Airplanes are complex, high-speed machines. The A-10, especially, requires to be *flown* every minute. It doesn't glide through the sky like an airliner. We're among the few Air Force pilots that get to train as we would operate in combat—drop bombs and fire our guns while flying at low altitudes. This keeps us keyed up during flying.

"Since we got the A-10, beginning in mid-1977, we've flown thousands and thousands of sorties and have suffered just two crash fatalities at Myrtle Beach."

(Within an hour of this interview, word came that Captain Roberts's close friend, Maj. James A. Frey, had been killed in the crash of an A-10 flying a Thunderhog II sortie. Jim Frey, thirty-four and a Vietnam combat veteran, leaves a wife and two daughters. Promoted to major on October 1, the twelve-year Air Force veteran was the recipient of the Distinguished Flying Cross, eight Air Medals, and two Commendation Medals for service in Southeast Asia. His flight leader did not have Major Frey in sight when the crash occurred. A board was convened to investigate the accident.)

Above, radar at the Georgetown, S. C., Airport Dispersed Operating Location controlled A-10s flying from there and from Myrtle Beach AFB during Thunderhog II. Above right, in full combat gear to "seize" the DOL. Right, donning gas masks in chemical warfare training during the wing-wide exercise.

base was located (a hangar area adjacent to the base's flight line served as squadron headquarters). For its part, the 353d (Panthers) operated from "Country Bravo" (with hangar area squadron headquarters). The 356th (Demons) was divided to augment the other two squadrons.

In a parallel action to provide a Dispersed Operating Location nearer the scenario's ground fighting (which raged hypothetically over ranges used by the wing) from which A-10 attacks could be launched, personnel from the 507th Tactical Air Control Wing, Shaw AFB, S. C., parachuted onto and seized an airfield (Georgetown County Airport, S. C., forty miles south of Myrtle. The 507th's tactical air control party is capable of air strike control and liaison in direct support of Army units).

They were followed by the 73d Tactical Control Flight from Myrtle, which set up portable radar to conduct air traffic control operations at the civil airport. (The 73d, besides its mobile surveillance and control radar, is also equipped with radios and can be dispatched to the forward edge of the battle area on short notice.) The 73d's radar was used to control aircraft from both Georgetown and Myrtle Beach.

Woodward Field at Camden, S. C., 100 miles WNW of Myrtle, was also used as a DOL, marking the first time in the US that combat training missions were flown from totally civilian airports.

After the initial "seizure" of Georgetown Airport, there was very little interference with normal civil air traffic. Air Force firefighting and aircraft refueling equipment was stationed at Camden. Because of the short distance from Myrtle, A-10s weren't refueled at Georgetown, but Air Force firefighting equipment was on hand.

To ensure that the local communities wouldn't be upset when their usually peaceful local airports suddenly started spouting lizard-green A-10s, the wing mounted a public-relations campaign. Besides

heavy pre-exercise media coverage, the wing sent spokesmen to address groups of citizens about the forthcoming operations. During a "Visitors Day" in the course of the exercise, several hundred invited guests visited the base and were briefed on the 354th's mission.

Flying From the FOLTA

Besides operations from the two DOLs and the Myrtle Beach AFB flight line, the wing pressed into service for the first time its FOLTA, or Forward Operating Location Training Area. Located on the base, the FOLTA is the brainchild of Deputy Combat Support Group Commander Lt. Col. John P. Kelly. It is the only NATO-like FOL in CONUS.

The FOLTA saw its first operational use during Thunderhog II. In a heavily wooded, 300-acre site on the base had been constructed during World War II an aircraft dispersal area consisting of hardstands and taxiways that had long since fallen into disuse and been abandoned. Colonel Kelly noted that if spruced up and repaved, the area could serve as a Forward Operating Location, such as those in Germany to which A-10s are constantly rotated from home base in the UK. The European-based A-10s fly training sorties from the FOLs, their pilots thus practicing how to operate aircraft from dispersed points. The Myrtle FOLTA could be put to much the same use. The idea quickly gained acceptance right up to Hq. TAC.

For Thunderhog II, five of the area's hardstands and three miles of taxiway were renovated, including the installation of metal rods to ground the aircraft electrically. The five hardstands and use of crossroads made eight aircraft stations available for the exercise. The wing's three squadrons were rotated into the FOLTA to give as many pilots and ground crew as possible experience in operating from there.

The 354th is hoping for the eventual modernization of the entire hardstand area, from which twenty-four aircraft—an entire squadron—could operate. In the immediate future, however, the wing plans to flex its muscles from the FOLTA in smaller exercises than the annual Thunderhog, perhaps occasionally squeezing in training sessions for aircraft from other TAC units.

Non-Wing Participants

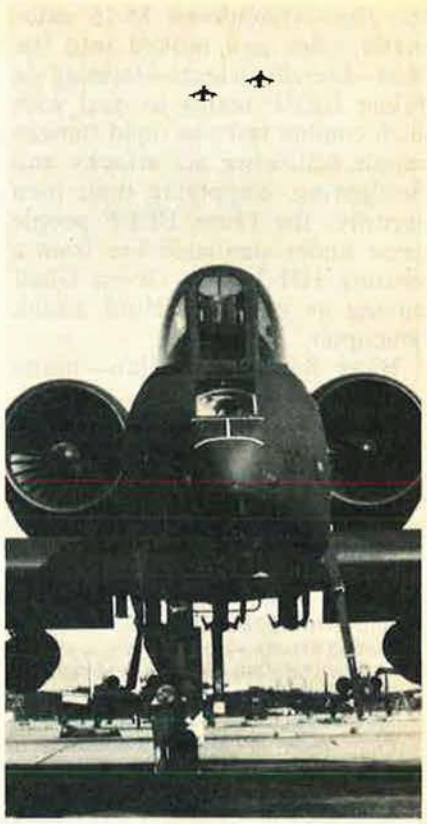
Outside participants were drawn to Thunderhog II like bears to honey, sensing the invaluable training opportunity. Among them were F-105s from the 192d Tactical Fighter Group, Byrd Field, Va., to provide simulated enemy air attacks, and A-7s from the 169th TFG from McEntire ANGB, S. C., another Air National Guard unit.

A-37s from AFRES's 434th Tactical Fighter Wing, Grissom AFB, Ind., supplemented the 354th's A-10s in the close-support role. The unit is in the process of converting to A-10s. Two A-10s from the ANG's 175th TFG, Baltimore, Md., joined in.

Unique aircraft that "came to play" in the exercise were two EC-130s of the 7th Airborne Command and Control Squadron, Keesler AFB, Miss. These, dubbed ABTripleC, for airborne battlefield command and control center, are crammed with communications gear manned by specialists and provide communication and command links among Army ground commanders, airborne and ground forward air controllers, and tactical air assets. Close-support aircraft like A-10s can be diverted by them, say, from preassigned to higher-priority targets at the behest of Army ground commanders. In war, they'd also be plugged in, via their radios, to the Allied Support Operations Center.

The EC-130s are attached to the 552d AWACS Wing at Tinker AFB, Okla., a unit that reports directly to Hq. TAC. The 7th ACCS's seven ABTripleCs were developed to control air operations over Laos and Cambodia in Southeast Asia. Pretty much on the back burner since, their role in controlling air assets and in working in concert with Airborne Warning and Control System (AWACS) aircraft is lately being reevaluated upward.

Other Air Force people and aircraft came from Shaw and Charleston AFBs in South Carolina, Tinker AFB, Okla., and Kelly AFB, Tex. A lone F-15 Eagle from the 1st TFW, Langley AFB, Va., performed an aggressor air role against the friendly A-10s.



ANG F-105s posing as aggressor aircraft "strafe" the A-10 flight line, one of several simulated attacks.

Elsewhere on the Base

In the base-wide exercise at Myrtle Beach AFB, other wing units got in the act. Under direction of the base's senior medical personnel, a MASH-like tent encampment was erected to shelter the equipment of the wing's air-transportable field hospital. Three generators—one of which can power the entire facility—were uncrated and put on line. A tent clinic was also set up on the base's flight line, and took sick call during the exercise.

In a mass casualty simulation following an F-105 raid, during which a supply depot was bombed, wounded were given first aid and then evacuated to hospital facilities, including Myrtle Beach's Grand Strand hospital. This "emergency" came unannounced to the civilian facility (except the administrators) and was in line with the hospital's own mass casualty training.

The base's civil engineering squadron—under normal conditions electricians, carpenters, and

the like—shouldered M-16 automatic rifles and moved into the field—literally in tents—forming six Prime BEEF teams to deal with such combat tasks as rapid runway repair following air attacks and firefighting. Supplying their own security, the Prime BEEF people came under simulated fire from a visiting HH-3 Jolly Green Giant posing as a Soviet Hind attack helicopter.

Base Security Police—many drawn from such departments as finance and accounting to sharpen war skills—patrolled heavily during the exercise, and countered would-be infiltrators. They manned entry control points and diligently checked identifications. Two Security Police exercises simulated armed robberies of both the base's weapons storage vault and commissary. They dealt with two bomb threats and helped out in the simulated mass casualty evacuation.

"With our rapid turnover in personnel—thirty to forty percent wing-wide per year—such training as provided under Thunderhog II is essential," said Colonel Kelly. "It constitutes in an actual sense 'on-the-job' training. Can you imagine mess personnel who have never seen a field stove before trying to get the hang of it while 300 troops in line outside the tent are beating on their mess kits? They learn fast." Mess personnel set up a tent kitchen and mess hall on the base flight line and served 7,000 meals during the exercise, with some 264 meals to pilots and ground crew at their stations in the FOLTA.

"Another aspect of the exercise," said Colonel Kelly, "is the war skill training it provides wing and base administrators.

"While during workouts like Thunderhog II we're somewhat restrained from what we can do by such factors as FAA flight regulations and that we overfly civilian communities, the fact that we are broken out of routine training schedules to mount an extraordinary effort is in itself excellent training," Colonel Kelly said.

The Final Tally

In the month of October, the 354th TFW set a new record of 1,717 sorties, twenty-nine more than in any single previous month. Of these, 1,004 were flown during Thunderhog II, short of the intended mark of more than 1,300 (weather curtailed air operations early on in the exercise and caused the cancellation of the wing's redeployment sortie that was to have capped the exercise on the last day).

Wing A-10s conducted twenty-eight sorties from the Georgetown DOL and twenty from Camden, each over a three-day period. The military events at the civil airports drew enthusiastic spectator response.

Ninety sorties were flown from the Myrtle FOLTA, with forty-five pilots from the wing rotated in to participate. Each of the wing's pilots averaged eleven sorties during Thunderhog II.

As for maintenance, only three of the deployed aircraft were grounded for lack of spare parts during the exercise, and those only for a limited time. ■

Fighter Pilot Lingo at a "Two-Ship" Briefing

The two pilots sat huddled over their maps. The flight leader of what was to become an A-10 "two-ship" sortie during Thunderhog II was briefing his wingman. It was an abbreviated, combat-condition briefing that took place thirty minutes before "step time," or when the two pilots would go to their aircraft for preflight inspections and engine runups prior to the mission. Fighter pilot language is laced with jargon, useful in cutting excess verbiage. Here is an example (with translation):

"We'll take ten seconds spacing [*between the two aircraft*] on take-off, 200-knot rejoin, and at fifteen miles out we'll cancel with departure [*sign off with the air traffic controllers*], drop to 500 feet and go tactical [*a line-abreast formation that allows the flight leader to navigate and both to watch each other's "sixes" for rear attacks by enemy fighters*]. Standard tactical spread [*distance between the two aircraft*]; you are responsible for avoiding me in turns, unless you get padlocked on a bogie [*if the wingman should spot an enemy aircraft approaching from the rear, both A-10s would turn to meet it, with the wingman keeping a steady eye on the "bogie" and the flight leader responsible for staying with the wingman. A-10s aren't designed for air-to-air combat but their 30-mm nose guns give them plenty of firepower if need be*].

"We'll call Bookshelf [*an orbiting EC-130 ABTripleC (see story) maintaining contact with Army units, FACs, and friendly aircraft, which can divert air attacks to higher-priority targets if necessary*] ASAP [*as soon as possible*] and get our words [*whether diverted or to continue to the assigned target*]. Right now, we're preplanned [*rather than being alerted to*] a target in Gamecock Golf/Fox [*a military operating area (MOA) being used during the Thunderhog II exercise for flying training employing aircraft tactically*]. We'll use this lake [*a map reference*] as an IP [*initial point*] since it is behind friendly lines; the target is just behind enemy lines.

"We'll leave the IP in *b'nai* [*the derivation of this word is vague. Presumably adapted from the Israeli Air Force, the Hebrew translation is "sons of"; here, it means "in tandem"*] and make a gun attack initially [*rather than fire the aircrafts' Maverick missiles, which are saved for clearly defined targets*]. If the target and threat [*enemy air defenses*] permit, and the environment is viz [*or visually free of smoke and other sight hindrances*], we'll go gun and Mavericks on subsequent attacks.

"I'll break off [*from the target*] and remask [*hide behind terrain*] for your attack and when you come off [*the target*] I want you to start back to the IP. I will drop into line formation with you and we'll get set for our reattack. If I turn away from you prior to getting back to the IP or at the IP, we're reattacking *b'nai*. If I turn into you, we're in a cross turn and going back for near simultaneous attacks. Same contract [*unique use of the word; stronger than a gentleman's agreement and vow of mutual support*] after our attacks; you head for the IP and wait for me. I'll come back to the IP low [*at treetop level*] so you'll be highlighted [*dark plane silhouetted against the sky that makes it easy for the flight leader to pick up, rather than green camouflage lost in the forest background*]. We'll go back together and either continue [*attacking*] or RTB [*return to base*]. If I don't show, start looking for me [*could be down or simply lost*]. Real world combat hold [*in actual combat, a single, unsupported A-10 wouldn't overfly enemy-held areas in search of a lost comrade*]. Hold until you have to go home [*fuel critical*] and then pick up an RTB [*return to base route*].

"The reattacks briefed are for a limited comm [*communications*] environment. If we can talk freely, expect any changes to come across the radios. If comjam [*communications jamming*] is heavy, and I need to change things, we'll continue back to the IP or even further into safe territory, until we can communicate.

"Once we pick up the RTB, you pass our flight rep [*report on mission success or failure so Bookshelf can reassign the mission if necessary*] and we'll come back in tactical at 500 feet. We'll call our status into the WOC [*Wing Operations Center*] and make a formation full stop [*formation landing*], if conditions permit. If winds or weather don't permit a formation landing, we'll go to initial [*point for landing approach*] and split [*separate*] for individual approaches."

End of briefing.

The study of aerial warfare has become the hallmark of an Air War College education. Such studies are also increasing in the Air Command and Staff College, while Squadron Officer School is adapting to the Air Force's influx of young lieutenants. It all adds up to Air University's making . . .

New Strides in Professional Military Education

BY MAJ. THOMAS L. SACK, USAF, CONTRIBUTING EDITOR

"In simplified terms, if it's the mission of the Air Force to fly and fight, then the mission of senior leadership is to know how to employ the forces to fly and fight effectively." In this way, Maj. Gen. David L. Gray, Air War College Commandant, at Maxwell AFB, Ala., explained why the school has been increasing its emphasis on war-fighting skills and the effective employment of aerospace forces.

The effort, which Air University officials describe as "putting the war back in the War College," began in 1976 with innovations introduced by Lt. Gen. Stanley M. Umstead, Jr., who served as the AWC Commandant from 1975 to 1977. *(See Ed Gates's article, "New Look at the War College,"* AIR FORCE *Magazine, January '77.)* Now, as the Air University Commander, General Umstead is in the unique position of capitalizing on his earlier efforts and enhancing the work of Air University as it enters the decade of the '80s.

Responsive to the Times

Modern aerial combat has demonstrated the importance of professional military education for officers. Historians attribute, for example, much of the success of Allied bombing efforts in World War II to a handful of men whose work in 1941 resulted in a paper known as Air War Planning Document-1, which became the framework of Army Air Forces action throughout the war. Significantly, the authors of AWPD-1 all had served, at one time or another, as faculty members at the Air Corps Tactical School, where they contributed to the body of thought that ultimately was reflected in the War Plan.

Air War College opened its doors as part of Air University when it was established in 1946. Today AWC represents the pinnacle of Air Force officer professional military education. AU officials say the chance to attend a senior service school, among those eligible, is about seventeen percent, but only nine percent for Air War College. Enrollment is limited to those lieutenant colonels and colonels with less than twenty-one years of service who the Air Force thinks have potential to lead as senior officers in the years ahead. This year's class of 209 includes 144 active-duty USAF officers.

In responding to the needs of its students over the years, AWC began placing more and more emphasis on international relations and on National Security Policy and policy formulation. A group, chaired by then Deputy Secretary of Defense William P. Clements, Jr., and known as the 1975–76 DoD Committee on Excellence in Education, evaluated all five senior service schools. It recommended AWC focus on mission-specific Air Force subjects. The school had become almost a mirror image of the National War College. Further, the committee recommended that study of aerospace warfare should comprise at least one-third of the curriculum. A similar study by Air University at about the same time reinforced the need for the curriculum changes.

New Curriculum

The additional hours of instruction about the employment of aerospace forces came in terms of military history and evolving land,

An Army and an Air Force officer point out ground targets for the next day's "air missions." These are the types of decisions Air War College students must make while participating in the school's Theater War Exercise, which calls on students to apply what they have learned about the employment of conventional forces.

Air University Commander Lt. Gen. Stanley M. Umstead, Jr., is establishing the Airpower Research Institute as an independent research arm for USAF.

Maj. Gen. David L. Gray is the first Commandant of Air War College to have graduated from AWC. He is also an Air Command and Staff College graduate.

Col. Christian F. Dreyer, Jr., Squadron Officer School Commandant, served as Chief, F-16 System Management Office before his assignment to Maxwell.

sea, and air strategies; the Soviet threat; and in-depth evaluations of US and allied abilities across the broad spectrum of conflict, from small contingencies to strategic nuclear war. But students entering the War College in 1979 also saw a completely redesigned curriculum structure. Gone were the four blocks of instruction, replaced by an integrated curriculum composed of three principal courses.

The Employment Course runs throughout the year so students are thinking about it from start to finish. According to General Umstead, "They no longer start off and think command, leadership, and management for two months and then go into military history, strategy, and air warfare. They start with employment at the outset and stay with it continuously, so the total year is oriented towards air warfare."

Two other courses complement the first. National Security Affairs runs from August through December; then students pick up Leadership and Management until May. The three courses have been carefully integrated by allowing closely related materials in different courses to parallel each other. For instance, the General Purpose Force Employment phase (from the Military Employment Course) and the Regional Assessments phase (from National Security Affairs) are taught at the same time, since one is heavily influenced by the other. AU officials also point out that students combine lessons learned from the different courses and apply that knowledge during projects, exercises, and case studies. These include the Political-Military Game, Defense Budgeting Exercise, Rapid Deployment Exercise, Theater War Exercise, and National Security Study.

Theater War Exercise

The Theater War Exercise (TWX) comes eight months into the academic year. General Umstead calls it "the one thing most indicative of our effort to teach warfighting in the War College, using airpower and deployment decision-making with imperfect information and under conditions of uncertainty." TWX is a computer-simulated air-land battle over Central Europe, which lasts more than a week and demands application of just about everything the students have learned about employing conventional forces. Twelve-member seminars are organized using force figures sufficiently representative of the area.

One member of each seminar plays the role of the Commander, Allied Air Force Central Europe (COMAAFCE). The others accept subordinate command positions. With their respective commander they develop plans and strategies to defend the Continent against a War-saw Pact invasion. Each group grapples with such problems as sustaining the force and employing it in different combinations. Seminar members feed their decisions into the computer at the end of each day, and the information is processed overnight. Next morning they read the results and adjust their strategies based on what they have learned from their actions the previous day.

Command Readiness Exercise System

Officials are trying to upgrade TWX to be part of a larger Command Readiness Exercise System, or CRES. Air University is working with its parent Air Training Command to introduce CRES as a 1983 Program Objectives Memorandum item. CRES would introduce many advantages, including use of actual force figures to make exercises more realistic. It will also offer immediate computer feedback to the would-be commanders in each seminar and could even be hooked up to other senior service schools.

The CRES will support other war-gaming exercises such as the RADEX, or Rapid Deployment Exercise, which General Gray introduced into his curriculum just this year. He considered its absence a weakness of the AWC program. "It's one thing to study a location like the Middle East, and quite another to understand what you can

and cannot do there or anywhere else."

RADEX fills a void that used to exist between the Political-Military Game, involving diplomacy and negotiation, and the Theater War Exercise. The problem with TWX was that essential preconflict actions were missing; the school was just letting the war start.

"That's not the way US military forces are structured," General Gray explained. "A significant portion of the air forces are stationed in the continental US, many in the hands of Reserve and National Guard. Preparation, buildup, movement times, and so forth are essential first steps and must be understood before you get around to going to war. These steps were missing." RADEX runs at the end of the Regional Assessments phase and teaches students the importance of logistics planning and force limitations.

Retired Air Force general officers (from left) Ira C. Eaker, Curtis E. LeMay, and Haywood S. Hansell, Jr., discuss the World War II European air campaign during the Strategy Phase of the Military Employment Course at Air War College.

Electives and Faculty

Two other recommendations that came to bear on the Air War College from the Clements Committee focused on its electives and faculty. When General Gray was an AWC student in 1968, the school offered only limited electives. This year it offers forty. Students are eligible to take up to eight during the school year's three elective terms. The school also allows students to audit classes that introduce them to new areas of study without affecting their grades. General Gray describes it as an "exceedingly rigorous, demanding, busy, and rewarding program," for those students who apply themselves.

As for the faculty, the General considers his so good he has reduced the number of guest speakers at AWC. He said some subjects can now be better covered in assigned readings and seminars because faculty seminar leaders are actually instructors, no longer just referees or facilitators. The faculty combines strong academic credentials with what General Gray describes as "a rich infusion of current operational experience" among his officers.

Ironically, Air University discovered, that while only the best graduates may serve as faculty members, these officers found it difficult to find good follow-on assignments. They were viewed as "Air University faculty types." Major command vice commanders, during AU's conference last January to evaluate professional military education, offered their personal support in placing former faculty members within their commands.

Airpower Research Institute

Last year, General Umstead took steps to increase AU's usefulness as an independent research arm for the Air Force. He calls it the Airpower Research Institute, or ARI. Five people are now on board, and it is expected to be funded for full implementation in Fiscal Year 1982 at a strength of about twenty-four people. Additional Air Force and civilian researchers will be assigned to establish a continuing program outside of normal student research that will, he said, "provide continuity and expertise to address tough Air Force issues."

ARI will not be assigned to any one school within AU, but it is presently located in the Air War College. General Umstead envisions the Air Staff and major commands sending officers to AU to work as research associates on command interest issues directly under one of the professional researchers. ARI will also offer flexibility to the Air War College program. Student re-

Maj. Gen. Mason M. Patrick, Chief of the US Air Service, presents diplomas to the graduates of the 1925 Air Service Tactical School Class at Langley Field, Va. Langley became the focal point for creative thinking among experienced air officers.

search, no matter how good, is limited by the competing curriculum activities and the normal tour length of ten months.

An interested student will be able to work under ARI sponsorship if he can handle the requirements along with his student work load. If his research warrants, he might be able to extend his stay beyond graduation to work the issue for whichever command it benefits. Or students might work together to complete a group research project. ARI should remain flexible enough to respond to any reasonable need, with officers spending up to two years as research associates if justified.

Regardless of length of stay, the main thrust of ARI researcher efforts will be to publish studies that bridge the gap between operations and research and contribute to Air Force conceptual thinking about the employment of airpower in the critical decades ahead.

Other Research

Within AU's Air Command and Staff College, applied research has been an established program for some time. Lt. Col. Hank Staley, of the ACSC faculty, points out that "our research program has changed dramatically since 1976. Students now select from twelve different options, including papers for presentation, articles for publication, and scientific technical reports. We also aggressively market the fresh ideas by sending copies directly to the sponsoring agencies, interested action officers, and primary repositories, such as the Defense Technical Information Center and the Fairchild Library."

One of ACSC's best customers has been Strategic Air Command. Numerous handbooks have been developed, tying together the technical and management requirements of many SAC jobs. Students have also done research that has benefited the Navy, MAC's Aerospace Rescue and Recovery Service, and other major Air Force commands.

Some research has cut across school lines at Air University. Faculty and students of the Air War College and ACSC teamed up to develop ideas the Air Force may use in preparation for SALT III negotiations. The request for this work, officials point out, came from the Chief of Staff, Gen. Lew Allen, Jr.

Air Command and Staff College

Intermediate-level professional military education is conducted by the Air Command and Staff College. Newly promoted majors (and captains selected for promotion) transition from being functional specialists to generalists who deal with broad Air Force issues at intermediate-level command and staff positions. Instruction is directed toward force employment, writing and speaking, logical problem solving, interpersonal relations, and staff coordination. Approximately the top fifteen percent of those selected for major each year will attend ACSC and must attend prior to their fifteenth year of commissioned active duty.

When major command vice commanders met in January of last year, they endorsed ACSC's Tailored Instruction Program. The TIP, conducted during the last four weeks of ACSC, was started in 1977 and allows students to enter spe-

The Future Air University

As we approach our thirty-fifth anniversary, Air University is taking a deep, introspective look toward the future. Although proud of our achievements, particularly the new Professional Military Education curriculum and the University organization (still unique among military educational institutions) for meeting the wide variety of professional education requirements of the Air Force, there is a growing eagerness among the people of Air University to seek new horizons and to play a more significant and imaginative role in the exploitation of aerospace power. Among the staff, school commandants, and, most significantly, the teaching faculty, there is a ferment that is reminiscent of the early days of the Air Corps Tactical School.

In Air War College (which has been attracting increasing numbers of "blue suit" and civilian scholars to its faculty) there is talk and excitement about the proposed Combat Readiness Exercise System (CRES). This highly automated, futuristic system will provide a decision-making environment in which emerging air commanders and battle staffs can examine war-fighting processes to the execution of air forces' weapon systems throughout a full range of applications from prehostilities force deployment through force employment in a theater of operations. It will enable our students to, first, think about war and, second, to examine the impact that various force management and employment decisions have on the performance of a war-fighting system.

In accordance with "Constant Readiness Tasking" of educational activities, CRES is aimed at enhancing readiness for war by developing a "think-war mindset" in USAF officers. Intensive classroom lessons on war-fighting will be reinforced by providing decision-making opportunities in a controlled environment. Additionally, the environment can be made flexible and allow students to test their own concepts of how best to employ current or proposed weapon systems to obtain military objectives in war.

Those of us responsible for the Professional Military Education system have sensed the need for a closer association with the operational commands directly involved in the employment/deployment of air forces. The Air War College, in concert with the Air Command and Staff College, has begun to implement the charter of the newly established Air University Research Institute, whose mission calls for cooperative research on airpower relative to the attainment of national objectives.

The Air Staff and commanders of designated MAJCOMs, specified commands, and separate operating agencies will be invited to assign an officer from their respective organizations to pursue research related to command long-range planning. These research associate positions will be filled at the discretion of the respective commander and research proposals will be approved by the sponsoring command. Thus, the ARI will be the focal point for combining the brainpower of the students and faculty with that of the operational commands in the formulation and evaluation of options and policy recommendations relating to the employment of airpower as an instrument of national policy.

These are just some of the interesting activities planned for the next several years at Air University. Their success, as indeed the success of any professional education institution, will depend in large measure upon the continued development of an imaginative, enthusiastic, and dynamic faculty. Those selected for faculty assignment to Air University's Professional Military Education schools during the next few years will have an opportunity to be in the vanguard of advanced thinking on aerospace employment concepts—a situation analogous to the days of the old Air Corps Tactical School, but far more complex and challenging.

Too often in the past, officers sought active operational assignments as opposed to the intellectual challenge of school assignments. We hope, in the future, one will not have to choose between these two alternatives. Both can, in a sense, be had at Air University.

—Lt. Gen. Stanley M. Umstead, Jr.,
Commander, Air University

cialized areas of study geared to their probable assignment patterns. The first students entered "specialty tracks" related to command, logistics, acquisition, tactical, and strategic studies. These were found too restrictive so, in 1979, the TIP was opened to many of the other schools and courses offered by AU in other programs. They include Academic Instructor School, Professional Military Comptroller School, and Air Force Professional Personnel Management Course. Student-developed independent studies are also an option in the TIP. Operationally oriented officers can receive up to 112 hours of study about employment, in addition to the 260 hours they receive in ACSC's core curriculum.

The January 1980 conference also recommended that ACSC give more depth to its warfare curriculum. The vice commanders cited command and control and chemical and electronic warfare as specific areas requiring more emphasis. Not only would it help improve Air Force readiness, but the opinion was expressed that it would better serve the students in their future jobs since more than seventy percent of them never attend another professional military school in residence. The school adjusted this year's curriculum to meet the recommendations of the vice commanders, and it will add more war-fighting next year. At the same time, ACSC will continue to offer instruction in the much-needed day-to-day staff officer and commander skills.

Squadron Officer School

Squadron Officer School (SOS) is Air University's entry level school for professional development of young company-grade officers. The retention problems of the past several years have resulted in more than thirty percent of today's officer corps being lieutenants; thus, early professional development has become vitally important to the Air Force. First lieutenants and captains with less than eight years of commissioned active duty find themselves learning group and individual skills in a very competitive environment through lectures, seminars, and field activities. Fifty-three percent of the Air Force's junior officers attend SOS. For eighty-five percent, it's the only Professional Military Education they'll receive in residence.

Last October, SOS introduced its first eight-and-one-half-week class, replacing the school's eleven-week program, which had been in effect since 1973. The former plan produced about 2,800 graduates annually; the new program is projected at 3,400 each year. The current curriculum offers 308 academic instructional hours blocked into four major areas: Officership, the focus of the entire curriculum; Force Employment; Leadership in the Air Force; and Communicative Skills.

The new program is only thirty-five academic hours shorter than its predecessor, meaning the faculty has packed proportionally more into it. For instance, students meet with their section commanders for regularly scheduled counseling. During the eleven-week program, while the section commander reviewed one student's progress, the others had free time. Under the new program, that free time is used for a writing exercise.

Typical of the new curriculum, SOS has reduced the number of speeches a student must give and reduced its objectives in the management area. Force Employment still represents about one-fourth of the academics. The compact schedule, though, has forced reduction in study about the People's Republic of China and the US Army, Navy, and Marine Corps. The SOS Commandant, Col. Christian F. Dreyer, Jr., however, feels the emphasis on Officership and the school's writing program "will go a long way in meeting the needs of the Air Force." He believes that, because the Air Force is bringing in approximately 10,000 new officers a year, "the important thing is to instill in them an appreciation for what's involved in their oath of office."

Curriculum refinements are an on-going activity at Air University as it prepares Air Force officers, junior company grade through field grade, to meet the demands of their profession: employing aerospace forces to fly, fight, and win. ■

Here students at Squadron Officer School take part in an aerospace employment exercise. The school introduced its first eight-and-a-half-week course last October. The focus of the new curriculum is on officership.

The Aerospace Education Foundation's Silver Anniversary

From its invaluable efforts to adapt Air Force training programs for civilian educational institutions, to its "Space Age Seminars" and support of Civil Air Patrol and ROTC, the Aerospace Education Foundation has been and will continue to be a powerful force for understanding aerospace technology and development.

BY MICHAEL J. NISOS, MANAGING DIRECTOR, AEROSPACE EDUCATION FOUNDATION

ALTHOUGH 1981 marks its twenty-fifth anniversary as a corporate entity, the Aerospace Education Foundation existed for several years before 1956, first as an *ad hoc* committee, then as a Council of Educators. In fact, the Foundation has its genesis in AFA's national constitution, which dates back to 1946 and sets forth as a basic objective that AFA members "educate themselves and the public at large in the development of adequate aerospace power for the betterment of mankind."

"Adequate aerospace power" means far more than planes and missiles and the men who operate them. It covers a wide range of issues and activities that go to the heart of the American community. It means encouraging the use of aerospace education in the classroom either as a motivating factor or integrated into the everyday curriculum as an effective way of teaching a variety of subjects. It means serving as a catalyst in the process of educating the public for meaningful participation in this complex technological era. It means supporting the Air Force Junior ROTC in our high schools, the Civil Air Patrol, and the Air Force Senior ROTC in our colleges and universities. And it means making available the aerospace technology of the Air Force for curriculum development in the civilian educational community.

On these terms the Air Force Association implemented its educational efforts in a variety of ways through its Aerospace Education Foundation.

In 1956, the Foundation was incorporated under the laws of the District of Columbia. The purpose and objectives of the Foundation, as specified in its bylaws, are:

1. Education of the public at large for greater understanding of aerospace development;
2. Encouragement of interest and activity in aerospace education and aerospace development on the part of the educational community, including teachers and administrators, both in the United States and abroad;
3. Stimulation of research and study relating to aerospace development and aerospace education;
4. Assistance and encouragement of literary efforts and publications advancing the knowledge of aerospace development and aerospace education;
5. Support of appropriate research and development programs aimed at bringing all phases of the educational system abreast of significant developments of the aerospace age; and
6. Application of aerospace technology to the advancement of education.

The President of the Foundation is always an educator and the Chairman of the Board an individual from the business, industry, or professional community. The current President is Dr. William L. Ramsey, who is also the President of Milwaukee Area Technical College. The Chairman of the Board is Sen. Barry Goldwater of Arizona. The Board of Trustees is made up of individuals from the business, industrial, educational, and professional fields.

The Beginnings

As an organized effort within the Air Force Association structure, the Foundation's education program began taking root early in the 1950s. Professors, deans, and teachers were seeking more information on aerospace and technology for their classrooms. Dr. Leon M. Lessinger, while serving as Associate Commissioner of the US Office of Education, put it this way:

"People who work in the aerospace world are on the frontiers of technological advance. They think in terms of total objectives. They have pioneered the systems approach in getting big jobs accomplished. They are realistic about the present, but think in futures. Research and development is not a fringe benefit for them, but a basic ingredient in their work. Change is not an emergency measure, but a way of life.

"So it wasn't surprising that educators began seeking out the leading aerospace organization in the country—the Air Force Association—as a way for them to get closer to the trends in our modern age.

"Technological revolution was all around the educators, but it had not yet entered their classrooms. It isn't surprising that the Air Force Association, in response, formed the Aerospace Education Foundation. . . ."

Besides the many Air Force personnel, Air Force Association members, Chapter and State Presidents, and National Officers involved in this effort, many other well-known individuals played major roles. A few of them and the positions they held at the time are: Dr. Frank Sorenson, University of Nebraska; Dr. Charles H. Boehm, Commissioner of Public Instruction, Pennsylvania; Dr. Ed D. Trice, Superintendent of Schools, Texarkana, Ark.; Dr. James G. Allen, Chairman, Department of History, University of Colorado; Dr. B. J. Chandler, Dean, College of Education, Northwestern University; and Dr. Robert M. Morgan, US Office of Education.

Symposia and Seminars

Acting on the premise that the Air Force represented a rich but untapped resource of educational ex-

perience that should be shared with the civilian community, the Foundation arranged tours for educators to visit Air Force training facilities and observe their operations. The next logical question of the educators was the training involved and the availability of course materials.

Campus conferences, called "Space Age Seminars," including teachers' workshops, were conducted at numerous locations throughout the United States in cooperation with state departments of education.

Particularly significant were the National Aerospace Education Seminars held annually through 1967 in Washington, D. C. Here, educators and industry representatives could meet to view a broad array of the latest in aerospace technology. Through these projects, close liaison was established with local, state, and private education officials, and a close relationship evolved between the Foundation and the US Office of Education.

In 1964, for example, more than 400 teachers and administrators from seventy-one countries participated in a Washington, D. C., conference sponsored by the Foundation in cooperation with the US Office of Education.

In 1967, a Foundation seminar in Washington featured a battery of nationally known education research and development leaders described by one government education leader as a collection of "more intellectual power than has ever before been mobilized for an exercise of this kind." A book entitled *Technology and Innovation in Education,* based on this seminar, was published by Praeger as a part of that publisher's Special Studies Program.

Sen. Barry Goldwater (R-Ariz.) is the Foundation's Board Chairman.

President of the Aerospace Education Foundation is Dr. William L. Ramsey.

Dr. Don C. Garrison serves the Aerospace Education Foundation as Secretary.

George D. Hardy, a former AFA National President, is Foundation Treasurer.

In 1968, the Foundation broke new ground with a three-day event attracting 1,600 people from all fifty states—the first National Laboratory for the Advancement of Education. It was devoted to "Individualized Learning for the Inner City." It represented a new medium of communications for the creative development and application of innovative education techniques; it featured Air Force course systems.

In 1970, more than 3,000 persons attended the Foundation's second National Laboratory. They came to learn more about "Education for the World of Work," and again Air Force course systems played a major role.

Of particular interest was a classroom demonstration presented by the US Air Force, featuring its driver safety education program. This successful concept was aimed at changing the behavior of drivers (a key factor in the Air Force's decreasing auto accident fatality rate), and it drew keen attention from the attendees.

The Foundation, also highly impressed by this program, later produced *The Safe Driving Handbook* (published by Grosset & Dunlap) based on the Air Force course. The book received wide readership throughout the country.

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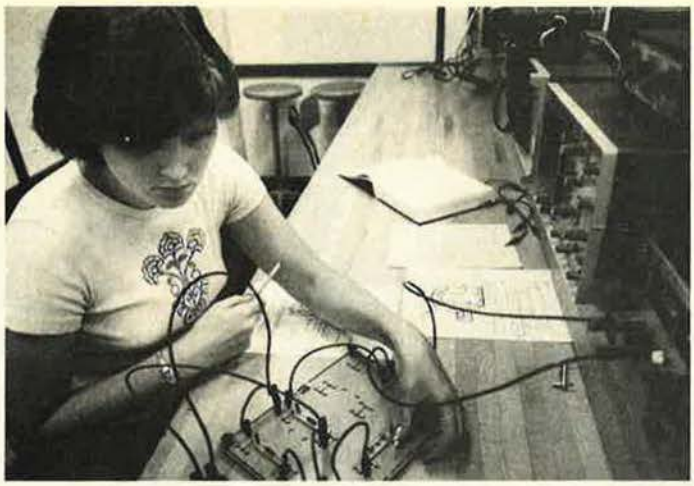


The Aerospace Education Foundation reproduces and disseminates USAF training courses for use by civilian educators. Here a student is engaged in using Electronic Principles course materials.

Congressional Testimony

In sharp contrast to its experience in the aerospace community, the Foundation discovered that less than one percent of the nation's total outlay for education was being invested in research activities.

Thus, the Foundation undertook to help strengthen the emphasis on educational research and development. This effort was explained in a Foundation statement published by Ohio State University's Bureau of Educational Research and Service. The article stated: "In this vast and complex struggle with communism we cannot afford second-best on the research and development front. . . . We need a steady stream of new basic knowledge—available only through research. . . .

"Certain areas permit no compromise with first place—if we are to preserve freedom over the long pull. Basic research is one of these areas. The school system is another. And they go hand in hand. . . .

"Our schools . . . demand aggressive research and development—in quantity—as do no other American institutions, because the end product is fundamental to all our institutions."

Then, as Congress engaged in a lengthy study of educational research, the Aerospace Education Foundation was invited on seven separate occasions to testify before various committees. It was the only group that is not a professional education society to be so honored.

Support of ROTC and CAP

Through the Foundation, AFA fully supports the Air Force Junior and Senior ROTC, the Civil Air Patrol programs, the Arnold Air Society and its female auxiliary, Angel Flight. AFA considers these fine organizations of prime importance as a source of future Air Force leadership and as major elements in aerospace education.

Support is furnished in a variety of ways at the local and state levels of AFA, as well as the national level.

On the local and state level the AFA members and Chapters assist in:

- Hosting ROTC, CAP, Arnold Air Society, and Angel Flight members at AFA meetings and dining-ins.
- Presenting AFA awards and scholarships.
- Presenting gifts and donations of equipment.
- Providing logistical support, as required.

Nationally, AFA sponsors, in cooperation with the Air University, an annual Aerospace Education workshop for Air Force Junior ROTC instructors during AFA's National Convention in Washington. This workshop serves to revalidate the credentials of the instructors.

AFA also sponsors an annual contest for all Air Force Junior ROTC units. The winner receives $2,000 in cash; the first runner-up, $800; the second runner-up, $600; the third runner-up, $400; and the fourth runner-up, $200; plus distinctive plaques. Certificates of Merit are awarded to twenty honorable mentions. The contest topics for the past eight years are shown in the box below.

Regarding the Arnold Air Society and Angel Flight, AFA serves as the national sponsor of these two fine organizations; it provides office space to the Society's Executive Administrator and his staff, and it supports the Society's annual conclave, financially and logistically.

In addition to supporting Air Force activities involved in Aerospace Education, the Foundation also supports and works with the many other organizations participating in such activities. A few of these are the National Congress on Aerospace Education, the American Society for Aerospace Education, FAA, and NASA.

Applying Aerospace Technology

Because the Air Force represents a vast resource of advanced educational concepts, techniques, and course materials, one of the major thrusts of the Aerospace Education Foundation has been its pioneering work in making Air Force-developed occupational instruction available to civilian school systems. Here, the civilian education community realizes the effectiveness of the training establishment existing in the Air Force, which results in a

Annual Contest Topics for AFJROTC Units

1973	"Why America Needs the B-1 Bomber"
1974	"The Air Force as an Unique National Resource"
1975	"How Best to Keep the Peace"
1976	"The Role of Aerospace in American History"
1977	"The Imperatives of National Readiness"
1978	"Theater Defense for the 1980s"
1979	"How Best to Meet the Military Threat"
1980	"Air Force Junior ROTC—for the Cadet, the School, and the Community"
1981	"Freedom Is Not Free"

positive image of the Air Force and saves time and money for the school systems.

The Air Force-developed course systems cover the entire vocational-technical spectrum, and the training is accomplished through a process called Instructional Systems Development, or ISD. It was first applied in a big way during Air Force-industry developments that led to the Apollo series that put men on the moon. Now ISD is applied to curriculum development.

It is an outgrowth of the systems approach to problem solving. In applying systems engineering to the design of curricula, one clearly defines the goals, chooses the training method desired, compares the results with the initial goals, and if the desired results have not been achieved, selects an alternative training technique or changes the system.

Under the ISD process, the Air Force has, for every job, a fully developed and validated instructional system. Each system has performance objectives based on a scientific task analysis of on-the-job requirements and on feedback from job experience. Keyed to these objectives, in a logically sequenced order, are carefully planned texts, workbooks, motion pictures, TV tapes, and other learning materials—all designed to give the student the essential job skills in the shortest possible time and with the highest possible rate of retention. This is significant because we live in a visually oriented society, with many young people exposed to television at an early age.

Each one of these instructional systems is the product of thousands of hours of painstaking and highly thoughtful labor on the part of special teams. The taxpayer has invested heavily in this military experience. And so the question arose: Can we take advantage of this experience in our civilian schools?

This question went unanswered until our Foundation, in 1967, supported and funded by the US Office of Education, began a series of projects that included the following:

- Portions of Air Force course systems were tested in Utah schools with positive results.
- Air Force course systems were inventoried and eighty-two identified as readily adaptable to civilian schools.
- A training course for teachers was developed.
- A nonprofit system of dissemination was developed.

Dissemination of Air Force courses began in 1972, with private funding. To date the program has resulted in the purchase by more than 800 school training systems in all fifty states of more than 3,200 Air Force course packages, many with multiple purchases.

Purchasers of the course systems fall into three main categories. The first of these categories, purchasing fully fifty percent of the courses, consists of post secondary schools—junior and community colleges and technical schools. The second category, purchasing thirty-five percent of all courses sold, consists of business and industry customers. The third category, accounting for the other fifteen percent of courses sold, comprises hospitals, penal institutions, departments of education, and the like.

Here's what some of the users of this technology say:

"I have been using the first two blocks of the Air Force Electronic Principles course with some modification . . . since the fall semester of 1974. Results: (1) Although the student load almost doubled, no additional instructors or school resources were required, and (2) some students who would have had to drop out because of job, travel, overtime, etc., remained in the course because they could make up missed portions at their convenience." (Henry E. Davis, Associate Professor, Engineering Technology, Prince George's Community College, Md.)

"We were so impressed with your Instructional Systems Development video package that we wish to order additional training materials" (Hank Smith, Branch Manager, Butler Service Group, Inc.)

A US Office of Education evaluation team concluded that the Air Force Electronics course, compared to conventional instruction:

- Increases teacher production.
- Generates a faster learning pace.
- Provides greater retention.
- Permits student self-tutoring and self-paced remedial work.
- Allows more instructor time for individualized attention to students.

The two final points demonstrate that the application of systems analysis to education—considered by some to be a mechanistic approach to problem solving—can result in more individualized, more student-centered, more humanistic education, the very type of education most needed by the young people of today.

They deserve this type of skill training. They can get it—and at a minimum cost—because we, as taxpayers, have paid for its development.

The Aerospace Education Foundation is proud to have pioneered in transferring needed materials from Air Force to civilian classrooms. In doing so, the following positive elements have resulted:

- The civilian educational community is deriving the benefit of advanced Air Force instructional systems based on the application of aerospace technology to curriculum development.
- The image of the Air Force is continually being enhanced.
- The work of the Community College of the Air Force in accreditation of Air Force courses and associate degree granting is supported.
- The taxpayer is getting double duty on the defense dollar. ■

Michael J. Nisos has been Managing Director of the Foundation and Director of ROTC Affairs for the Air Force Association since he retired from the Air Force in April 1967. Among his many assignments in the Air Force, he was editorial director of a magazine, teacher and teacher supervisor, inspector, and had extensive experience in ground and air instruction on the principles and application of navigation, bombing, radar, and meteorology. His twenty-four-year Air Force career culminated in Legislative Liaison, Office of the Secretary of the Air Force, with the final six months as Military Assistant to the then-Vice President, Hubert H. Humphrey. He has a Master of Arts degree in Education from the Catholic University of America and is a member of the major education associations.

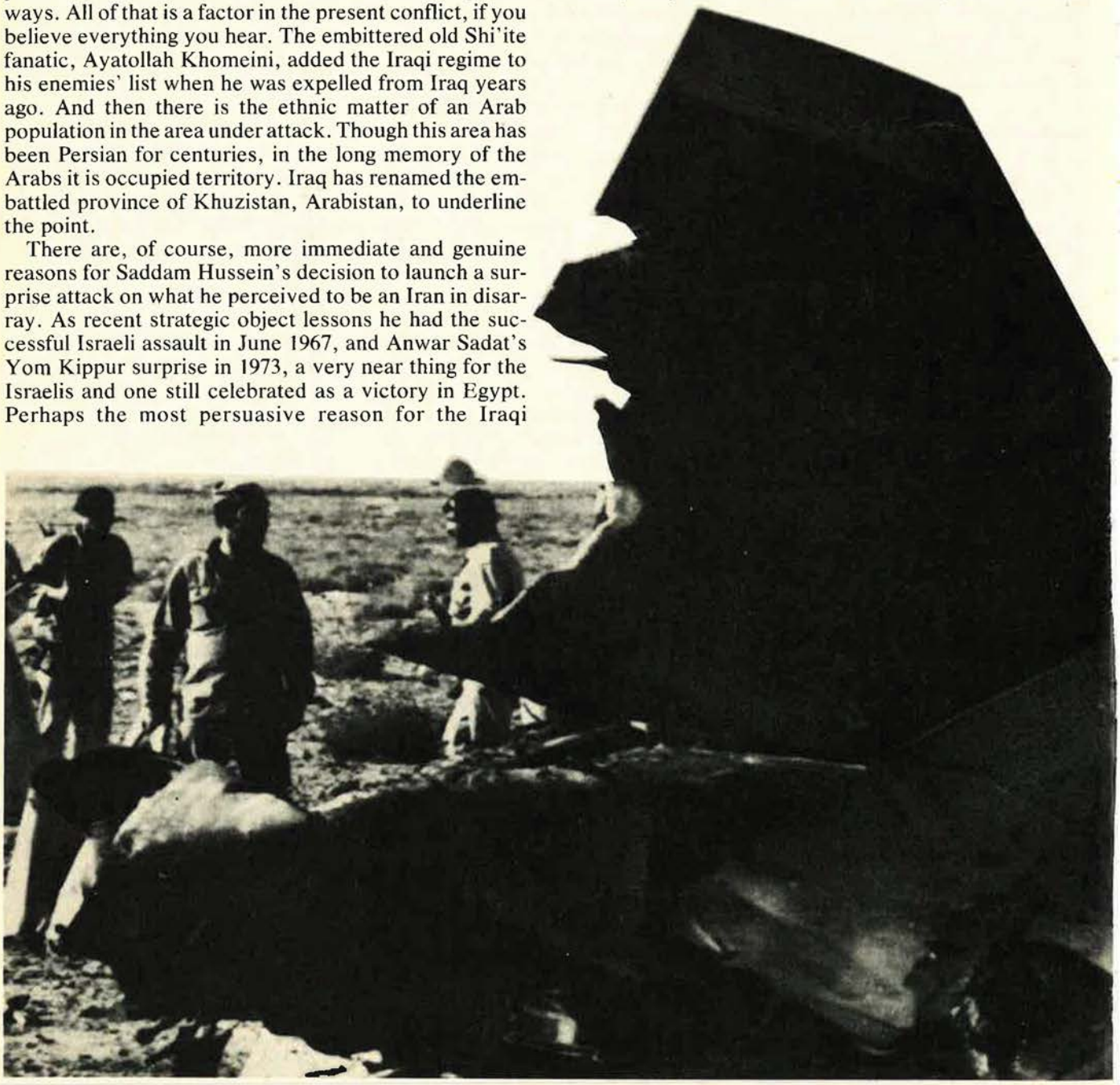
Employment of airpower in the Iraq-Iran war has been more haphazard or episodic than according to accepted doctrine. The reasons are as murky as the battlefield communiqués, but the outcome affects US and allied interests in the Middle East . . .

Where the Cauldron Boiled Over

BY GEN. T. R. MILTON, USAF (RET.), CONTRIBUTING EDITOR

JUDGING from Iraqi propaganda, Moslems have a long memory. The causes for the present war, it seems, go back to the year 637 and the battle of Quaddisieh in which the Arabs defeated the Persians. A few years later, the Islamic version of the Great Schism took place as the Sunnis and the Shi'ites went their separate ways. All of that is a factor in the present conflict, if you believe everything you hear. The embittered old Shi'ite fanatic, Ayatollah Khomeini, added the Iraqi regime to his enemies' list when he was expelled from Iraq years ago. And then there is the ethnic matter of an Arab population in the area under attack. Though this area has been Persian for centuries, in the long memory of the Arabs it is occupied territory. Iraq has renamed the embattled province of Khuzistan, Arabistan, to underline the point.

There are, of course, more immediate and genuine reasons for Saddam Hussein's decision to launch a surprise attack on what he perceived to be an Iran in disarray. As recent strategic object lessons he had the successful Israeli assault in June 1967, and Anwar Sadat's Yom Kippur surprise in 1973, a very near thing for the Israelis and one still celebrated as a victory in Egypt. Perhaps the most persuasive reason for the Iraqi strongman's decision to go to war was his perception of the situation in the Persian Gulf. The Shah had a clear objective during the years of his frantic arms buildup. That was to make Iran the power, and thus the policeman, in the Gulf. When the British pulled out in the 1960s, they left a vacuum. The Shah, with our en-



thusiastic help, rushed in to fill it. Now, once again, there is a power vacuum. Who better than Iraq, thought Saddam Hussein, to fill it this time?

Possibly that is the answer; or just as possibly, the war is only for some limited territorial objectives: the barren islands seized from Iraq by the Shah, for instance, and enough territory to give Iraq control over the Shatt-al-Arab, the passageway to the Gulf. Since Hussein evidently cleared his plans with his neighbors—Saudi Arabia, Kuwait, and Jordan—this latter reason seems the probable one he gave to them. Whatever his reasons, Saddam Hussein is a tough customer who has hanged and shot a good many people on his way up. It seems unlikely that he will come along quietly to any mediation conference that does not give him what he is after. Unless, that is, things go so slowly, or so badly, for Iraq that Hussein does not make it to the peace talks.

Pan-Arab Support?

Regardless of his reputation as a man who has left a lot of bones along his road to power, Saddam Hussein has the support of Jordan and the Arab states in the Gulf. Egypt, of course, is the odd man out these days in the Arab world, in spite of having shed far more than its share of blood for the Arab cause. Syria and Libya have signed a curious unification pact, based, presumably, on the money Qaddafi has at his disposal, and have come out in support of Iran. Otherwise, the troubled regime of Syria's Assad appears to be growing ever closer to the Soviets. As for Qaddafi, he committed the unforgivable insult to the Saudi regime by calling for a holy war to liberate Mecca, defiled by our AWACS airplanes, from the custody of the Saudis. King Khalid of Saudi Arabia broke diplomatic relations with Libya almost instantly.

The rest of the Arab Nation, as King Hussein of Jordan puts it, is apparently, if reluctantly, on Iraq's side. King Hussein—no relation to Saddam Hussein—has been enthusiastic in his support. The Jordanian evening news featured the King's two-day visit to Baghdad in late October, an occasion of much warm camaraderie between the two Husseins. As the royal airplane was escorted to the border by Iraqi MiG-23s, King Hussein may have reflected on what a changing and dangerous world this is for royalty. His cousin, King Faisal, was the Hashemite ruler of Iraq until he was murdered by the Iraq military junta now represented by Saddam Hussein.

In contrast to Jordan, Saudi Arabia and the other Gulf states have restrained their enthusiasm for Iraq's adventure, but they have not opposed it. Whatever their worries about Iraq's eventual aims, Khomeini's Islamic revolution—and his desire to export it—remains an overriding concern to the Gulf sheikdoms. That still leaves Saddam Hussein in the awkward position of not having won the quick victory he was after. If the war drags on without a settlement, he may end up a victim of his own ambitious scheme.

Employment of Airpower

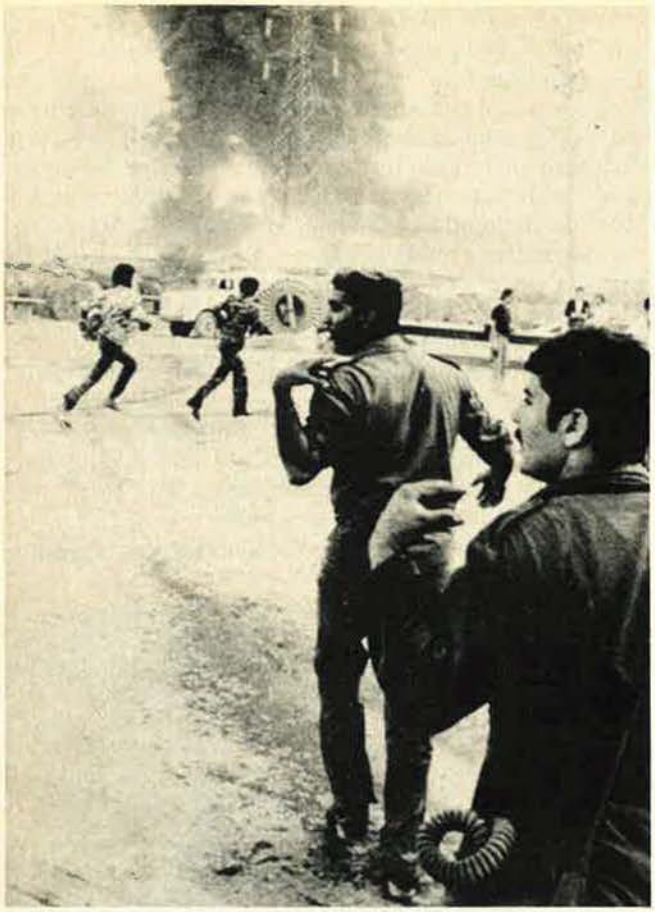
During the first two months, the Iraq-Iran war has been a restrained, even timid one, considering the modern firepower available to each side. In fact, the Iranian Air Force, decimated though it may have been by the Islamic revolution, has been more than a match for the Iraqis. One of the apparent reasons for this surprising standoff should be encouraging to our side: The Soviets do a poor job of training their clients in the business of air warfare. It seems to be more a square-filling approach than one devoted to the fine art of air tactics. Maybe this unimaginative concept is traceable to the fact that the Soviets have not had much air combat in the past thirty-five years. For whatever reason, Arab air forces, like those of Egypt, Algeria, and quite evidently, Iraq, have not prospered under the Soviet system. By comparison, the Iranians seem to have remembered some of their American lessons. If their command and control apparatus, along with their logistics and maintenance systems, were in less of a shambles, it is likely they would have the Iraqi air in a corner.

Another encouraging note for our side coming out of this hapless war is the evidence, once again, that Soviet airplanes are inferior to the United States product. If we can believe what a Jordanian officer told me, the Iraqi pilots are not great admirers of the MiG-23. As for the MiG-21, it has never really sparkled in combat against American, or for that matter, French and Israeli airplanes. The score for the Israeli Etzion squadrons in the 1973 war was Etzion forty, Egypt zero.

Iranian troops near Ahwaz take cover near armored vehicles while being strafed by an Iraqi MiG fighter. The unsuccessful attack inflicted no casualties. (Wide World Photos)

Neither side, however, is showing much in the way of professional application of airpower. The targets, with the exception of the oil refineries, appear to be chosen at random. There has been little evidence that either side is using its air forces for any objective purpose, whether to gain air superiority, in close support, or in a planned interdiction campaign. Unlikely though it may be, the thought occurs that the Iraqis are trying the sort of air warfare—whatever did we call it: giving signals?—that our own politicians devised in the '60s. As for the Iranians, it is a wonder they are fighting as well as they are. Only Allah knows what they are using in the way of a command structure, how they locate their spares, or who is preparing the operation orders.

Left, Iraqi soldiers examine tail section of Iranian jet fighter downed by missile near Basra, Iran. (Wide World Photos)



Iraqi soldiers rush toward an electrical generating plant near Baghdad following bombing raid by Iranian aircraft. The air war in the Mideast has been inconclusive. (Wide World Photos)

Anyway, the targets being hit are, for the most part, unprofitable ones. The Iranians, for instance, were trying persistently to knock out a bridge near Khorramshahr using two-ship sorties of F-4s armed with 500-pound bombs.

In the long run, attrition, lack of supplies, and, ironically, a shortage of POL will probably do the Iranians in. When Iraq put the Abadan refinery out of business, Iran began operating on however many days storage it had of jet fuel and gasoline. Libya has promised to help, but how is another matter.

If we are to believe Saddam Hussein, Iraq wants to end the conflict and negotiate a few limited objectives. Obviously, control of the Shatt-al-Arab is one of these. Whether the Ayatollah Khomeini will negotiate with anyone on terms other than his own was one of the unanswered questions as Saddam Hussein's failed blitzkrieg dragged into its second month.

The Larger Implications

Well, so much for the war. As wars go, it is an unimportant one except for the people in it. What is important is the danger signal it is giving to a world so desperately dependent on Middle East oil and, therefore, on Middle East stability.

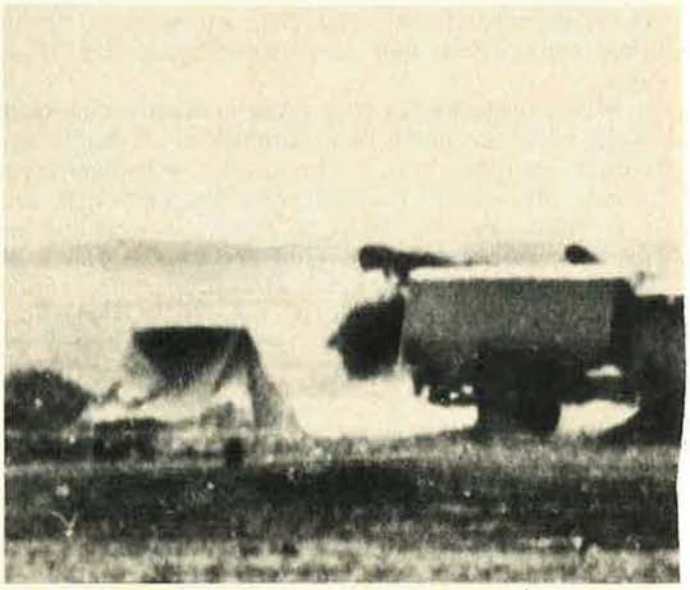
There are about twenty-two Arab countries. Despite King Hussein's use of the term Arab Nation, they are a long way from being united except, perhaps, in their common antipathy toward Israel. Libya and Syria support Iran in the war and are, in addition, clients of the atheistic Soviets, an anomaly for any Moslem land. Iraq itself is a Soviet client, if not a very reliable one these days, and South Yemen is practically a Soviet satellite. Then there are the Western-oriented Arab states led by Saudi Arabia and including Sadat's Egypt, still isolated in many ways from the rest of the Arab world in punishment for the Camp David accord.

The Arab support for Iraq in this war with Iran is, as we have noted, muted. Saudi Arabia and the rest of the oil-producing Gulf states are hosts to hundreds of thousands of Palestinians who do much of the running of the oil fields. The Palestinians pose an increasingly serious, if ill-defined, problem to the sparsely populated oil sheikdoms. The loyalty of these expatriates is always in question, but the oil could not flow without them. Their grievance against Israel is shared by their host countries, but their basic loyalties and their capacity for trouble are a worry to these oil-rich but still essentially feudal lands. The prospect of the Persian Gulf being dominated by an Iran intent on spreading its Islamic revolution is a further complicating concern of countries harboring so many foreigners within their borders. Under the circumstances, Arabian Iraq, with all its faults, is an easy choice for the oil sheiks over the government of the Persian mullahs.

Jordan's Case

Under the Baghdad agreement of 1978, an arrangement in which the oil-producing countries agree to provide help to their less fortunate Arab neighbors, Iraq funnels a considerable amount of money to Jordan, perhaps as much as $300 million a year. That alone is a persuasive reason for Jordan's loyalty to Iraq. Beyond that, however, King Hussein is a survivor who has learned to adapt to the changing pressures of the world he must live in.

Jordan, like many countries in the Middle East, owes its boundaries to lines a British official drew on a map years ago, never dreaming he was making decisions that would some day affect the distribution of the oil treasure and thus the whole course of world history. The Brit

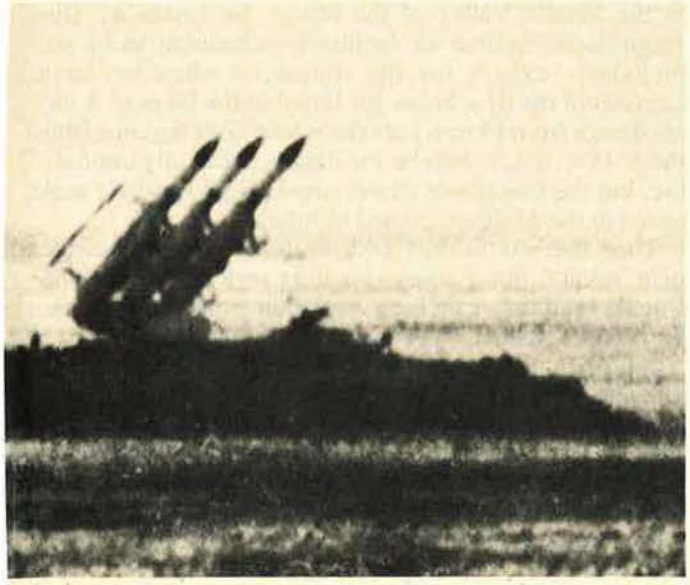


who drew those lines put Jordan squarely in the middle between the oil-rich nations of Kuwait, Saudi Arabia, and Iraq, the not-so-oil-rich Syria, and the other have-not, Israel. There have been times, as during the Palestinian rebellion of 1970, when Syria has been a sort of ally of Jordan. There have been other times, such as now, when Syria seems very close to being an enemy. Similarly, the equally erratic Baathist regime in Iraq has both threatened and befriended Jordan. For whatever reason, it is now a friend.

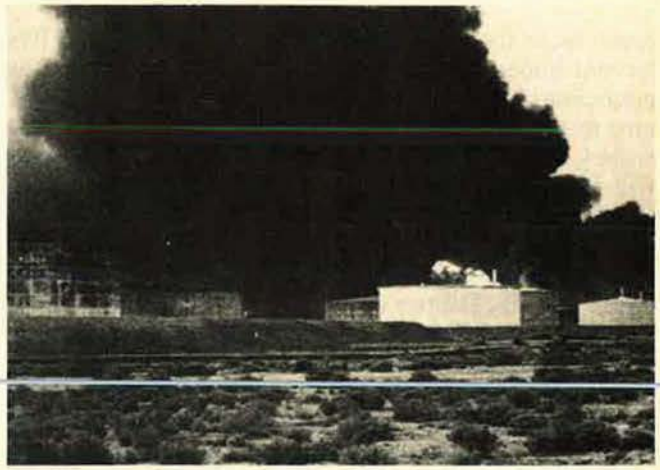
In the case of this Iran-Iraq war, King Hussein has still another reason for taking sides, and that is his friendship with the late Shah of Iran. It is yet another reason, but probably not one that had much to do with his decision. The King is a practical man, and there were practical reasons for his siding with Iraq.

By and large, Jordan is also a friend of the United States, at least to the extent circumstances allow her to be. The military equipment in Jordan has been largely American up until now. The Jordanian Air Force flies F-5As, F-5Es, trains in T-37s, and uses the ubiquitous C-130 for airlift support. Hawk missiles provide the antiaircraft defense, although they are Hawks with a slight difference. As a concession to the sentiment in Congress against giving these missiles to an enemy of Israel, Jordan's Hawks are fixed, rather than mobile.

The American corner on the Jordanian military market, however, has come to an end. Jordan wanted a new fighter. Specifically, it wanted the F-16—the real F-16, not the one with the J79 engine. The one, in other words, like the F-16s in Israel and Egypt. This time, unlike the battle over the Hawks, the pressure was too great. The Jordanian Air Force turned to the French who are ever-present, just outside the door whenever we drop a sale. Jordan is buying the F-1 after negotiating a contract the terms of which seem attractive. The French have agreed to furnish any munitions that will fit on the F-1 except nuclear weapons. Any future developments will also be made available to Jordan. Beyond that, all manuals and training will be in English, and the French have further promised to build a depot maintenance facility in Jordan. Those, at any rate, are the promises.



Still, it will complicate life for a small air force like Jordan's to take on a new airplane from another country. Their senior officers say they would rather not have done it, but what else was there to do? The Jordanian Air Force chief sees Jordan as ringed by more powerful military forces and not just threatened, he insists, by Israel. If Jordan is attacked, it is his air force's job to pull a few teeth before help comes. To do this tooth pulling, he feels the need of aircraft with more sophisticated fire-control systems than those in F-5Es. So, if he cannot have F-16s or F-18s—both airplanes he admires—then it has to be the F-1.



Smoke engulfs storage tanks at the oil refinery at Abadan, Iran, the aftermath of an Iraqi air attack. In the aerial war, neither side sought air supremacy. (Wide World Photos)

Israel On the Sidelines

The spectator in this war, for once in its brief and turbulent history, is Israel. It is a strange feeling for the Israelis to be sitting in the grandstand while their Moslem enemies go at each other. Nonetheless, it is not entirely a comforting feeling. The Israelis see this war as a dangerous affair not only for the Mideast but for the world at large. So far as their immediate security is concerned, Israeli military analysts worry about the Jordan-Iraq entente as a possible forerunner of the day when Iraqi forces will deploy to Jordan and thus significantly increase the threat to Israel's eastern border. As for the war itself, the professional Israelis have contempt for the way it is being conducted. In their admittedly prejudiced view, this conflict should serve as a lesson to the United States of the futility of placing any serious reliance on Arab military capabilities. The Iranians, as the Israelis see things, should have been too demoralized and disorganized to have been effective, but, even so, they have done a fair job of holding off what should have been a superior and cohesive Iraqi force.

Aside from their view of this present conflict as an amateur affair, the Israelis have some forebodings about their military status in the Middle East a few years hence. Saudi Arabia has requested long-range tanks and

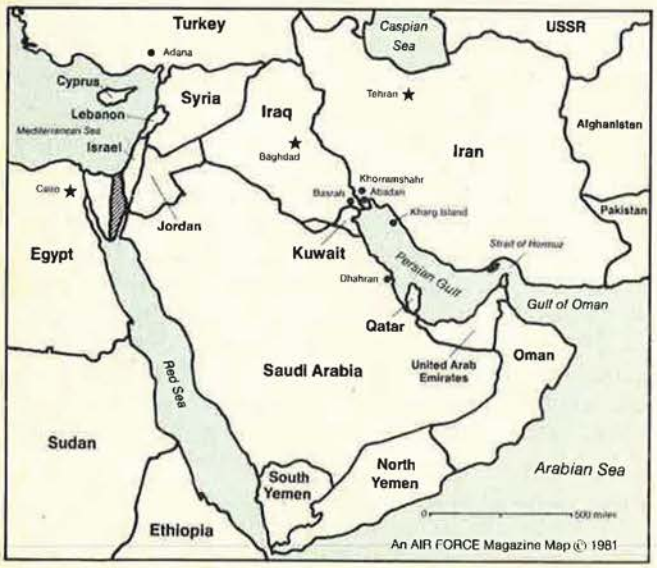
An Iraqi SAM missile emplacement near Basra. Targets attacked by both Iranian and Iraqi aircraft seemed to be picked at random with no strategic forethought. (Wide World Photos)

Gen. T. R. Milton, a regular contributor to AIR FORCE *Magazine, visited the Middle East for this first-person assessment based on interviews with a range of government and military persons close to the issues. He graduated from the US Military Academy at West Point in 1940, and commanded bombing units in the air war in Europe during World War II. He commanded a variety of units in his later career, and also served as Comptroller of the Air Force and US Representative to the NATO Military Committee before his retirement from active duty in 1974.*

bomb racks for the F-15s it will soon acquire. Israel has fervent hopes—hopes certain to be made clear to our politicians—that we turn the Saudis down. Let them turn to the French, is the Israeli view, and spend their money on underwriting the Mirage 4000. That airplane will never equal the threat of the F-15 equipped with long-range fuel tanks and bombs. The Saudis, on the other hand, have a legitimate case for more range and capability if they are to contemplate a serious defense of their oil fields. The test of this one will come next spring. The decision of President Reagan, and the Congress, on the Saudi request will have a far-reaching effect on our future relationships in the Gulf. Considering the volatility of that region, and remembering our experience in arming the Shah, the decision will not be an easy one. On balance, and considering the importance of Saudi Arabia to our own and thus Israel's future, it would seem in our interest to furnish the tanks and the racks.

The US Role

Our own role in this unfolding Middle East drama has so far been a minor one. The general feeling seems to be that we have played it about right. The deployment of the AWACS had a reassuring effect on those Arab nations more or less on our side, and it was almost hysterically denounced by our enemies. Similarly, the casual way our fighter squadrons cross the Atlantic has not gone unnoticed. The lack of any fanfare about these deployments has underlined the routine way we view them. One way or another, the United States is gradually increasing its visibility in that vital part of the world. Whether we have any clear idea as to how to deal with the difficult problems that will remain, no matter what our visibility, is something yet to be determined.



Looking Ahead, Regionally

The road ahead is a rocky one. No matter what the outcome of this ill-advised and ineptly fought war, we can be sure that a deep and lasting enmity has been created between Iraq and Iran. The results of this enmity will almost certainly be another arms buildup when this particular skirmish has ended and, at some point, another war. It is the way things happen.

An interesting question yet to be answered is who will furnish the arms for Iran when it seeks to strengthen its position. Iraq appears to be drifting towards the West as its arms supplier, although nothing is ever clear about that murderous regime, but Iran is one of the world's enigmas. Presumably, the mullahs now realize that their Islamic state needs military strength and not just self-righteous faith to guard their revolution.

Where they will go for this rearmament is the question. Perhaps the Soviets will seize their chance under some version of the Brezhnev Doctrine, ditching Iraq in the process. Or maybe Iran will come to its senses with a new and once again Western-oriented government.

Whatever happens, Iraq-Iran hostility is almost certainly going to persist for a very long time, and oil from those two countries is going to be permanently at risk. If the amateur performances of the two opposing air forces have demonstrated nothing else, they have proven the extreme vulnerability of oil production in the Gulf. Any second-rate air force can knock it out.

The effect of this war on Turkey could be calamitous. Iraq has been a principal supplier to Turkey, and that supply is now cut off. With winter coming on, Turkey's already grave internal problems could be made worse by an oil shortage, or just an increase in prices. The latter seems inevitable.

Saddam Hussein has set a dangerous course of events in motion. Even with the best of efforts, it will be awhile before we will have the sort of military capability to offer real protection to our friends—and thus to ourselves—in the Gulf.

In the meantime, there do seem to be a few possible ways to stretch our capabilities. There is the Etzion base in the Sinai's Valley of the Moon, for instance. This magnificent tactical air facility is scheduled to be demolished—except for the runways—when we have completed the new bases for Israel in the Negev. A circle drawn from Etzion puts the whole Gulf region within the F-15's radius. Maybe the idea is politically impossible, but the thought of destroying Etzion while we seek bases in the Mideast is hard to take.

Then there is Turkey and the NATO base, Incirlik, near Adana, but Turkey is a long way from the Gulf. Finally, and this is an idea whose time may have come, we might consider Cyprus.

Beyond any doubt, the Mideast has become our greatest danger area. Using Israeli bases would clearly jeopardize anything we might try to do in concert with the Arabs. But Etzion, or Eitam, the other Sinai base doomed by Camp David, would seem sensible possibilities. Surely the Camp David accords can at least be reexamined in the light of the new situation in the Mideast. ■

SOVIET AEROSPACE ALMANAC

The March issue of AIR FORCE Magazine will once again feature The Soviet Aerospace Almanac—a comprehensive examination of Soviet strategic and tactical aerospace forces, including organization, deployment, missions, doctrine, and concepts... key military leaders... Soviet R&D... military space applications... analysis of total military-related expenditures... statistical data on Soviet aerospace forces and budgets... a "Jane's" prepared Gallery of Soviet Aerospace Weapon Systems... plus other features... a must for military planners... a year-round reference issue... a great advertising opportunity. Closing for reservations is January 23, copy by February 5.

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., Nov. 24

Proxmire Votes Yea

You know the outlook for defense is brighter when Sen. William Proxmire (D-Wis.), self-appointed watchdog of government spending, votes for defense appropriations $6.5 billion more than the President's request.

As the Senator said, his vote for the defense bill probably represents the first time in twenty years he has lent support for spending legislation above the amount requested.

It doesn't take much insight to recognize that Senator Proxmire, a member of the Appropriations Defense subcommittee, is not satisfied with current capabilities. It also seems consistent with public mood as shown on November 4; *i.e.*, election of strong pro-defense candidates and a surprising ousting of incumbents not responsive to national security concerns.

The Senator from Wisconsin pointed to manpower and readiness inadequacies as reasons for a "yea" vote on the spending package. Senator Proxmire said the manpower provisions, though enhanced by the 11.7 percent pay raise and the Nunn-Warner benefits, remain insufficient to make up for the loss of purchasing power over the last several years. Further, the much-publicized low operational readiness rates of our aircraft, tanks, and overall equipment further swayed the Senator to vote for increased funds.

The defense establishment seems to have a new-found friend in the gentleman from Wisconsin.

MX Back on Target

MX withstood another attempt to whittle away its R&D funds for FY '81.

Sen. Thomas Eagleton (D-Mo.) wanted to parallel House action by reducing the MX program by $120 million. The action in the form of an amendment to the Defense Appropriations measure was soundly defeated by a vote of twelve to sixty-five.

Budget Finalized

The House and Senate—after deliberate preelection delays—reached speedy agreement on binding ceilings for the FY '81 budget.

With all hopes for a balanced budget long forgotten, final ceilings result in a deficit of $27.4 billion, assuming a $35 billion tax cut and acceptance of the Reconciliation Bill. Added defense appropriations and higher than anticipated inflation were prime causes of the substantial increases over the FY '80 figures.

The budget earmarks $172.7 billion in budget authority and $159.0 billion in outlays for defense. The preliminary resolution had targeted $170.5 billion and $153.7 billion respectively.

The Reconciliation Bill, established by the first resolution to save approximately $10 billion through various program cuts, is out of conference and awaits final approval by the House and Senate. The conferees did vote to retain the semiannual Cost of Living Adjustment (COLA) for military and federal retirees.

Brown vs. Senate on Spending

Outgoing Secretary of Defense Harold Brown urged the Senate to reverse several provisions in the House-passed $157.2 billion spending package for DoD.

The Senate, however, passed its own $160.8 billion bill for FY '81. The figure represents restoration of some major R&D cuts in Air Force programs made by the House. As the Pentagon chief requested: $120 million was restored to the MX program to prevent flight date schedule slippage, the Civil Reserve Air Fleet (CRAF) was funded at the authorized amount of $54.8 million, and $754 million was restored to cover inflation in overall R&D programs. The CX was funded at $35 million as authorized. The House had allotted only $20 million for the CX, which Secretary Brown warned would delay development in the early stages. Despite badly needed C-5 enhancements, current airlift capability suffers severe shortfalls.

Similarly, the Senate followed Dr. Brown's advice on restoring $40 million to the USAF O&M account for C-5 and C-141 fleets—the House had directed the savings through rebasing the two fleets on the east coast to "reflect greater airlift requirements for Europe." Secretary Brown warned that the rebasing would be "disastrous if war occurs. . . ."

Although not requested by the Administration, the Senate bill allows $300 million for R&D of a new multirole bomber and $75 million for long-lead items, topping the House figure by $200 million.

The Senate, however, rejected Administration calls for reduction in House procurement figures, especially concerning aircraft. More than $1 billion was included for additional purchases of F-14s, F-15s, F-18s, C-130s, and two-seater A-7s.

Conferees expected to meet the first week of December to thrash out a compromise. Top congressional staff expect the final figure to be close to the Senate proposal.

Tower Outlines Defense Ahead

Sen. John Tower (R-Tex.), incoming Chairman of the Senate Armed Services Committee, barring appointment as Secretary of Defense, outlined what DoD can expect with a GOP Senate and White House.

The Senator stressed across-the-board improvements to eliminate Soviet advantages over US capabilities.

Expect moves toward:

- Increases in aircraft production.
- A B-1 derivative as a B-52 follow-on.
- Military pay raise of 13.5 percent.
- FY '81 Supplemental as much as $3 billion for fuel, inflation, war reserves, and added pay for mid-level officers and enlisteds.
- Support for the Enhanced Radiation Warhead (the so-called neutron bomb).
- Defense budgets four to eight percent above current Administration projections.
- Improvements in airlift and sealift for the Rapid Deployment Force.
- MX to proceed on schedule, but a possible change in the basing mode.
- Cutting lead times between deployment of a weapon system and development of a follow-on. ■

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Topics and challenges of vital concern to the Air Force—from the Rapid Deployment Force to the need for new strategic weapon systems—were highlighted by senior Air Force and Defense Department officials at a recent Air Force Association symposium, aptly titled . . .

AMERICA'S SECURITY IN THE '80s

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY AND TECHNOLOGY)

AT THE end of the Carter Administration's term, USAF, according to Air Force Secretary Dr. Hans Mark, is making "good progress" in both its programmatic and operational priorities. In his keynote address to the Air Force Association's national symposium, "America's Security in the '80s," held in Los Angeles, Calif., October 23–24, 1980, Dr. Mark underscored what he termed advances over the past four years in the modernization of USAF's nuclear strategic forces, airlift capability, and space operations. To increase "our ability to engage in battle on short notice and to sustain our forces once they are engaged, we have been seriously attacking the dual problems of providing the necessary logistics support for our equipment and providing the programs necessary . . . to retain people of the highest quality," he said.

In enumerating specific progress in high-priority programs, he cited the imminent fielding of cruise missiles and conversion of the B-52s to carry these weapons. He stressed further that "we are firmly committed to field the MX missile system using multiple protective shelter basing. We will make a decision early next year on how to go about creating a new manned penetrating bomber."

On the operational side, he said, "we have improved the ability of our most modern aircraft to fly more combat sorties, and the Congress has enacted a pay and benefits package that will make it somewhat easier for us to retain our most valuable people."

In discussing congressional skepticism concerning the proposed CX airlifter, Dr. Mark suggested that the problem centers not so much on the requirement but on "how we have tried to fill it. We have been criticized for not knowing precisely what we want. I have to tell you that the criticism is accurate. It reflects [still] on-going conversations in the Defense Department about what we ought to be doing." He predicted that once a decision is made on precisely what kind of aircraft should be built—and how soon it should be built—Congress will appropriate the required funding. The recent RFP (request for proposals) concerning the CX, a versatile strategic airlift aircraft with possible ancillary intratheater airlift capabilities, he said, elicits innovative recommendations by the aerospace industry on how this requirement should be met.

Turning to the so-called Stealth technology that has been featured prominently by the outgoing Administration, Dr. Mark explained to the symposium that "all of us agree that modernization of our nuclear strategic forces is the highest priority [challenge we face]. One element involved here is [creation] of a new large warfighting aircraft of some kind. I think that there is a possibility that such an aircraft may be one that applies this kind of technology." Appending the caveat that the "operative word is 'may,' " Secretary Mark emphasized that "we haven't looked close enough" to make any decisions yet concerning whether the Stealth technology should or could be incorporated into the country's next strategic aircraft. The next Secretary of Defense is to report to Congress's two armed services committees by March 15, 1981, on how the requirement for a new multirole bomber is to be met. While Congress did not specify whether a single or several types of aircraft are needed, its mandate is that at least one design achieve operational status by 1987.

Dealing with the prospects and potential first application of directed-energy weapons (high-energy lasers and charged or neutral particle beam designs), Dr. Mark termed the operational feasibility of high-energy laser weapons "rather high." USAF's Airborne Laser Laboratory (ALL), a converted C-135, he said, is now "completed and flying." He added that "in the not too distant future" ALL will demonstrate the feasibility of shooting down surface-to-air missiles with laser weapons. He predicted that "in the next decade" it will become practical to equip large, high-flying aircraft with laser weapons. The reasons why laser weapons probably will be confined to aircraft of this type, he suggested, is that

these systems are "fairly massive," require considerable amounts of power—on the order of putting an extra jet engine on an aircraft—and that propagation of laser beams in the rarified atmosphere encountered in the 35,000-foot to 40,000-foot altitude range is good. Further, at these higher altitudes, laser weapons are effective over the relatively long ranges that are required to make them attractive from an operational point of view.

Dr. Mark was less sanguine about the potential of laser weapons aboard low-flying aircraft. Under these conditions, he warned, propagation of the laser beam is hampered by water vapor, carbon dioxide, and dense concentrations of molecules that singly or in combination cause the air to heat up, which leads to "thermal blooming that can destroy" the effectiveness of laser weapons. He added that this problem is worse in the case of shipboard-based laser weapons, with the result that there is little likelihood that such weapons could be deployed in the foreseeable future. Although he rated the theoretical feasibility of space-based laser weapons as good—"lasers work fine in the vacuum of space"—Dr. Mark warned that their great size and weight militate against their use until space becomes accessible to heavier and bulkier payloads than are feasible at present. He rated the feasibility of particle beam weapons as "much later, if ever."

Air Force Secretary Dr. Hans Mark (right) confers with Gen. Richard L. Lawson, US Representative to the Military Committee, NATO. Both men addressed the AFA symposium.

So far as tactical airpower is concerned, Secretary Mark felt that the F-15 and F-16 represent the "finest aerodynamic vehicles in the world today." The challenge in the 1980s is to acquire these aircraft in the programmed numbers yet, at the same time, "keep some of the production lines open" to provide the option for additional purchases. By promoting foreign sales of the current generation of USAF tactical aircraft—F-15, F-16, and A-10—Dr. Mark suggested it might be possible to keep production lines warm for some time to come. He questioned the soundness of accounting standards that impel the Air Force to buy aircraft as rapidly as possible for the sole purpose of keeping unit costs low. Nobody, he complained, bothers to put a value on open production lines even though often they turn out to be "invaluable."

Looking beyond the present generation of tactical aircraft, Secretary Mark, taking a position that he said was not being shared by USAF, predicted that future designs will have to include VTOL (vertical takeoff and landing) capabilities. Admitting that at this time VTOL technologies were still exacting unacceptable penalties in terms of curtailed range and payload, he nevertheless saw evidence that "it will become possible in time for the next generation of combat aircraft to produce high-performance VTOL designs."

The very nature of the Space Shuttle, Dr. Mark told the AFA symposium, will, over the next few years, lead to "turbulence" and necessitate the formulation of new bureaucratic arrangements to accommodate national security and civilian requirements simultaneously. The resulting "institutional problem" reflects the fact that "when and if we convert all of our [military and intelligence] payloads to the Shuttle, we no longer will be in control of our own launch operations. This is a circumstance that anybody responsible for Air Force operations in space has to look at with some concern."

The 1958 Space Act, the law under which the US conducts space operations, envisioned two separate and distinct types of space programs, Dr. Mark pointed out: "One that is carried out in the open and devoted to research and another concerned with national security." The Shuttle, he warned, does not lend itself easily to such a division. "I want to preserve the intent of the law. But we in the national security sector must control our own space program. There can't be any question on that score in my mind," he emphasized. It is not yet clear, however, how this can be achieved in the case of the Shuttle, Dr. Mark added. A step in the right direction was a Memorandum of Understanding recently agreed to by the Air Force, the Defense Department's executive agency for the Shuttle program, and NASA, concerning a certain class of missions "called dedicated missions." These missions would be run by the Air Force. "We would have the ship commander, the mission director, and the controller, [all of whom] would report through USAF's chain of command," meaning Air Force Systems Command's Space Division or "whatever we come up with," he explained.

The Challenge of Force Protection

"The US depends [in a political, economic, and military sense] on regions of the world that are much closer to our adversaries than they are to us. [These regions] often are more than 10,000 miles from us, yet no more than between 100 and 1,000 miles from the Soviet

Dr. Seymour L. Zeiberg, Deputy Under Secretary of Defense for Strategic and Space Systems, highlighted the Rapid Deployment Force.

Union. Further, these regions are small and isolated and hence can be overrun easily by a dedicated invasion force," Dr. Seymour L. Zeiberg, Deputy Under Secretary of Defense for Strategic and Space Systems, told the AFA symposium. Hence, there is a pronounced need for force-projection forces capable of global reach and high responsiveness, which translates into "an upgraded bomber force and considerable increase in our airlift capability." Pointing out that the Soviets during last year's invasion of Afghanistan needed only five hours to take over Kabul airport with paratroopers and about forty-eight hours to have an entire mobile division in place, he stressed that US force-projection forces must be capable of decisive action "on the time scale of a day" anywhere in the world.

Since US options to preposition war supplies at potential conflict sites are sharply curtailed, the alternatives are either a large in-theater presence or the rapid application of massive firepower delivered by carrier-based aircraft and CONUS-based long-range bombers. Citing three concomitants—the upgrading of the B-52 fleet to dovetail with the peculiar requirements of the Rapid Deployment Force, the expeditious development and deployment of a new long-range bomber, and massive airlift enhancements—Dr. Zeiberg pegged the total cost of such a program at between $25 billion and $30 billion.

These requirements, he warned, compete against other elements in the Defense budget. Support for force-projection requirements depends largely on the public's understanding of the necessity of these requirements. Congress, and the public at large, he pointed out, "need to understand that a show of force by our bombers today can be as effective and vital as Teddy

The legendary Jimmy Doolittle (left), AFA's first national President and a "regular" at AFA's annual Los Angeles symposia, is shown with Lt. Gen. Richard C. Henry, Commander of AFSC's Space Division (second from left), AFA Board Chairman Dan Callahan (second from right), and Secretary Mark (right).

Roosevelt's Great White Fleet going around the world in its day."

Dr. Zeiberg told the AFA symposium that one of the most effective means for increasing the free world's force-projection capabilities would be to use theater forces for rapid deployment and then "backfill" the drawn down force.

But in the case of two countries that appear especially well-suited for such a stratagem—Germany and Japan—their postwar constitutions prohibit force-projection and other offensive military operations by their armed forces. There might be ways "to work around" this problem by using only theater-based US forces for force projection and filling the void they leave by calling up the reserves of the countries in question. Dr. Zeiberg suggested that under many scenarios effective force projection may be more important to US allies than to this country "because often they have more at stake." Western Europe's protection of the oil supply from the Middle East is a case in point, he added.

Dr. Zeiberg applauded Congress's plan to deploy an additional fifty Minuteman IIIs—above the current total of 550—in silos presently housing Minuteman IIs. Such a step, he said, would come across as "an important show of resolve" as well as free up some Minuteman IIs for testing. The Defense official showed less enthusiasm concerning deployment of Minuteman IIIs in either a mobile or multiple protective shelters (MPS) mode. In the first instance, a truck-mobile Minuteman that is continuously on the move over public roads creates monstrous safety and public interface problems. The Minuteman III/MPS concept involving deployment within the current basing areas, Dr. Zeiberg suggested, is both "interesting and doable," but not as cost-effective as MX and entails comparable problems in terms of land acquisition and environmental impact. The basic drawback is that the Minuteman III/MPS would not achieve operational status quicker than MX, Dr. Zeiberg claimed. He suggested that because of the time-consuming environmental and land acquisition aspects, "the time has passed to beat 1986 [the currently envisioned initial availability of MX] with anything."

The idea of shoring up the increasingly vulnerable silo-based Minuteman II and III force with a complex ballistic missile defense (BMD) system, Dr. Zeiberg said, is seriously flawed for a number of reasons. A pivotal deficiency is that a BMD system capable of defending a silo-based (as opposed to a multiple aim point, deceptively based) ICBM force requires both an overlay (long-range, outside of the atmosphere) and an underlay (close-in, well-within the atmosphere) element. Such a BMD system probably could not achieve initial operational capability (IOC) until the 1990s, meaning that the current ICBM force would remain vulnerable to a first strike for ten years or more. Additionally, Dr. Zeiberg told the AFA meeting, there are technological uncertainties about the efficacy of the overlay portion of BMD: "We only now are learning that there is a staggering amount of work to be done in discrimination, data processing, and testing" before a reliable overlay interceptor defense could become feasible. On the other hand, BMD coupled with MX shows great promise, according to Dr. Zeiberg, because lead times are not nearly as critical as in the case of the silo-based ICBMs. Also, there is a synergistic effect that derives from the shell-game basing of MX—BMD only has to defend the one shelter out of twenty-three housing a missile and not the twenty-two empty ones. Recent Pentagon studies, Dr. Zeiberg said, confirm that it would cost less and be more effective to add a dedicated BMD system to MX rather than increase (backfill) the number of shelters within each MX complex beyond the currently planned total of twenty-three. Whether one assumes that SALT II remains in effect or not influences the BMD schedule in a decisive manner, Dr. Zeiberg suggested. Without SALT II the time to start a full-scale BMD program "is now"; with SALT II—and the at least theoretical ceiling that it imposes on the number of MIRVed ICBM warheads available to the Soviets—the start of a BMD program could be delayed somewhat, he claimed.

SAC CINC Gen. Richard H. Ellis called for improvements in US C³ capabilities at the symposium. General Ellis, left, listens to a presentation with Dr. Seymour Zeiberg.

The View From Omaha

The ICBM force, and its future, also was in the forefront of the Symposium report by Gen. Richard H. Ellis, SAC's Commander in Chief and the JCS's Director of Strategic Target Planning. Acknowledging that so far as the MX basing mode is concerned "some dissent" is likely to continue, he warned that "the time for comparative studies has passed and further debate is not in the national interest. The initial operational capability date is some six years away . . . but I, for one, would feel more comfortable if it were in the field today."

From the point of view of the Strategic Air Command's operational requirements, General Ellis said, MX ensures specifically that:

- Mobility provides a hedge against any unpredictable threats that could develop over the years.
- Throw-weight is adequate to allow future growth in the business end of the missile.
- Command and control within the system ensures fast reaction and endurability.
- The basing mode permits growth or contraction to meet future threats or negotiated reductions without compromising the basic deployment concept.

Turning to tanker modernization, General Ellis applauded support for and progress on the KC-10—

General Lawson warned that Soviet force-projection capabilities are increasing rapidly, thus enhancing the possibility of a surprise attack by the Warsaw Pact forces.

thirty-two of which are programmed, with the first two aircraft slated to enter SAC's operational inventory early this year—but expressed concern over delays in efforts to reengine the KC-135 "although a replacement engine has been selected and one prototype authorized." Pointing out that reengining of the KC-135 does not impinge on the KC-10 program, he said that "our NATO and nuclear war plan requirements—which could occur simultaneously—demand a large number of booms to support all combat commands. Without the reengined KC-135—which I see as a national asset—the bomber portion of the SIOP could not be effectively executed, nor could the rapid reinforcement of Europe be carried out in a NATO crisis situation."

Conceding that strategic command control and communications (C^3) represents an Achilles' heel of US nuclear deterrence, the SAC CINC said that a number of corrective steps should be taken. Over the short term, improvements are possible by changing existing procedures and through the use of off-the-shelf hardware. Over the mid-term, General Ellis said, it is imperative to get more C^3 airborne, "aboard NEACP [the E-4 National Emergency Airborne Command Post] and the airborne command posts of the unified/specified commands." The underlying purpose here is "not just to communicate with our forces and each other" but link up with sensor systems that provide warning and other relevant information. Over the long term, General Ellis suggested, "we will have to get back to mother earth," because total dependence on space-based systems entails grave risks. The solution might be to modify commercial communications systems to augment and back up military communications nets, General Ellis suggested. Terming the strategic C^3 problem "probably the most critical" national security challenge, he explained that it would be futile to develop "all these fancy weapon systems if you can't use them when you [need to] or if you can't use them at all."

In the related field of strategic reconnaissance forces, the SAC chief said that he plans to station twenty of the initially programmed total of twenty-five TR-1s (a follow-on aircraft to the U-2) in Europe, while the remaining five aircraft will be based at Beale AFB, Calif. The first TR-1 is scheduled to enter SAC's inventory in 1983. Another gain in strategic reconnaissance capability is being realized through an upgrading of SAC's small SR-71 fleet, involving the addition of a "new state-of-the-art radar imaging system, [which] is considered a major advancement in radar technology." Lastly, RC-135 reconnaissance aircraft are being modified through "an enhanced electrical magnetic collection capability that provides expanded frequency coverage but is far less manpower-intensive than the current system." SAC's strategic reconnaissance upgrade programs "will markedly enhance our collection capability in support of theater and national intelligence programs," General Ellis asserted.

Regarding the congressional directive to the Secretary of Defense to report by March 15, 1981, on what kind of multirole bomber the Department plans to produce by 1987, General Ellis commented that "the problem centers around whether a new technology bomber can be available in accordance with the congressional timetable, or if there must be an interim bomber to fill the gap until an advanced aircraft can be available. SAC continues to believe the latter course is more probable . . . and practical. In any event, a clear national course of action has been established—there is to be a new strategic bomber. This will be our third attempt and the military-industrial team had best make it a successful effort . . . or it could be our last."

Space, General Ellis predicted, ultimately will have to be exploited through manned military missions involving a host of functions ranging from offensive/defensive recce to communications. He added that "we don't have a vehicle for this mission yet. The Shuttle, I think, lacks the kind of flexibility needed for manned military operations in space." Nevertheless, the Shuttle might provide the impetus for the development of a second-generation space transportation system that could meet these needs, according to General Ellis.

The View From NATO

NATO's long-term defense program—a comprehensive fifteen-year blueprint covering ten specific areas of concern that is being supported vigorously by all Alliance members—was highlighted at AFA's symposium by Gen. Richard L. Lawson, US Representative to the Military Committee, NATO.

With Soviet force-projection capabilities growing rapidly—thus increasing the possibility of a Warsaw

Pact attack on NATO with little warning—NATO is bolstering its "ability to respond with the maximum possible combat capability in the face of short warning time," General Lawson said. A host of measures are being implemented to shore up NATO's military readiness, he explained. These include increased antiarmor capabilities; acquisition of more and better air-to-surface weapons; improved defense against chemical warfare; increased holdings of tanks, armed helicopters, antiarmor weapons, and missiles; and a larger commitment of national forces to the Alliance.

Complementing enhanced readiness of the NATO forces is a concerted effort to streamline reinforcement capabilities through "greater commitments of civil air, sea, and land transportation and support resources . . . and new measures to accelerate movement of significant fighting units and tactical air forces to the forward areas in the critical early phase of any potential conflict with the Warsaw Pact," General Lawson told the AFA meeting. Central to these efforts, he explained, "is the US commitment to more than double its ground reinforcement rate in the first week after mobilization by adding prepositioned equipment for three additional reinforcement divisions in the critical central region."

With reserve forces accounting for almost half the war-authorized strength of ground forces in the central region, their quality and availability are of crucial importance to NATO's total force. The Alliance, therefore, developed a program to ensure the "rapid and coordinated mobilization of reserve forces . . . that those forces are adequately trained and equipped to comply with approved NATO standards, and that they are sufficient in number to counter the increased threat," General Lawson said.

With the Soviets increasing both maritime and tactical airpower capabilities dramatically, NATO is building up its defensive capabilities in both areas. Of key concern are improved maritime C^3 capabilities and air defense of naval units. Further, with the Warsaw Pact's tactical airpower developing extensive offensive capabilities, and with a high percentage of these forces stationed within less than half an hour's flying time of principal NATO bases, major boosts in NATO's air defenses become imperative, General Lawson said.

Upgrade efforts under way include better identification of hostile aircraft, tighter control over NATO's own combat aircraft, and acquisition of modern surface-to-air missiles. Additionally, NATO is now building a comprehensive airborne early warning and control (AEW&C) system to counter the growing offensive capabilities of the Pact forces and to increase NATO's detection, warning, and control capabilities. The program provides for common procedures and interoperability of its "mixed force" of eleven British-built Nimrod and eighteen US-built NATO E-3A aircraft as well as modification of fifty-two ground sites. AEW&C, General Lawson pointed out, will provide for "all-altitude surveillance, warning, and control; will [furnish] a deep look into unfriendly territory, eliminating gaps in conventional radar coverage; will present accurate and timely information to decision-makers; and will deny a surprise attack capability to the Warsaw Pact forces."

In the C^3 area, completion of the NATO integrated communications system (NICS) and other efforts to internet national systems can be expected to neutralize the Warsaw Pact's current advantage derived from "centralized command and control of their forces through a modern, reliable, and survivable C^3 system," General Lawson suggested. Standardization and interoperability of electronic warfare capabilities as well as of weapon systems and logistics support poses another tough challenge that the NATO member nations are facing up to, General Lawson said.

Lastly, modernization of theater nuclear forces—primarily deployment of two long-range US systems, Pershing II and ground-launched cruise missiles—can be expected to "ensure adequate NATO theater nuclear forces throughout the 1980s, yet . . . is consistent with our efforts to limit nuclear armament," according to General Lawson.

About 700 industry executives and civic leaders attended the AFA symposium in Los Angeles. This was the registration desk.

Congressional Trends

Maj. Gen. Guy L. Hecker, Jr., USAF's Director of Legislative Liaison, highlighted the increasing disparity between proliferation of congressional staff members and shrinkage in the size of the Air Staff. The congressional staff—characterized by greater permanence than the elected members of Congress—has shot up to about 18,000 members at present. This total is up 160 percent from what it was ten years ago. Yet at the same time, the Air Staff, which must respond to the inquiries generated by Congress, has dropped from 4,500 to 3,000 over the same period.

Another trend brought out by General Hecker is the declining number of members of Congress who have served in the military in general and in the Air Force in particular. Only forty-two of all present members have served in the Air Force and only sixty-eight percent have served in the armed forces. As a result, he said, "fewer and fewer members understand national defense on a personal basis." Nevertheless, the nationwide shift toward increased concern over defense capabilities and deficiencies is finding a strong echo in Congress. On average, the vote totals in support of defense requirements in the Senate have risen from about fifty-five percent in the Ninety-fourth Congress to seventy-four percent in the waning days of the Ninety-sixth Congress. On the House side, the corresponding trend was from about sixty-two percent in the Ninety-fourth to seventy-two percent in the Ninety-sixth Congress. The reason behind this change is increasing awareness of the growing Soviet threat, General Hecker suggested. ■

(This report on the AFA symposium will be completed in the February 1981 issue of AIR FORCE *Magazine.)*

AIRMAN'S BOOKSHELF

The Belenko Defection

MiG Pilot, The Final Escape of Lieutenant Belenko, by John Barron. Reader's Digest Press, New York, N. Y., 1980. 224 pages with photographs and index. $10.95.

On September 6, 1976, Soviet pilot Lt. Viktor Belenko landed his MiG-25 at an airport in Japan and sought asylum in the West. This marked the first time that the West had obtained a MiG-25, and Belenko was one of the more valuable Soviet defectors.

The story begins with his takeoff from an air base in Chuguyevka, about 120 miles northeast of Vladivostok, and traces his erratic and hectic flight to Japan. It then returns to the life of Belenko and why he chose to defect. His life in Russia, his unhappy adolescence, his love of flying, and his entry into the Soviet Air Force are recounted in such detail that the reader can almost feel as if he were there with Belenko.

Viktor Belenko's landing in Japan, his journey to the US, and the international crises that affair produced are faithfully recounted in the remainder of the book. In addition, some details about the exploitation of the plane by technical experts from Japan and the US are discussed.

The book is important to all intelligence officers because it gives a great deal of insight into conditions in the Soviet Air Force as well as Soviet industrial production. It also points out the role of foreign-material exploitation in modifying US intelligence estimates.

Apart from telling of Belenko's defection, and US intelligence operations, the book is a searing indictment of life in the Soviet Union. Belenko's observations on situations in the Soviet Union would make an excellent situation comedy at the expense of Communist leaders.

The book is only 217 pages long and makes for easy and enjoyable reading. I recommend it to all intelligence officers who are involved with aviation units or strategic-level intelligence estimates. Also, all pilots should read it simply as a means of understanding the Soviet Air Force.

—Reviewed by Maj. William L. Howard, USAR.

Manchester's War

Goodbye, Darkness: A Memoir of the Pacific War, by William Manchester. Little, Brown & Co., Boston, Mass., 1980. 401 pages with photographs. $14.95.

William Manchester has been a prolific author for more than thirty years, but he is perhaps best known for his *Death of a President,* a thorough, if sometimes biased, recapitulation of the assassination of John F. Kennedy. He has also written biography (*An American Caesar,* Gen. Douglas MacArthur), other histories, and three novels, all in a style that has reflected, to a large degree, the author's "knee-jerk FDR liberalism" (his own description of himself). *Goodbye, Darkness* is totally different from anything that has gone before.

The subtitle describes it well, for it is indeed "A Memoir of the Pacific War," and a highly personal one at that. Manchester was a Marine sergeant during World War II and moved from island to island in that savage fighting, finally being wounded on Okinawa near the end of the war.

In 1978, Manchester decided it was time "to try to find what I had lost out there and retrieve it." His visits to the islands of the Pacific, the battlegrounds of his youth, form the adhesive that holds together these memoirs, these remembrances of things that he wanted so much to forget.

As history, the memoir is somewhat ragged, relying heavily on the experiences of others in places where the author did not experience the battles first-hand. But this strengthens, rather than weakens, the whole, bringing the far-flung battles into a more personal overall perspective. And the tiny time-capsules of each of a wide variety of islands—Guam, Tinian, Saipan, Tarawa, Leyte, Guadalcanal, Okinawa—not only detail the agony of those mini-wars, but also outline the background and the present of these all-but-forgotten specks of coral and jungle, each recaptured from the Japanese at the cost of thousands of lives.

Manchester is raunchy at times—and that's all right—GIs were never noted for their purity of speech. Style triumphs over substance throughout; the combat descriptions are gut-wrenching and emotional, never the detached reporting of an S. L. A. Marshall or a Samuel Eliot Morison. They are descriptions that call for a personal involvement of the reader in the horror and often surrealistic landscape that made up the life of a combat Marine.

The author frequently bemoans the fact that his generation *wanted* to fight and *believed* in their country, while today's generations burn flags or head for Canada at the drop of a draft card. Speaking of his generation: "If adolescents wanted to read pulp magazines, or smoke . . . they needed parental permission. . . ." "There was no teenage ethos . . . young people were called youngsters . . . children rarely felt any conflict between their friends and their families." As he so eloquently talks about those days and all the things "lost," it is curious that he never seems to grasp the possibility that "knee-jerk liberalism" may have played a large part in the change.

There is a great deal of ambivalence in *Goodbye, Darkness.* In trying to come to grips with his past, Manchester has discovered a dichotomy in himself that he honestly bares for all the world to see. He hates war, but often loved the battles. He detests the Japanese, but could feel no empathy for the aircrews who dropped the atomic bomb. And he does not like what our modern world has become, yet he labored hard and fought well to make it what it is today.

Goodbye, Darkness is a moving experience, a revealing profile of a great author and an emotional re-

counting of a war that needs to be remembered. It deserves to be read and will certainly hit the nonfiction best-seller list.

—Reviewed by Maj. N. Kent Goldsmith, USAF (Ret.), aerospace industry executive.

War-Winning Aircraft

Saga of the Superfortress: The Dramatic Story of the B-29 and the Twentieth Air Force, by Steve Birdsall. Doubleday & Co., Inc., Garden City, N. Y., 1980. 346 pages with index, appendices, and photographs. $19.95.

In 1938, design and testing of a new long-range, high-speed bomber began. The resulting Boeing B-29 was too late for deployment in Europe during World War II, but went on to lead the fight in the Pacific, heralding a new era of strategic airpower and the dawn of the atomic age.

The B-29's initial performance in the China-Burma-India (CBI) theater was only mediocre, though the units gained valuable experience and knowledge. Maj. James Pattillo of the 468th Bomb Group summed up the B-29's first six months of combat as "just one big heartbreak after another."

When the Superforts reached the Marianas in October 1944, and for the next few months, things were not much better. The aircraft continued to have technical problems, and bombing results were poor. General "Hap" Arnold, the AAF Commanding General who had been a strong backer of the B-29 since its days on the drawing board, perceived the aircraft's poor performance as a threat to his own credibility and saw a solution in Maj. Gen. Curtis LeMay.

LeMay, who had been the B-29 commander in the CBI, introduced incendiary bombing and low-level night attacks, to which the Japanese cities were extremely vulnerable. On March 9, 1945, the raid on Tokyo by 334 B-29s, the first in a series of air blitzes on Japan's major cities, reduced 15.8 square miles of the city to ashes and rubble and killed more than 78,000 people.

The Allied victory in Europe increased pressure to bring a swift halt to the war in the Pacific. Despite LeMay's successful campaign against Japan's industry and cities, and the B-29s' mining efforts, the Japanese proved tenacious, and an invasion by American troops seemed inevitable. Then came a new mission for the B-29—carrying history's first atomic bombs to Hiroshima and Nagasaki.

It was fitting that the B-29 should be selected for these two missions, since the Superfortress had come to embody terror and destruction to the Japanese. In the words of Premier Kantaro Suzuki, as he reminisced after the war: "It seemed to me unavoidable that in the long run Japan would be almost destroyed by air attack. . . . On the basis of the B-29s alone, I was convinced that Japan should sue for peace." On August 15, the world learned of the unconditional surrender of the Japanese empire.

Saga of the Superfortress is a tribute to the foresight of men like "Hap" Arnold who pushed the B-29's development and continued to believe in it through its growing pains.

The book's 220 photographs capture the drama and devastation of B-29 missions, as well as a more human side. The imaginative artwork on such Superfortresses as "Doc's Deadly Dose," "Pocahantas," and "Heavenly Body" reveals the affection of crew members for their aircraft.

In his *Saga of the Superfortress,* Steve Birdsall has effectively retold through eyewitness testimony the dramatic history of this aircraft and the lives of the men who flew it.

—Reviewed by Ann Leopard, Editorial Assistant.

New Books in Brief

Doubletalk: The Story of SALT I, by Gerard Smith. Smith, former Director of the Arms Control and Disarmament Agency under President Nixon and Nixon's Chief Delegate to SALT I, has written this book from an insider's point of view, explaining the procedures and negotiations that finally led to the SALT I agreement. He provides valuable insights into the SALT negotiating process, along with interesting (and sometimes critical) portraits of the principals, particularly of Henry Kissinger. Appendices, photos, index. Doubleday & Co., Inc., Garden City, N. Y., 1980. 556 pages. $17.95.

Flying, by Walter J. Boyne. Boyne, a retired USAF colonel and currently Assistant Director of the National Air and Space Museum, has written a thoroughly exciting introduction to the world of flying. His infectious and enthusiastic presentation of the thrill of flight and of the opportunities for enjoyment and employment in aviation is perfectly suited for youngsters (or older armchair pilots) who have felt the bite of the bug (or especially for those who haven't). With photographs and index. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1980. 211 pages. $14.95.

Handbook of Soviet Manned Space Flight, by Nicholas L. Johnson. With America's manned space program schedule slipping and the Soviet Union's exploration of manned spaceflight steaming along, this new research work from the American Astronautical Society's Science and Technology Series is a timely look at the past and present efforts of the Soviet manned space effort. A companion to author Johnson's *Handbook of Soviet Lunar and Planetary Exploration,* this book completes one of the most comprehensive open histories available of the Soviet space exploration program. With photos, diagrams, appendices, bibliography, and index. Univelt, Inc., P. O. Box 28130, San Diego, Calif. 92128, 1980. 461 pages. Hard cover $45; soft cover $35.

History of Marine Corps Aviation in World War II, by Robert Sherrod. This book, originally published in 1952, is a comprehensive though unofficial history of the role of Marine Corps aviation in WW II. The book begins with an overview of Marine aviation up to the war, and then proceeds with a chapter-by-chapter narrative account, ending with a well-researched set of appendices chock full of statistics and individual unit histories. As a broad overview of history, tactics, and strategy, or a gripping account of the men who fought the battles, this book is a rousing success. With photos, maps, and index. Presidio Press, San Rafael, Calif., 1980. 496 pages. $16.95.

We Led the Way, by William O. Darby and William H. Baumer. This is an account of the exploits of the legendary William Darby and his Rangers, a special forces commando unit that saw action from North Africa up the boot of Italy during World War II. Skilled at amphibious landings and close assault combat, Darby's Rangers were at the forefront of Allied battles in the Mediterranean theater. Here author Baumer tells their story from conversations he held with Darby shortly before Darby's death a week before V-E Day. Illustrated, with photographs and maps. Presidio Press, San Rafael, Calif., 1980. 198 pages. $14.95.

—Reviewed by Hugh Winkler, Associate Editor.

AIR FORCE MAGAZINE PROUDLY PRESENTS THE

Keith Ferris Military Aviation Calendar for 1981

Following the success of its 1980 calendar, and the pleasure it has given to thousands of purchasers, AIR FORCE Magazine has again commissioned aviation artist Keith Ferris to produce twelve original paintings for the 1981 calendar.

Paintings, such as "Solo Student Over the Numbers" shown above, measure 12" x 9" and are suitable for framing.

These twelve new Ferris paintings have been executed exclusively for this purpose. Each painting depicts a noteworthy event in military aviation. They span military aviation history, both in time and geography, and depict a variety of air forces and aircraft missions.

Aircraft depicted in the 1981 calendar are: T-37 jet trainer; P-51 Mustang fighter; Russian MiG-21 fighter; Japanese "Betty" bomber; C-123 Provider transport; B-57 Canberra bomber; German Ju-87 Stuka dive bomber; FF-1 US Navy fighter; Sopwith Camel carrier launch; F-106 Delta Dart interceptor; Tornado multirole combat aircraft; B-10 bomber.

Keith Ferris, son of an Air Force officer, grew up around airplanes, and has been painting them for more than twenty-six years. He is an AFA member, belonging to the Union-Morris (New Jersey) Chapter. Ferris's aviation paintings are renowned for their technical accuracy and depiction of events as seen through the eyes of a pilot.

The descriptive commentary accompanying each painting is written by Jeffrey L. Ethell, expert aviation writer, and also the son of an Air Force officer. Ethell's research not only contributes to the veracity of Ferris's paintings; it enhances the enjoyment and appreciation of the events painted.

Each full-color reproduction is appropriate for framing. In fact, persons ordering two copies can have one for calendar use and frame the other right away.

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SPEAKING OF PEOPLE

Air Force Family Matters Emphasized

By Ed Gates, CONTRIBUTING EDITOR

THE Air Force in recent years has moved forward in developing and expanding various family-oriented projects.

For example, it boasts 123 base child-care centers, averaging more than 100 hours of service per week, and round-the-clock service is being tested. A host of recreational projects have sprung up, and special counseling on finances, marriage, and other topics is available at some installations.

The activity, called INTRO (which stands for Introduction to New Base), provides transferring families a personal sponsor to help ease the trials and tribulations involved in moving to a new site. A computer supports the efforts to ensure rapid selection of a sponsor.

But more can be done, and since two-thirds of the USAF population are family members, single parents included, it's only good business to promote these kinds of activities. And that's what we find today—a greater emphasis on family needs and concerns. If families are happy, retention is likely to improve, and members' job performances are likely to improve.

A special study sponsored by the Office of the USAF Chief of Chaplains recently probed deep into family concerns. Its subsequent report, titled "Families in Blue," found that many persons are disturbed by too frequent moves, inadequate and declining benefits, lack of control over one's life, etc. More specific gripes cited adverse influence on the family from separations, inadequate children's education, poor recreation facilities, the perceived low regard for family interests and welfare, and the general quality of Air Force life.

About the same time the Chaplains' report surfaced, the service appointed as Assistant for Air Force Family Matters (AFFAM) at Hq. USAF, Col. Lawrence W. Foley. His job is to coordinate the many family programs, stay abreast of the issues and trends in service and out, gather data for functional staff areas and field points, generate research on family issues, and serve as the family advocate on the Air Staff.

Colonel Foley, whose new office includes only four officers and one NCO, considers the advocacy role particularly important. It assures that family matters will be weighed when important management decisions are considered.

To get the new effort rolling Air Force-wide, the AFFAM recently hosted a conference at Randolph AFB, Tex. Each command and Air Staff office involved in working family-related issues took part. They put together a list of forty-two "family concerns that are becoming commonly recognized as priority issues for possible development into working family programs."

From that list, the following will be addressed first by the AFFAM:

1. Support restoring and maintaining pay comparability.
2. Provide government funds to negate the need for utility deposits.
3. Increase moving reimbursements to offset moving costs.
4. Provide spouse/family job information and education.
5. Build more temporary lodging facilities and improve existing ones.
6. Increase weight allowance, quality, and liability limits for household goods moves.
7. Improve INTRO and provide early information on new assignments.
8. Develop and test a base-level family support center concept.
9. Provide dependent medical care as an entitlement with full support of CHAMPUS as an alternative.
10. Establish a family practice concept at all hospitals and clinics.
11. Establish and emphasize family preventive health-care programs.
12. Develop and provide information on family needs and concerns and on-going family projects for commanders and first sergeants.
13. Expand current child-development activities and develop a youth development program.
14. Allow transfer of VA education benefits to wives and children.
15. Develop a recurring survey to identify needs and serve as a basis to define family research needs.

Other of AFFAM's forty-two goals include the following: provide more summer jobs for children and encourage part-time employment for wives; expand exchange credit and boost dollar ceilings on exchange items; produce more information on do-it-yourself moves; examine quarters cleaning policy options; let families precede sponsor to the new base and move into quarters when available; provide foreign language training for families going abroad; establish classes on base to emphasize parental responsibilities; and encourage base "town meetings."

Many of the AFFAM objectives are not new; USAF has been trying to reduce PCS costs for a long time, to cite just one example. Yet there are some interesting new items on the list, like the utility deposit ploy. But regardless of whether the targets are old or new, the added push by the newly created AFFAM is welcome. ■

THE BULLETIN BOARD

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

Good Recruiting in FY '80

FY '80 was a good Air Force recruiting year, as the service met its main goal by signing up more than 84,000 members. In addition, the General Accounting Office, the federal spending watchdog, praised the Air Force for astute management of its recruiting program.

And the Air Force Recruiting Service, which manages a force of 3,200 recruiters and support personnel, won the Air Force Organizational Excellence award as the fiscal year ended.

The good news was tempered somewhat by the fact that only eighty-three percent of the 71,800 non-prior-service recruits possessed high school diplomas, the same as FY '79. Still, this topped the other services by far. The Army, for instance, recruited only fifty-four percent high school graduates.

USAF in FY '80 also recruited 1,456 health-care professionals, 4,892 college grads entering OTS, and 2,800 prior-service members. Recruiters referred more than 4,000 qualified persons for enlistment in the Air Reserve and Air National Guard.

The non-PS goal this year has been increased to 79,000. The other targets for FY '81 are 3,980 officer trainees, 1,340 health professionals (including 208 physicians and 538 nurses), 5,000 prior-service people, and 2,000 Reserve and Guard referrals.

The GAO issued reports on recruiting management in all the services, but only the Air Force received high marks. The GAO particularly lauded USAF for making fast "appropriate policy adjustments," such as new enlistment incentives, in late 1979. By doing so, the service cut that year's projected recruiting shortfall of 8,500 to 1,384.

Recruiting Service headquarters received the Organizational Excellence Award for conducting a successful recruitment program between July 1, 1973, the advent of the All-Volunteer Force recruiting, and June 30, 1980. During the period, Air Force recruiters enlisted half a million youths despite loss of the GI Bill, declining interest in military service, and more stringent enlistment criteria.

Recruiting Service Commander Brig. Gen. Keith D. McCartney accepted the award for his personnel.

Wives Working, Not Volunteering

Family Services, long a program that gave meaning to the slogan "The Air Force Takes Care of Its Own," needs volunteers. Without enough of them, the program may be headed for trouble. Similarly with other projects like Red Cross, wives' club fund raisers, hospital aides, education services, and others, volunteers have fallen off.

The main reason, Air Force officials state, is financial. Wives who would normally volunteer for base projects have gone to work, specifically sixty-six percent of the enlisted wives and forty-five percent of the officer wives. Most say it is necessary "to make ends meet."

Other reasons given for the falloff of volunteers include the fact that many wives live off base and their social and civic ties are now with the community rather than the base. The most interesting reason for the volunteer reduction, officials claim, is "the perception that the spouse's working as a volunteer was a necessary prerequisite for the success of the military member's career has been largely dispelled."

The service leadership remains strong for the volunteer programs. Of the Family Services program, officials warned that if it "is to continue its dedicated service to our Air Force families, we must seek to improve volunteer recruitment and retention or face the decreased effectiveness of this valuable program."

The volunteer problem was one of many family-related issues examined at the recent conference on Air Force families held at the Manpower and Personnel Center *(see "Speaking of People" column, p. 115).*

Tuition Aid Popularity Rises

Tuition assistance usage rose again in FY '80 when USAF members chalked up an estimated 189,780 course enrollments. Except for FY '76, when GI Bill usage was heavy, tuition aid enrollments have risen from four to seven percent a year. In FY '74, when the force was larger, there were 154,370.

Tuition assistance should climb another ten percent this year, Hq. USAF officials believe, if Congress raises the government subsidy from seventy-five to ninety percent of course costs. At press time, the Senate was considering the move, the House having approved it earlier.

An increase to ninety percent won't mean as much as it might appear, however. Officials explained that while tuition rates vary widely between schools and colleges, a charge of $50 per semester hour for a three-hour course might be considered typical. At the seventy-five percent rate, the Air Force pays $112.50 and the student $37.50; under the ninety percent rate, USAF would pay $135 and the student $15. However, in both cases the student pays for textbooks and supplies which generally are at least $30 per course.

The Air Force has objected to the House-passed plan in that it limits the increased subsidy to E-5s and above with less than fourteen years of service and thus doesn't do much for recruiting young people or for retaining veterans.

"The Air Force supports an across-the-board increase . . . to the ninety percent level including all enlisted members and officers," an official said. The service also wants Congress to scrub the long-established rule that officers accepting tuition aid agree to serve two years following the end of each course. But that isn't likely to be changed.

Force-Outs Drop Again

Only ninety officers are being fired because of accumulating a second promotion passover by calendar 1980 (CY '80) selection boards. This compares with 307 forced out by 1979 boards and 380 dismissed as the result of board action in 1978. This is out of more than 85,000 officers.

Several Air Force Academy cadets from the Fort Worth, Tex., area attended a recent luncheon for Air Force Secretary Dr. Hans Mark sponsored by AFA's Fort Worth Chapter. The cadets were in Fort Worth as part of the Grass Roots program designed to allow Academy cadets to meet with potential Academy applicants from their home town. Secretary Mark was the main speaker at the luncheon, and afterwards met with the cadets. With Secretary Mark are (from left): Cadet Richard Lynch; Cadet Kevin Ruth; Cadet Russell Erb; Dr. Mark; Cadet John Gustafson; and Cadet Eric Mair.

Boards and "continuation" actions this year are expected to sustain this trend, thus further diffusing the "up or out" flap of recent years. The promotion opportunity to the temporary grades of captain, major, and lieutenant colonel remains at fully qualified (virtually 100 percent), ninety, and seventy-five percent, respectively.

To temporary colonel the percentage opportunity is going up, from fifty to fifty-five.

Officers facing permanent boards again will enjoy the following liberal promotion opportunity percentages: to O-3, fully qualified; to O-4, ninety-five; to O-5, ninety; and to O-6, fifty.

The continuation (on active duty) policy for many officers passed over twice is slated to remain in effect as the Air Force struggles to meet its officer strength target of 88,500. As reported elsewhere in this column, severe pilot, navigator, and scientific and engineering shortages remain. Officials hope to partially ease the expected deficit by enticing 500 former officers to return.

Most of the continued officers are Reserve captains twice turned down for temporary major. Asked how they're shaping up, Hq. USAF officials said, "They are performing well." They added that ten of the sixty-nine captains continued by the CY 1979 temporary O-4 board made major by the time of the 1980 board held last April.

Calendar 1981 boards got off to an early start with the temporary captains' panel convening this month. The temporary O-4, O-5, and O-6 panels will meet earlier than last year to coincide with the time new lists are needed for continuous monthly promotions.

The accompanying table shows official figures on line officer dismissals due to two promotion failures by 1980 boards. Officers who were eligible to retire or be retained in the "sanctuary" (eighteen to twenty years of service) until eligible to retire are not included.

Up or Out
Result of CY 1980 Board Action

Line Boards	*Pilot*	*Navigator*	*Nonrated*	*Total*
Jan. '80 Temp. Captains	0	0	6	6
Apr. '80 Temp. Majors	0	1	14	15*
May '80 Perm. Captains	0	0	0	0
Aug. '80 Temp. Captains	0	0	4	4
Sept. '80 Perm. Majors	21	5	39	65
Total	21	6	63	90

*An additional 143 non-Regular officers—twenty-four pilots, nine navs, and 110 nonrads—twice considered but not selected were chosen for continuation but opted to separate.

Spouse Bills Gain Momentum

The time may be nearing when ex-spouses of retired service members are cut in on their former mates' retired pay. Several recent developments support this possibility and indicate the issue is gaining momentum.

For the first time last year the House Armed Services Committee conducted hearings on a bill giving a former spouse married to a service member for ten years or more a pro-rata share of retired pay. No action was taken, but Rep. Patricia Schroeder (D-Colo.), the driving force behind the legislation, was reelected and she will "definitely try again," her office told AIR FORCE Magazine.

Also, the Supreme Court has agreed to consider whether states can treat retired pay as property that can be split in divorce cases. The case involves a retired Army officer ordered by a California court to give his ex-wife almost half his retired pay. He's appealing.

Furthermore, Congress recently approved the Foreign Service Act of 1980 providing ex-wives of Foreign Service Officers a portion of their retired pay. This is seen as encouraging supporters of pro-spouse bills.

On the other side of the issue are the 1,300,000 military retirees, plus the thousands nearing retirement, who are believed to vigorously oppose the pay garnishment scheme. A confrontation could be brewing.

USAF says that both its Finance Center and Manpower Center receive "numerous calls from retirees who are bitter when a portion of their pay for alimony or child support is withheld. They believe the action is unfair and expect the USAF to do something about it. . . ." Withholding of retired pay for ex-wives doubtless would

touch off even louder complaints.

The Air Force says it's required by law to comply with a garnishment order.

New Move May Attract Engineers

USAF has come up with a new move to fill the hundreds of engineering officer vacancies. It's enlisting collegians within twelve months of receiving their BA degree in one of the engineering disciplines.

They'll receive airman first class status, regular pay and allowances, full use of military facilities, free medical and dental care, thirty days' paid vacation, and annual cost-of-living raises.

On graduation they will advance to staff sergeant and enter the three-month Officer Training School. After that they'll be commissioned and enter extended active duty. Recruiters are telling applicants they can expect "rapid advancement into management positions, excellent working conditions, annual pay increases, and timely promotions commensurate with their ability and career goals."

The Recruiting Service says this arrangement allows participants to earn more than $9,600 during their senior year, probably well above the income of the typical senior engineering student. This favorable picture changes somewhat, of course, on graduation when the officer engineer starts at something over $14,000 a year and his civilian counterpart draws considerably more.

Mary Elsie Ellis, daughter of Gen. and Mrs. Richard H. Ellis, was recently crowned queen of Ak-Sar-Ben, a social and civic organization in Nebraska and Iowa. A University of Florida graduate, Miss Ellis is an audiovisual specialist with Mutual of Omaha in Omaha, Neb.

THE BULLETIN BOARD

Return of Slots Delayed

The reappearance of slot machines in Air Force clubs abroad has been delayed. Original plans called for "testing" slot machines at the following bases in October or November of last year: Sembach, Ramstein, and Rhein-Main in Germany, Clark in the Philippines, and Kadena in Japan.

Now the slots—275 nickel and quarter devices—are expected to be installed at the test sites beginning in "mid-1981."

What about the return of slots to the other 128 USAF locations in sixty-one countries? The service now says that "any decision concerning retention of the test machines and reinstatement of machines at other overseas locations will be made at the Secretary of the Air Force-level only after results of the test program are thoroughly reviewed and analyzed."

The delay was attributed to "administrative requirements which must be completed within the Air Force before the test can begin." The slot income will be used to support morale and recreational projects, but each day's delay in launching the program reduces the anticipated support.

USAF and Army removed and destroyed their overseas iron bandits in 1972 following congressional criticism of club irregularities in SEA. The Navy held on to its machines—and has been enjoying the income ever since.

He Came Back

Now an instructor pilot at Vance AFB, Okla., Capt. James Price is one of the more than 800 officers who have returned to active duty under the voluntary recall program. His happiness with the return is detailed by the Air Force news service, which publishes similar "happy-to-return" stories nearly every week.

Price had left to fly for the airlines, but he ran into problems including low probation pay and being furloughed by Hughes Air West. With a wife and two kids, it was rough going, so when he received his second Air Force invitation to return he accepted.

USAF needs many more people like Captain Price as it faces an end-FY '81 shortage of nearly 3,000 pilots and navigators and more than 1,100 scientific/engineering officers. Those interested in recall may apply through the Manpower and Personnel Center, Randolph AFB, Tex. (800 531-5809), their Air Guard or Air Reserve unit, or the Air Reserve Personnel Center, Lowry AFB, Colo.

In addition, Air Force hopes to snag other disgruntled airline pilots via a sort of "outreach" project. It has formed a team to brief and counsel potential recallees at airline home ports. Cities on the team's schedule include Denver, Dallas-Fort Worth, Los Angeles, Chicago, and New York.

Short Bursts

In one of his last requests of Congress, President Carter asked for **substantial raises in sea and submarine pay.** Maximum enlisted sea pay would increase from $115 to $310 a month, with an extra $100 for those who serve more than three consecutive years at sea. Enlisted sub pay would reach $265 a month, and the maximum officer sub pay would be $440 a month.

Air Force **military couples** need only to fill out Form 1048 (Spouse Information) to be automatically considered for a **joint assignment to the same base.** The change eliminates the uncertainty that such couples previously encountered when one member received as assignment and the other had to apply to join him or her. Fill out the form and see that it's filed in your personnel records, USAF is telling them.

The service has been expanding the list of occasions authorized for taking **permissive TDY.** Late last year another one was on the horizon: okaying permissive TDY for recent overseas returnees to travel to the port where they would pick up their late-arriving cars.

The **Lance P. Sijan Leadership Award**—that's the name of a new,

Are You Eligible?

Widows of retired USAF NCOs and retired NCOs and their spouses can get a quick reading as to their eligibility for residency in the Enlisted Men's Widows and Dependents Home by contacting the Home ahead of time. The Home's two facilities are Teresa Village and the projected Bob Hope Village, both in Fort Walton Beach, Fla. Inquiries may be addressed to the Air Force Enlisted Men's Widows and Dependents Home Foundation, Inc., 572 Mooney Rd., Fort Walton Beach, Fla. 32548.

very prestigious USAF award. It will recognize base-level enlisted and officer leaders and will be presented personally—to just two EM and two officers annually—by the Chief of Staff. Captain Sijan, an Air Force Academy graduate and a posthumous Medal of Honor winner, died of starvation and lack of attention to his wounds while a prisoner of the North Vietnamese in 1968.

Veterans taking flight training or **correspondence courses** under the GI Bill must pay a larger share of the costs, under a recent change in the law. Uncle Sam now pays veterans taking flight training sixty percent of the cost, instead of the previous ninety percent. New correspondence course enrollees now are paid seventy percent of the cost, also down from ninety percent. Veterans enrolled in either program before last September continue to receive ninety percent of the cost. The VA also announced that low-cost loans of up to $2,500 are now available to vets in flight training.

The leaders of the service bands, including USAF's Col. Arnald Gabriel, will judge the **USO's National March Contest** and pick a winner they hope is the equal of the works of John Philip Sousa. Any US citizen with an original march can enter. The winner collects $1,000. Entries, which close March 1, 1981, should be sent to USO National March Contest, USO World Headquarters, 1146 19th St. N. W., Washington, D. C. 20036. Colonel Gabriel currently serves as President of the American Bandmasters Association.

From the VA comes this significant notice: **Unemployment rates for Vietnam-era veterans,** which reached a high 11.0 percent in February of 1975, had plunged to 6.6 percent this past September. And for the year 1979, the median personal income of families headed by Vietnam-era vets was $21,280, compared to $15,100 for nonveterans in the same age group (twenty to thirty-four).

Senior Staff Changes

PROMOTIONS: To be **ANG Major General:** Jack R. **Brasher;** Harry L. **Cochran,** Jr.; Wayne C. **Gatlin;** Robert A. **Neal;** Darrol G. **Schroeder.**

To be **ANG Brigadier General:** Richard B. **Almour;** James L. **Dawson;** William J. **DeNuccio;** James J. **Hanlon;** David B. **Hoff;** Robert A. **Johnson,** Sr.; Robert W. **McDonald;** Fred M. **Rosenbaum;** Robert W. **Schaumann;** Paul A. **Schempp;** Edward **Schneider;** James D. **Shepherd;** William M. **Whittaker.**

RETIREMENTS: B/G John H. **Bennett;** M/G Edwin A. **Coy;** B/G John F. **O'Donnell;** M/G Hoyt S. **Vandenberg,** Jr.

CHANGES: B/G John A. Brashear, from Cmdr., 14th AD, SAC, Beale AFB, Calif., to Vice Cmdr., 15th Air Force, SAC, March AFB, Calif., replacing M/G Jack L. Watkins . . . **B/G Martin M. Ostrow,** AFRES, from Mobilization Ass't to the Ass't Judge Advocate General, Hq. USAF, Washington, D. C., to Mobilization Ass't to the Judge Advocate General, Hq. USAF, Washington, D. C. . . . **M/G Herman O. Thomson,** from DCS/Ops. & Intel., Hq. PACAF, Hickam AFB, Hawaii, to Vice CINCPACAF, Hq. PACAF, Hickam AFB, Hawaii, replacing retiring M/G Hoyt S. Vandenberg, Jr. . . . **M/G Jack L. Watkins,** from Vice Cmdr., 15th Air Force, SAC, March AFB, Calif., to Cmdr., 1st STRAD, SAC, Vandenberg AFB, Calif., replacing retiring M/G Edwin A. Coy. ■

Superb Special-Edition Prints of Two Paintings By William J. Reynolds

As part of its continuing fund-raising efforts, the Aerospace Education Foundation—an affiliate of the Air Force Association — has arranged with artist William Reynolds to produce special-edition prints of his two most recent oil paintings, shown below.

The print "Last Aerial Combat of World War II" (B-32) measures 21¾" by 26½", including border and legend. The print "Approaching the Initial Point" (B-17) measures 21¾" by 24", including border and legend. These special, limited-edition lithographs will be struck on fine heavy paper.

Each print will be numbered and accompanied by a Certificate of Authenticity, will have a description of the action depicted by the painting, and will have the artist's authenticating signature. The finished prints are being offered at a price of $75 each, postpaid, to the first 500 individuals to reserve their copies. They will make excellent Christmas gifts.

The artist drew heavily on his experience as a World War II fighter pilot and on his other flying experiences for the accuracy in detail and situation.

To preserve the exclusivity of each print, when the 500 lithographs are sold, no more copies will be struck from the plates prepared for these special editions.

Here is an excellent way to add unique works of art to your collection and support the Foundation at the same time. Remember that the value of your lithographs is assured by individual print numbers and the artist's authenticating signature.

Approaching the Initial Point

The B-17 crewman with the best seat in the house during World War II was the bombardier. His station was the "greenhouse," the unprotected Plexiglas nose of the aircraft. The bombardier's station gave him an unparalleled opportunity to watch incoming enemy fighters. That's the situation shown in this fine Bill Reynolds painting "Approaching the Initial Point." The Initial Point (IP) was the place where the bomb run to the target began. After the IP, the fighters usually left the area because of the volume of antiaircraft fire from the ground. It was the bombardier's job to keep the aircraft on a constant course and heading so he could synchronize his Norden bombsight on the target. Since the bomber's nose area was a prime target for incoming enemy fighters, bombardiers needed not only technical skills but also a special measure of courage and dedication.

The oil painting was specially commissioned for the 9th Biennial Reunion of the Bombardiers Alumni Association held in Washington, D.C., in August 1980.

Last Aerial Combat of World War II

This is believed to be the last aerial combat of World War II, fought on August 18, 1945. A pair of B-32 Dominator aircraft were flying a photo-reconnaissance mission over Tokyo when they were attacked by an estimated fourteen Japanese fighters—Zekes and Tojos. The B-32 shown in the painting had its number three engine shot out. One of its two photographers was killed, and the other photographer and the top-turret gunner were wounded. The B-32s fought their way clear and returned to base in Okinawa. The Dominator, originally intended as a backup to the B-29 Superfortress, was one of the less well-known aircraft of the war. Of the 1,706 ordered, only 118 were built, and only 15 saw action. The flurry of combat over Japan on August 18, 1945, earned the B-32 a footnote in the history of US aerial combat.

This painting appeared on the cover of the September 1980 issue of this magazine.

Order These Limited-Edition Prints from the Aerospace Education Foundation

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The Air Force Association is an independent, nonprofit, aerospace organization serving no personal, political, or commercial interests; established January 26, 1946; incorporated February 4, 1946.

The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength

OBJECTIVES

adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principle of freedom and equal rights for all mankind.

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AFA NEWS

Chapter and State Photo Gallery

By Vic Powell, AFA AFFAIRS EDITOR

Brig. Gen. Keith D. McCartney, Commander of USAF Recruiting Service, was the featured speaker at a recent meeting of the Iron Gate Chapter. He was welcomed to the "21" Club in New York City by the Chapter's newly elected officers. From left to right are: Peter F. Barry, Vice President; Harold W. Miller, President; General McCartney; Dorothy L. Welker, Secretary; Frederick M. Glass, Vice President; and Tallmadge L. Boyd, Treasurer.

Former Secretary of the Air Force John C. Stetson, center, received a western-style hat at the recent meeting of the Texas State AFA Executives Meeting in Houston. Victor Thompson, right, President of AFA's Houston Chapter, made the presentation. At left is William W. Roth, President of Texas State AFA. Mr. Stetson addressed the 100 guests attending the evening banquet of the Executive Meeting.

New officers of the Harry S. Truman Chapter and Missouri State AFA were installed recently. William A. Dietrich, right, is the new President of the State organization. Garey M. Reeves, second from right, is the new President of the Truman Chapter. At left is Earl D. Clark, AFA National Secretary. National President Victor R. Kregel, second from left, was the featured speaker. He received the key to the city from Kansas City Councilman Ray James.

CALENDAR OF EVENTS

AFA National Board of Directors Meeting, Holiday Inn, Melbourne Beach, Fla., February 21 . . . **Chicagoland O'Hare Chapter Symposium,** O'Hare Ramada Inn, Des Plaines, Ill., March 14 . . . **Iron Gate Chapter's 18th National Air Force Salute,** Sheraton Center, New York City, March 28 . . . **South Carolina State AFA Convention,** May 1–2, Charleston . . . **Kansas State AFA Convention,** May 16, Wichita . . . **New Jersey State AFA Convention,** June 26–28, Cape May . . . **Pennsylvania State AFA Convention,** July 17–19, Hershey . . . **California State AFA Convention,** August 13–15, Vandenberg AFB.

AFA's Eglin, Fla., Chapter recently sponsored a benefit show starring entertainer Bob Hope. More than 6,500 people filled the Fort Walton Beach Memorial Stadium to hear Mr. Hope and local talent. The program supported the Air Force Enlisted Men's Widows and Dependents Home Foundation, and was the second such effort sponsored by the Eglin Chapter.

A Fall Dining-Out for the 5th Bomb Wing was sponsored recently by AFA's Minot Chapter, N. D. AFA Executive Director Gen. Russell E. Dougherty, USAF (Ret.), was the guest speaker. Guests at the head table included, from left: Col. Al Herring, Commander, 5th Bomb Wing; Warren Sands, North Dakota State AFA President; Russ Dougherty; Ralph Ehlers, Minot Chapter President; and Brig. Gen. John Shaud, USAF, Commander of the 57th Air Division, Minot AFB, N. D.

A desk pen set was recently presented to Gen. Alexander M. Haig, Jr., USA (Ret.), by Connecticut State AFA members in appreciation for his support of the Air Force Association in the state. At left is Joseph R. Falcone, New England Region Vice President. At right is Frank J. Wallace, President of Connecticut State AFA.

AFA NEWS PHOTO GALLERY

Mary B. Perrine, of Clearwater, Calif., was one of four winners of a scholarship from SCAMP (Scholarships for Children of American Military Personnel) presented at the recent Air Force Ball in Los Angeles. Perrine, daughter of Capt. Elton L. Perrine, USAF, missing in action in Southeast Asia since 1967, discusses with Chief of Staff Gen. Lew Allen, Jr., and actor Lloyd Bridges her plans to attend Emory University in Atlanta, Ga. SCAMP provides a $1,500 per year scholarship for four years to children of those who served in the US armed forces during the Vietnam conflict and were killed in action, were prisoners of war, or are missing. SCAMP President Martin M. Ostrow is a National Director of AFA.

Robert Eve, right, Manager of the Nellis AFB, Nev., branch of the First National Bank of Nevada, receives a Community Partner certificate from Robert McLellan, President of AFA's Las Vegas Chapter. At the close of the fourth operational quarter, the Las Vegas Chapter ranked second in the number of Community Partners recruited, one less than the eleven that have joined the Central Florida Chapter.

Capt. Joan Croft, center, of the Air Force Communications Command's Briefing Team, Scott AFB, Ill., was the guest speaker at the recent awards and officer installation ceremonies of the Olmsted Chapter, Camp Hill, Pa. Jack Flaig, left, President of Pennsylvania State AFA, installed the newly elected officers, and outgoing President Robert Pomeroy presented awards to Chapter members. Olmsted Chapter will serve as host for the Pennsylvania State AFA convention in 1981.

SSgt. Bonnie L. Lewis, of the David Grant USAF Medical Center, Travis AFB, Calif., was recently presented the Travis Chapter NCO of the Year Award. Making the presentation is Rev. Russell L. Waldron, Chaplain of AFA's General Robert F. Travis Chapter, Fairfield, Calif. (Photo by Connie Hermann)

Artist Keith Ferris was among the dignitaries welcoming the public to a benefit cocktail party for the Cradle of Aviation Museum at Mitchel Field in Garden City, N. Y. The facility is Long Island's first air and space museum, and is the new meeting place for AFA's Mitchel Chapter. The event was sponsored by the Chapter. Outgoing Chapter President Robert Holland watches from the podium at left. (Photo by James Powers)

Irwin Hansen, right, newly elected President of the H. H. Arnold Chapter, Syosset, N. Y., receives the Chapter Charter and gavel of office from outgoing President Robert Key, left. Frank X. Battersby, Chairman of the Chapter's Executive Council, installed the new officers of the Chapter.

Col. Ralph Newman, USAF (Ret.), Aerospace Education Instructor for the 31st AFJROTC Unit at Butler High School in Huntsville, Ala., presents the AFA Award to Cadet Col. Joseph Plaia, left, for outstanding performance during the 1979–80 school year. Colonel Newman is a member of AFA's Tennessee Valley Chapter, Huntsville, Ala.

20% Dividend paid for 1979 calendar year

SEE NEW BENEFITS FOR FAMILY COVERAGE!

NOW AVAILABLE TO

CURRENT BENEFIT TABLES

Insured's Attained Age	STANDARD PREMIUM: $10 per month Basic Benefit*	HIGH OPTION PREMIUM: $15 per month Basic Benefit*	HIGH OPTION PLUS PREMIUM: $20 per month Basic Benefit*
20-29	$85,000	$127,500	$170,000
30-34	65,000	97,500	130,000
35-39	50,000	75,000	100,000
40-44	35,000	52,500	70,000
45-49	20,000	30,000	40,000
50-54	12,500	18,750	25,000
55-59	10,000	15,000	20,000
60-64	7,500	11,250	15,000
65-69	4,000	6,000	8,000
70-74	2,500	3,750	5,000
Aviation Death Benefit*			
Non-war related	$25,000	$37,500	$50,000
War related	$15,000	$22,500	$30,000
Extra Accidental Death Benefit*	$12,500*	$15,000*	$17,500*

*The Extra Accidental Death Benefit is payable in addition to the basic benefit in the event an accidental death occurs within 13 weeks of the accident, except as noted under AVIATION DEATH BENEFIT (below).

*AVIATION DEATH BENEFIT: The coverage provided under the Aviation Death Benefit is paid for death which is caused by an aviation accident in which the insured is serving as pilot or crew member of the aircraft involved. Under this condition, the Aviation Death Benefit is paid in lieu of all other benefits of this coverage. Furthermore the non-war related benefit will be paid in all cases where the death does not result from war or an act of war, whether declared or undeclared.

OTHER IMPORTANT BENEFITS

COVERAGE YOU CAN KEEP. Provided you apply for coverage under age 60 (see "ELIGIBILITY") your insurance may be retained at the same low group rates to age 75.

FULL TIME, WORLD WIDE PROTECTION. The policy contains no war clause, hazardous duty restriction, combat zone waiting period or geographical limitation.

DISABILITY WAIVER OF PREMIUM. If you become totally disabled at any time prior to age 60 for at least a 9-month period, your coverage will be continued in force without further payment of premiums as long as you remain disabled.

FULL CHOICE OF SETTLEMENT OPTIONS. All standard forms of settlement options, as well as special options agreed to by the insured and United of Omaha, are available to insured members.

CONVENIENT PAYMENT PLANS. Premium payments may be made by monthly government allotment (payable to Air Force Association), or direct to AFA in quarterly, annual or semi-annual installments.

DIVIDEND POLICY. AFA's primary policy is to provide maximum coverage at the lowest possible cost. Consistent with this policy, AFA has provided year-end dividends in all but three years (during the Vietnam War) since the program was initiated in 1961, and basic coverage has been increased on six separate occasions.

ADDITIONAL INFORMATION

Effective Date of Your Coverage. All certificates are dated and take effect on the last day of the month in which your application for coverage is approved, and coverage runs concurrently with AFA membership. AFA Group Life Insurance is written in conformity with the insurance regulations of the State of Minnesota. The insurance will be provided under the group insurance policy issued by United of Omaha to the First National Bank of Minnesota as trustees of the Air Force Association Group Insurance Trust.

EXCEPTIONS: There are a few logical exceptions to this coverage. They are:

Group Life Insurance: Benefits for suicide or death from injuries intentionally self-inflicted while sane or insane will not be effective until your coverage has been in force for 12 months.

The Accidental Death Benefit and Aviation Death Benefit shall not be effective if death results: (1) From injuries intentionally self-inflicted while sane or insane, or (2) From injuries sustained while committing a felony, or (3) Either directly or indirectly from bodily or mental infirmity, poisoning or asphyxiation from carbon monoxide, or (4) During any period a member's coverage is being continued under the waiver of premium provision, or (5) From an aviation accident, either military or civilian, in which the insured was acting as pilot or crew member of the aircraft involved, except as provided under AVIATION DEATH BENEFIT.

ELIGIBILITY

All members of the Air Force Association are eligible to apply for this coverage provided they are under age 60 at the time application for coverage is made.

*Because of certain restrictions on the issuance of group insurance coverage, applications for coverage under the group program cannot be accepted from non-active duty personnel residing in either New York or Ohio. Non-active duty members residing in Ohio, however, may request special application forms from AFA for individual policies which provide coverage quite similar to the group program.

OPTIONAL FAMILY COVERAGE
(new benefit schedule effective 6/30/80)
PREMIUM: $2.50 per month

Insured's Attained Age	Life Insurance Coverage for Spouse	Life Insurance Coverage for each Child*
20-39	$20,000.00	$4,000.00
40-44	15,000.00	4,000.00
45-49	10,000.00	4,000.00
50-54	7,000.00	4,000.00
55-59	5,000.00	4,000.00
60-64	3,000.00	4,000.00
65-69	2,000.00	4,000.00
70-75	1,000.00	4,000.00

*Children under six months are provided with $250 coverage once they are 15 days old and discharged from the hospital.

Upon attaining age 21, and upon submission of satisfactory evidence of insurability, insured dependent children may replace this $4,000 group coverage (in most states) with a $10,000 permanent individual life insurance policy with guaranteed purchase options.

Please Retain This Medical Bureau Prenotification For Your Records

Information regarding your insurability will be treated as confidential. United Benefit Life Insurance Company may, however, make a brief report thereon to the Medical Information Bureau, a nonprofit membership organization of life insurance companies, which operates an information exchange on behalf of its members. If you apply to another bureau member company for life or health insurance coverage, or a claim for benefits is submitted to such a company, the Bureau, upon request, will supply such company with the information in its file.

Upon receipt of a request from you, the Bureau will arrange disclosure of any information it may have in your file. (Medical information will be disclosed only to your attending physician.) If you question the accuracy of information in the Bureau's file, you may contact the Bureau and seek a correction in accordance with the procedures set forth in the federal Fair Credit Reporting Act. The address of the Bureau's information office is P.O. Box 105, Essex Station, Boston, Mass. 02112. Phone (617)426-3660.

United Benefit Life Insurance Company may also release information in its file to other life insurance companies to whom you may apply for life or health insurance, or to whom a claim for benefits may be submitted.

ALL AFA MEMBERS (under age 60)

APPLICATION FOR
AFA GROUP LIFE INSURANCE

United of Omaha

Group Policy GLG-2625
United Benefit Life Insurance Company
Home Office Omaha Nebraska

Full name of member _____
Rank Last First Middle

Address _____
Number and Street City State ZIP Code

Date of birth (Mo. Day Yr.)	Height	Weight	Social Security Number

This insurance is available only to AFA members

☐ I enclose $13 for annual AFA membership dues (includes subscription ($9) to AIR FORCE Magazine). Please send membership application.

☐ I am an AFA member.

Name and relationship of primary beneficiary

Name and relationship of contingent beneficiary

Please indicate below the Mode of Payment and the Plan you elect:

Plan of Insurance

Mode of Payment	Standard Plan		High Option Plan		High Option PLUS Plan	
	Member Only	Member And Dependents	Member Only	Member And Dependents	Member Only	Member And Dependents
Monthly government allotment (only for military personnel). I enclose 2 month's premium to cover the necessary period for my allotment (payable to Air Force Association) to be established.	☐ $ 10.00	☐ $ 12.50	☐ $ 15.00	☐ $ 17.50	☐ $ 20.00	☐ $ 22.50
Quarterly. I enclose amount checked.	☐ $ 30.00	☐ $ 37.50	☐ $ 45.00	☐ $ 52.50	☐ $ 60.00	☐ $ 67.50
Semi-Annually. I enclose amount checked.	☐ $ 60.00	☐ $ 75.00	☐ $ 90.00	☐ $105.00	☐ $120.00	☐ $135.00
Annually. I enclose amount checked.	☐ $120.00	☐ $150.00	☐ $180.00	☐ $210.00	☐ $240.00	☐ $270.00

Names of Dependents To Be Insured	Relationship to Member	Dates of Birth Mo. Day Yr.	Height	Weight

Have you or any dependents for whom you are requesting insurance ever had or received advice or treatment for: kidney disease, cancer, diabetes, respiratory disease, epilepsy, arteriosclerosis, high blood pressure, heart disease or disorder, stroke, venereal disease or tuberculosis? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance been confined to any hospital, sanatorium, asylum or similar institution in the past 5 years? Yes ☐ No ☐

Have you or any dependents for whom you are requesting insurance received medical attention or surgical advice or treatment in the past 5 years or are now under treatment or using medications for any disease or disorder? Yes ☐ No ☐

If YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, EXPLAIN FULLY including date, name, degree of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I apply to United Benefit Life Insurance Company for insurance under the group plan issued to the First National Bank of Minneapolis as Trustee of the Air Force Association Group Insurance Trust. Information in this application, a copy of which shall be attached to and made a part of my certificate when issued, is given to obtain the plan requested and is true and complete to the best of my knowledge and belief. I agree that no insurance will be effective until a certificate has been issued and the initial premium paid.

I hereby authorize any licensed physician, medical practitioner, hospital, clinic or other medical or medically related facility, insurance company, the Medical Information Bureau or other organization, institution or person, that has any records or knowledge of me or my health, to give to the United Benefit Life Insurance Company any such information. A photographic copy of this authorization shall be as valid as the original. I hereby acknowledge that I have a copy of the Medical Information Bureau's prenotification information.

Date _____, 19____ _____
Member's Signature

FORM 3676GL App. REV. 10-79

Application must be accompanied by a check or money order. Send remittance to:
Insurance Division, AFA, 1750 Pennsylvania Avenue, NW, Washington, D.C. 20006 1/81

Bob Stevens'

"There I was..."

THEY WERE CALLED "LITTLE TIN GUYS" (FOR WHAT REASON I HAVEN'T THE FOGGIEST NOTION)-HOWEVER, NAVIGATORS WERE MADE OF THE SAME STUFF AS OTHER AIRCREWMEN. IN THE DAYS BEFORE LORAN and INERTIAL GUIDANCE, A LOT HUNG ON THE BUBBLE IN THEIR OCTANT—

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← and BACK!

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