JUNE 1979/$1

AIR FORCE MAGAZINE

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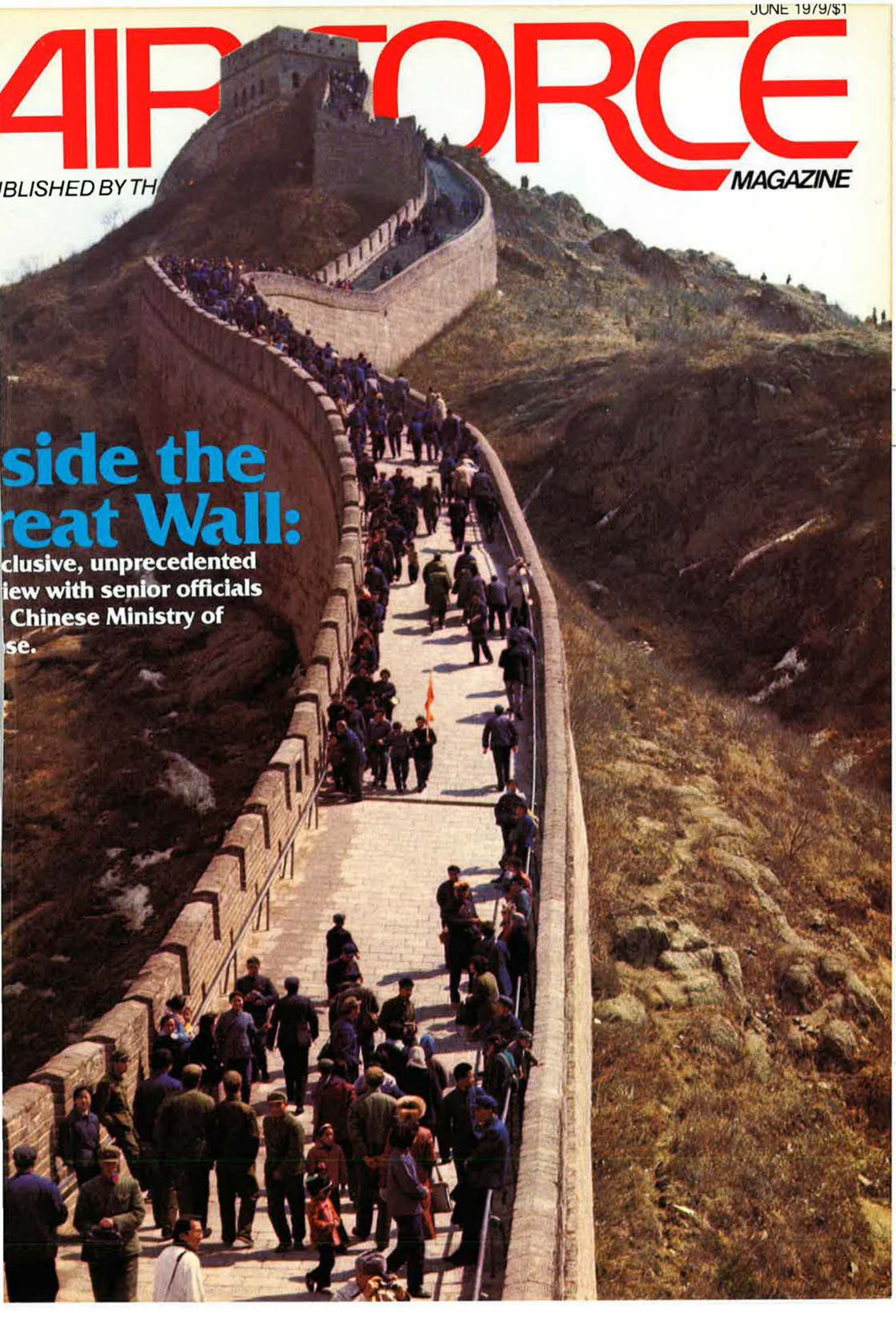


side the reat Wall:

clusive, unprecedented iew with senior officials Chinese Ministry of se.

By the time Wilbur and Orville took off, we were already developing space technology.

When the Wright brothers ıde their epic flight in 1903, Gen-ıl Electric had already shown im-ɜssive progress in the advanced ːhnology which would prove es-ıtial to space flight.

The Edison effect, physical sis for space communication ːhnology, had been discovered by Ɜ's founder 19 years earlier. Pat-ts for high-vacuum research, es-ıtial for space-qualified material velopment, had been granted to Ɜ in the same period. In 1900, GE d established the first industrial search laboratory, and in 1903 oduced the first combustion gas-iven turbine, fore-runner of tur-ne pumps and auxiliary power for ace vehicles. GE, from the begin-ng, was a leader not only in elec-ɔnics, command and control, and avigation systems, but in devel-ɒment of materials, devices, rocesses and techniques in many isciplines.

This thrust into advanced chnology qualified GE to build the rst U.S. jet engine, and to sign the first contract for rocket research with the U.S. government in 1944. GE engineering directed the launch of the first large rocket in the U.S. in 1946, and the first launch from Cape Canaveral in 1950. To list major programs in which GE has had significant involvement is to recite the history of the U.S. space effort: Vanguard, Atlas, Thor, Polaris and Poseidon . . . Talos, Tartar, and Nike . . . Titan and Minuteman . . . Mercury, Gemini, Skylab and Apollo . . . Mariner and Discoverer.

Today, leadership continues at GE in crucial subsystem contributions to the successes of Viking, Voyager and Pioneer, and in astute management of the Nimbus weather research program in which seven satellites, with a total contract life requirement of 6 years, already have achieved a service life of 24 years.

The GE-managed Landsat program is compiling a similar reputation for long life in orbit, with three satellites piling up 10½ years of service against a life requirement total of 2½ years.

Simultaneously, GE works toward an early 1980 launch for DSCS-III, a military communication system with significant advances in power, orbital life, and operational utility. The broadcast satellite system which GE designed and built for the Japanese government meanwhile is in its second year in synchronous orbit and meeting demanding contract requirements. Work is also proceeding on the nine major contracts which GE holds for flight hardware, payloads, and mission support for the Space Shuttle.

From the flight of the Wright brothers to the flight of the Shuttle, GE has maintained its commitment to leadership in research. Today it applies the resources of generations of advanced technology to its space programs. A century of dedication to advanced technology is what makes General Electric unique among aerospace companies. Isn't that what you would like to have applied to your next space program?

162-89

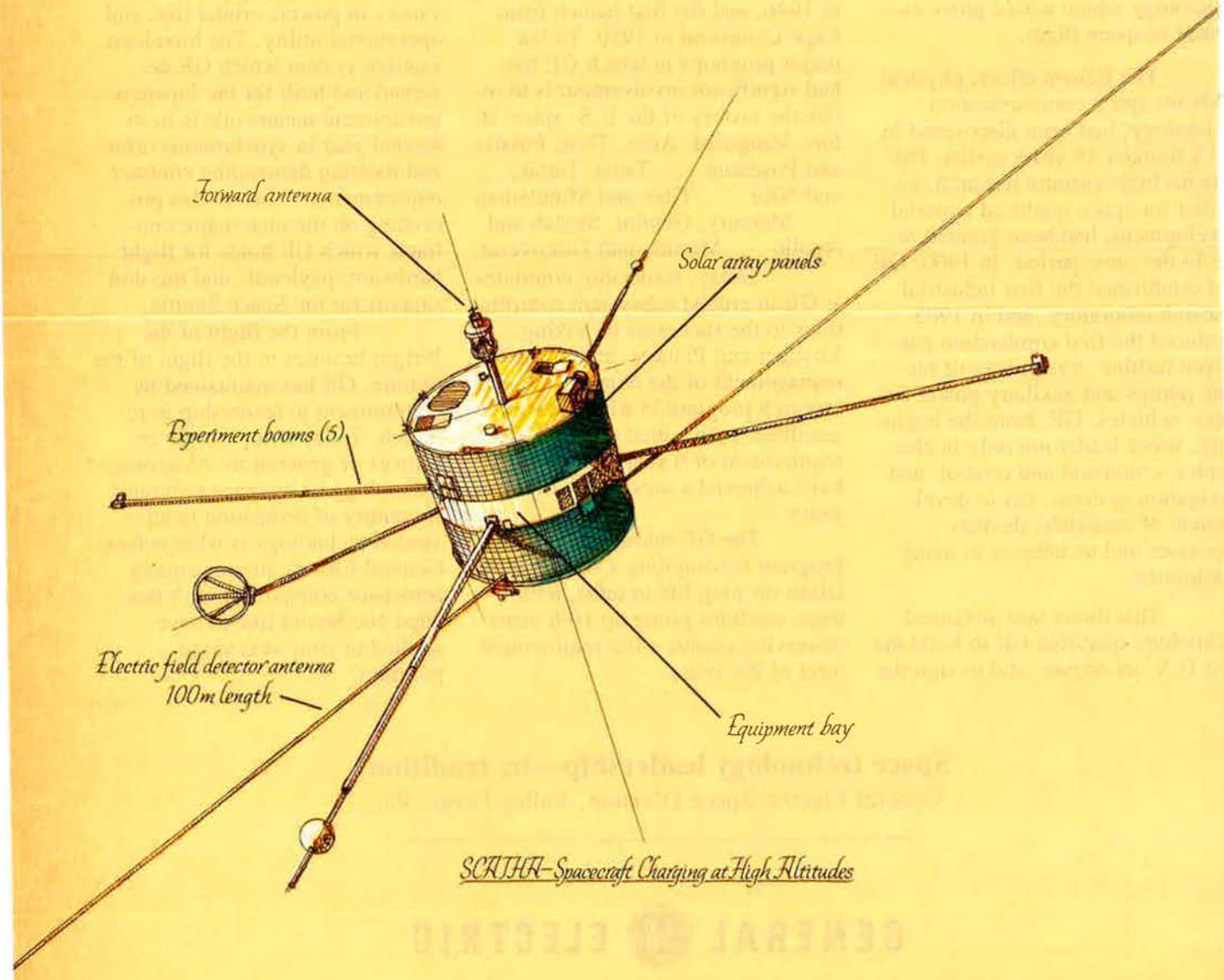
Space technology leadership—by tradition

General Electric Space Division, Valley Forge, Pa.

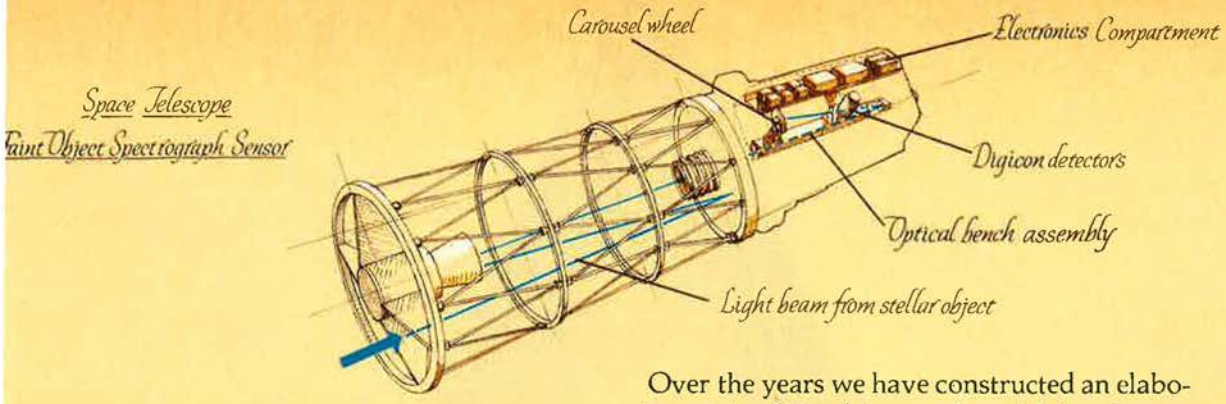
GENERAL ELECTRIC

What is required for future space exploration?

Successful experience.



SCATHA–Spacecraft Charging at High Altitudes



Space Telescope
Faint Object Spectrograph Sensor

Satellites in orbit, men in space, scientific lab-
ıtories on Mars, voyages to Venus, Jupiter and
:urn: in three decades man's exploration of
ıce rivals the 16th century's exploration of
:th.

From the outset, Martin Marietta has played a
›wing part in the development of this new
ntier. Beginning with our first launch of the
nguard in 1958, our role continues today in
ıcecraft, their instruments and experiments.

Millions of miles in space our experiments are
ing the measure of Mars, examining and ana-
ing the atmosphere, cloud structure and radio
issions of Jupiter, and studying the variation
:he sun's energy on the environment of Venus.

Closer to Earth, another instrument, an inte-
l part of Space Telescope, is designed to pro-
le unprecedented spectral data on stars,
axies and quasars 50 to 100 times fainter than
servable from ground telescopes.

One of our satellites, SCATHA, built for the
· Force, carries 12 experiments to explore the
le understood phenomenon of destructive
ctrical charge buildup on orbiting spacecraft.

A concept under development for use by
:ure Space Shuttle crews is a small remotely
ntrolled spacecraft to deploy, retrieve, survey
d even repair other spacecraft.

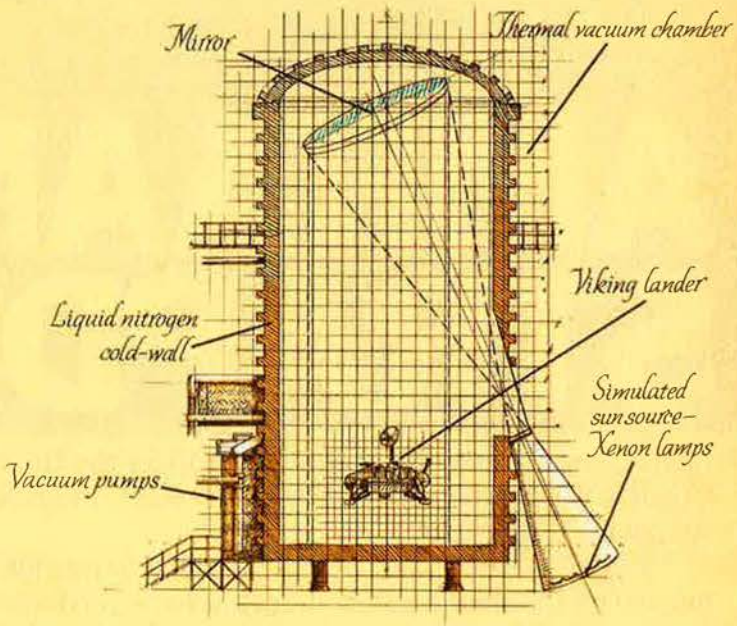
An important advance in navigation is our
tonomous space sextant. Using the moon and
ırs for reference, it establishes the satellite po-
ion almost instantaneously, allowing the craft
operate independently of signals from Earth.

Over the years we have constructed an elaborate variety of simulators and special chambers to help in the conquest of space. Prior to flight, single instruments and complete craft face the rigors of vibration, noise, heat, cold, radiation and vacuum to be encountered in space.

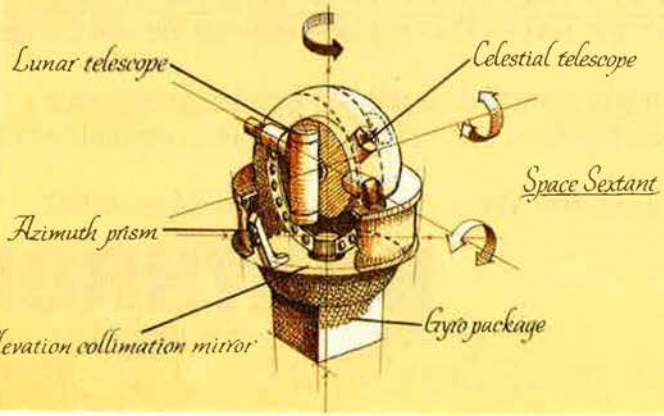
With our knowledge, advanced technologies, facilities and success, we are prepared to assist in developing the new systems our country needs for exploration of space during the next decade and beyond.

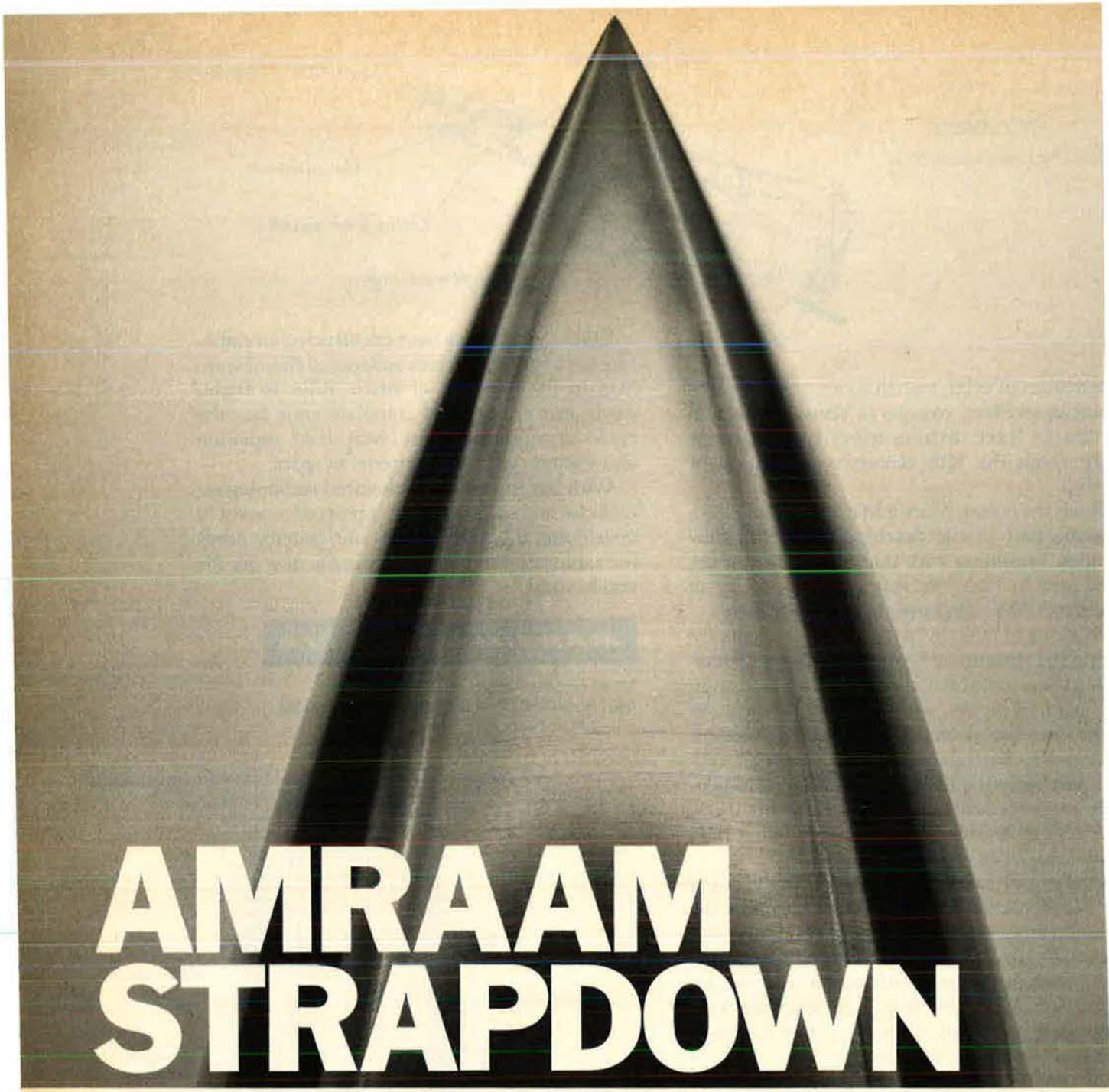
MARTIN MARIETTA

Martin Marietta Aerospace
6801 Rockledge Drive, Bethesda, Maryland 20034



Space & Solar Simulation





AMRAAM STRAPDOWN

Simple, low-cost inertial guidance system for the Hughes Advanced Medium Range Air-to-Air Missi (AMRAAM) for the U.S. Air Force and Navy. From Northrop's Precision Products Division, a leader strapdown technology.

Hughes Aircraft Co. selected Northrop to provide mid-course guidance for AMRAAM because proven "off-the-shelf" sensors in high volume production and demonstrated microprocessor technolog result in precision inertial performance with assured reliability.

Working to bring strapdown guidance technology to other tactical missile programs, Northrop is under contract to provide digital strapdown units for the Navy's Phoenix air-to-air missile and for the Navy's Harpoon and Tomahawk anti-ship missiles.

Also, Northrop is first to develop small, lightweight standard strapdown inertial package for broad range of precision navigation and guidance applications. For aircraft, helicopters, ground vehic torpedoes and tactical missiles.

Northrop Corporation, Precision Products Division, 100 Morse Street, Norwood, Mass. 02062.

NORTHRO

Making advanced technology wo

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

JUNE 1979
VOLUME 62, NUMBER 6

This Month

ABOUT THE COVER

The Great Wall of China was built to keep foreigners—and their ideas—out. After the semi-isolation of recent times, China is scrambling to modernize its industry, technology—and armed forces. For a look behind the Wall, see p. 40. Cover photo by Gail Winslow Ginsburgh.

Departments

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AN EDITORIAL

The Luftwaffe Wasn't There

JUNE 6, 1944. D-Day. A military code-word that instantly became a proper noun. A great turning point in history. A memory vivid in the minds of those who were there and survived its horror. A date indelibly stamped in the annals of democracy and freedom. It is now thirty-five years later, and still there is a compulsion to look back and glean again from the event itself and what preceded it some great lessons and reminders.

It was a near thing, that invasion of Hitler's Fortress Europa. Much went wrong, as it always does in war. But enough went right to make it work.

Things could have been worse. Much worse. But the men on the beaches could not know that. Nor could they have been convinced, had anyone tried to tell them. For them things were as bad as they could get—those scattered, battered, bewildered clumps of young soldiers, clawing for a toehold from which to launch the long march that would eventually lead to Berlin.

How could it have been worse?

What could have made it worse, more costly in blood and treasure, what could perhaps have turned a tenuous success into a costly failure of unimaginable dimensions and fearful consequence was the presence over the beaches of an effective German air force. What a target—the invasion fleet riding almost helplessly while disgorging its cargoes of men and machines, not to mention the crowded, disorganized beaches themselves. What havoc even a modest presence could have wrought!

To the men on the beaches, of course, it seemed that everything that could be thrown at them was being thrown. To them the absence of the Luftwaffe was small comfort indeed. Yet it was that very absence that ensured eventual success to those Allied troops clustered at water's edge, made worthwhile the blood that was spilled so profligately at the places called Omaha, Utah, Gold, Juno, and Sword. Ultimately, it was the absence of the Luftwaffe, not only on D-Day but at many crucial moments thereafter, that sealed the doom of Hitler and his insane dreams of world domination.

Why the Luftwaffe failed to show has been explained many times and in many places, including the pages of this magazine. *(See pp. 96–101.)* Quite simply, it had been unable to cope with the long-range strategic airpower of the Allies and notably the American forces of Gen. Carl "Tooey" Spaatz. Spaatz had insisted all along that target destruction was only part of the story. The trick was to pick targets the enemy would fight for and, once the long-range fighter escorts were available, to beat and batter not only the targets themselves but the air forces that the Nazis sent out to defend them.

As Air Force historian Herman Wolk put it in our pages five years ago this month:

"Air superiority for OVERLORD [code name for the invasion of Europe] had been won early in 1944 when t great bomber fleets, escorted by long-range fighte assaulted critical targets on the Continent and t Luftwaffe rose to the challenge, to be beaten back a ultimately defeated. Gen. Carl Spaatz had been ins tent—and correct. The enemy would fight for oil and t enemy would lose his fighters, his crews, *and* his fue

"Ultimately," wrote Wolk, "the war was wo everywhere. On the Eastern and Western fronts. land, sea, and in the air. Though the historian does n search for certainty, there can be no doubt of airpowe decisive contribution." ("Prelude to D-Day: The Bomb Offensive," AIR FORCE Magazine, June 1974.)

As this is written, the SALT II agreement with t Soviet Union is being trumpeted as a great and nece sary contribution to world peace and international sec rity. It has to do with issues and weapons unheard thirty-five years ago, although we find some si nificance in the fact that a key pre-D-Day target US bombers was a certain building in the Mersebu Leuna area, where experiments with heavy water we going on as part of the German quest for their atom weapon. All of which leads to the conclusion that not ing is irrelevant at a time when, in thirty-five short yea we are negotiating on an adversary basis with erstwhile ally while an important fraction of Germar the erstwhile enemy, stands as a linchpin of the pol ico-military arrangement that protects Western Euro from Soviet aggressive ambitions.

In 1944, as in almost every military action since, a power could prove itself only after major politica philosophical, and military compromises. A good thin it was that the combined bomber offensive had time do its job essentially in the months before D-Day. For the weeks immediately preceding the invasion, a si able fraction of its strength was diverted from those cri ical targets in Germany to assist in the so-called railwa campaign that isolated the battlefield and even provide close support for the landing troops. Much that effort proved wasted when bad weather impose such wide safety factors that the heavy bombers we unable to strike the beaches themselves and dumpe their loads too far inland to be of immediate help.

Anyone who contemplates the cost of D-Day must b forever thankful that it did not have to be repeated Japan. The carnage that would have ensued there fearful to envisage.

Japan provides perhaps the only case where politica considerations enabled airpower to completely fulfill i destiny—which it could have done, atomic bomb or no

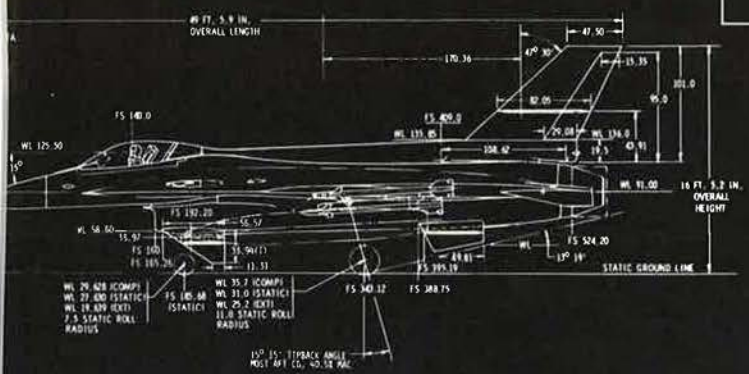
All of which is a way of saying, perhaps, that th philosophical base for airpower doctrine has yet to w complete acceptance. And so there still is plenty of wo for all of us to do.

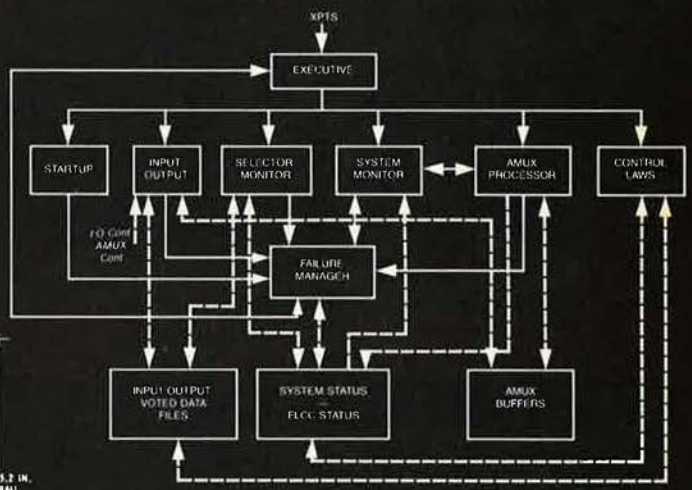
—JOHN F. LOOSBROO

ur engineers are developing, tegrating, demonstrating and lidating advanced fighter chnologies for the AFTI program.

"The Advanced Fighter Technology Integration (AFTI) program at General Dynamics is a pure, technical, research project designed to advance the state of the fighter aircraft art. It's a learning situation. Working on the AFTI program, engineers have the opportunity to do unrestrained technical work in redundancy management, digital computer self-test, control law synthesis, avionics systems architecture and systems hardware integration."

Larry Lydick
AFTI-F-16 Chief Engineer





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dvanced Fighter Technology Integration I) program now underway at General mics' Fort Worth Division will explore ising technologies for future tactical r options. Says Larry Lydick: "We're ng at a triplex digital flight control system will give required redundancy while ng significant improvements in air-to-air air-to-ground combat effectiveness." dified F-16 will be used as a test vehicle monstrate digital-controlled flight refinements and integrated flight and fire control (IFFC). Featuring task-tailored multi-modes which include weapon line pointing and direct force control, the digital flight control system plus IFFC will improve lethality and survivability in the air-to-ground mode. In air-to-air combat scenarios it will provide faster, more accurate target alignments over a wide range of encounter geometries. Lydick and other AFTI engineers see this program as more than just an opportunity to participate in flight test synthesis. They also feel it is "a firsthand chance to advance the state-of-the-art." AFTI key disciplines include electronics reliability, control laws, avionics integration, digital processors, redundancy management, self-test, software aerodynamics and more.

Interested? Write:
R. H. Widmer
Vice President, Science and Engineering
1519 Pierre Laclede Center,
St. Louis, MO 63105

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GENERAL DYNAMICS

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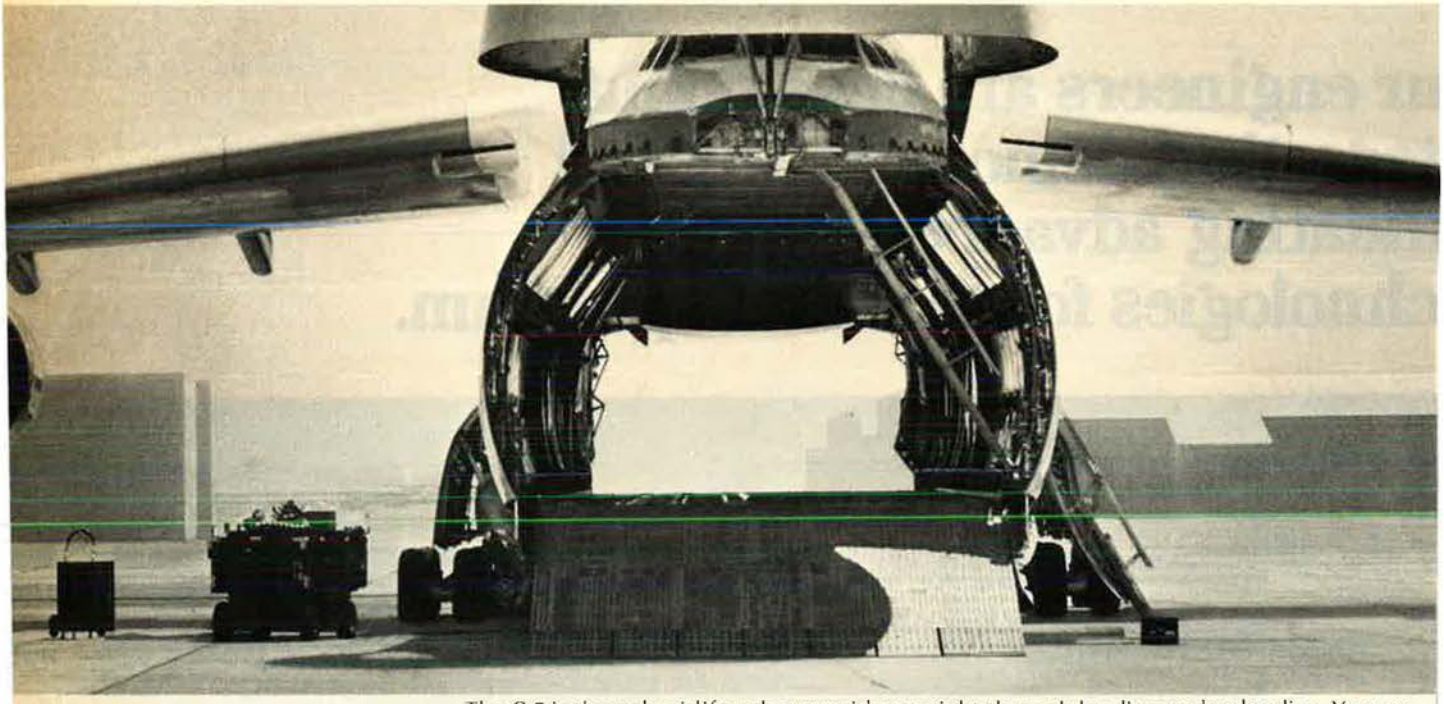
The world's most versatil

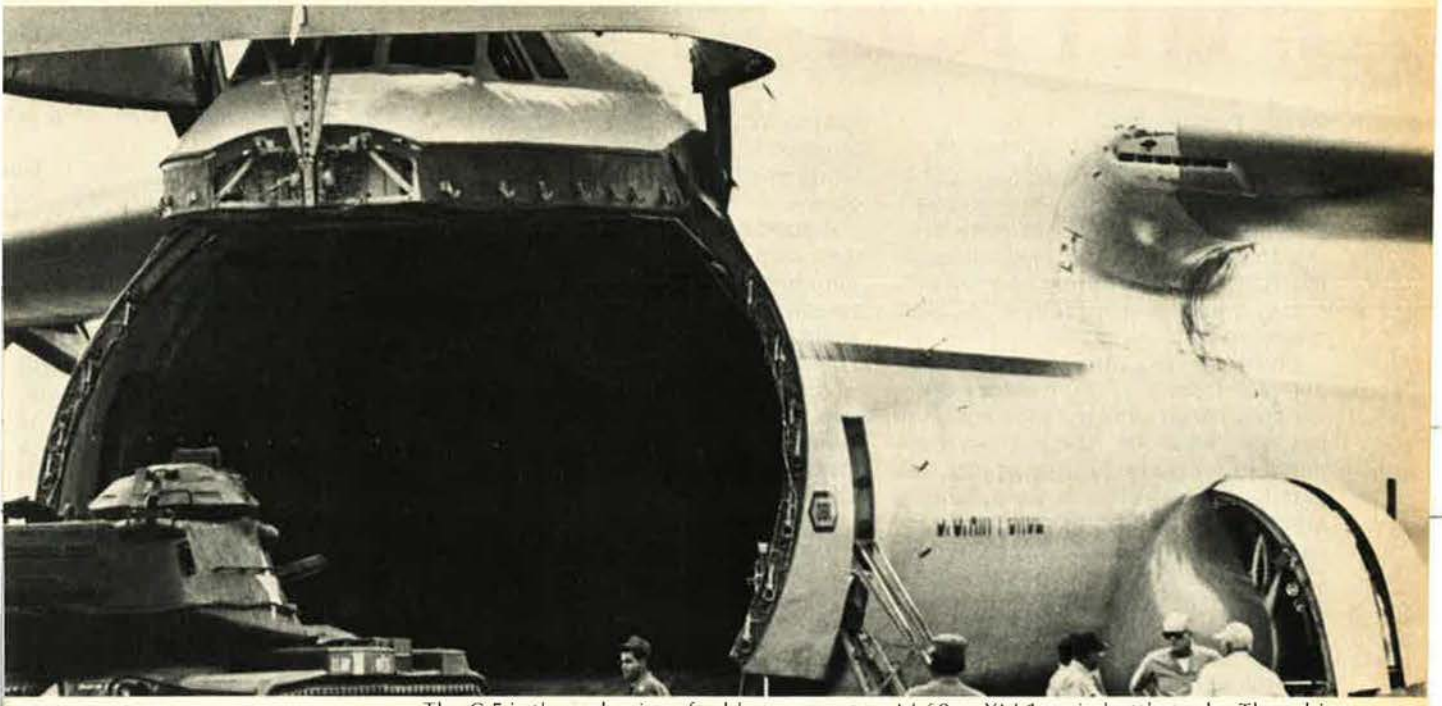


Loading champion. The C-5 is the only airlifter that provides straight-through loading and unloading. You can drive up the low rear ramp and drive down the low front ramp. Thanks to this unique featur the C-5 unloads more than 200,000 pounds of cargo in less than 30 minutes.

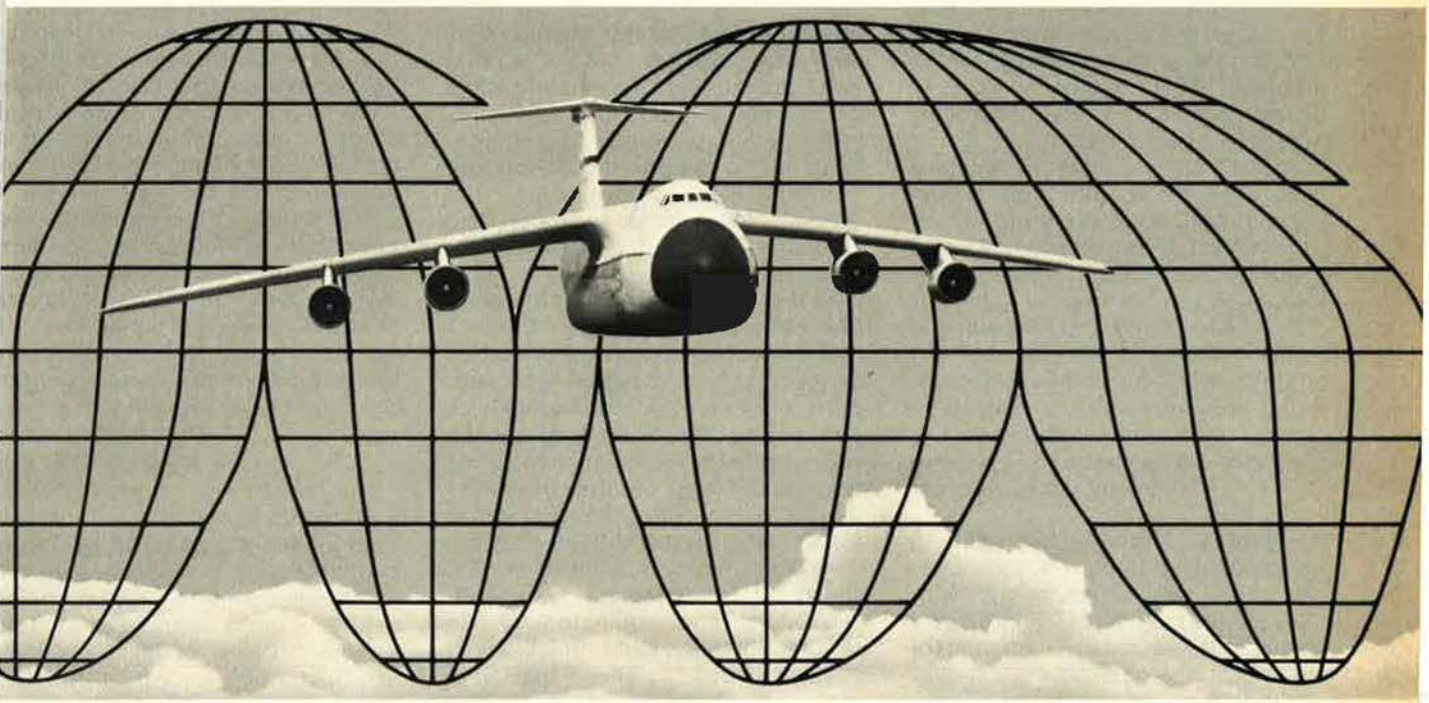
Air-launched ICBM champion. The C-5 has successfully launched a Minuteman intercontinental ballist missile. It's the only aircraft in the world that has been able to achieve t

There's a lot more to the C-5's versatility. Its high-flotation landing gear enables it to lift the Army's heaviest tank into and out of semi-prepared runways as short as 3500 feet. Its advanced navigational systems enable it to operate in remote areas of the world. These and other features give the C-5 inherent versatility. Moreover, it can be adapted many missions at low cost. The C-5. Built on the or

big aircraft.



Tank-hauling champion. The C-5 is the only aircraft able to carry two M-60 or XM-1 main battle tanks. They drive on in minutes; they drive off in minutes. The C-5 also can carry bridge launchers, giant Chinook helicopters—virtually any equipment the Army needs.



Distance champion. In-flight refueling gives the C-5 globe girdling capabilities. It's the only operational airlifter in the world with this feature that can be so important if friendly bases are not available.

rlifter production line in the U.S. by the people
ho designed and built the C-130 and C-141, the
eople who know more about designing and build-
g airlifters than anyone else.

Lockheed C-5

Airmail

Wrong Perspective

Ed Gates's April issue article, "Putting Up-Or-Out in Perspective," contained one statistic that higher-level Air Force management has been trying to sell us for the past several months. Unfortunately, he interpreted it just as incorrectly as we are expected to.

One thousand forced separations per year from a 95,000-member officer corps does work out to about one percent. What Mr. Gates does not mention, or possibly even realize, is that forced-out officers were career officers who wanted to stay in for at least twenty years to qualify for a decent retirement program. The chances of being forced out during a twenty-year career are, therefore, twenty percent. This fits precisely with the eighty percent selection rate to major, which we are told will remain for a few more years. So, since most officers come on active duty as second lieutenants, about twenty percent will be forced out for not making major. What we junior officers find so extremely offensive about up-or-out is that, at best, only one or two percent of us are really deadbeats who deserve such treatment.

Give us several chances to make major from the ten- through twenty-year points in our careers and we will stay motivated. If we have not made major by then, at least we can retire with dignity as captains.

I would like to see the Air Force Association take a strong position against up-or-out immediately. It would really give our current membership drive a tremendous boost in the junior officer ranks.

Name Withheld by Request

I just read "Putting Up-Or-Out in Perspective." It doesn't. It does confuse "How did we get here?" with "Should we stay here?" and gives a history of the retirement system. It focuses on force-outs, which is a cop-out because of easily available statistics; it should have focused on the system's effect on job performance. Lt. Gen. Bennie L. Davis's quote accurately points up the problem—rank obsession. The service has too many people more interested in their next promotion than their present job. What's needed are people interested in a job, not a career; then, being good at your job will result in a career.

If good people are allowed to seek their own level, some will choose to remain low in the pyramid for job satisfaction near the hardware level; some will seek to rise in management. The key is defining good people, which requires a believable OER system. We almost had it, but management buckled under to the cries of those who couldn't admit to not being able to walk on water.

Certain jobs are tied to certain ranks. When a person is forced up (not out) he is "above" the type of job that may be best for him. Therefore, he will elect to get out rather than change career fields. Maybe the OER should contain a block to be filled in by the *ratee:* "Do you want a promotion/job change at this time? Yes/No."

Robert H. Cordella, Jr.
Silver Spring, Md.

Importance of Chapter Membership

On Wednesday, April 4, 1979, my wife and I attended our last meeting at the Wichita Falls Chapter of AFA. I had attended a number of the AFA chapter meetings in the past but it was not until that night, at the close of the evening, that I came to realize just how much the chapter affiliation can mean to an individual.

As an on-and-off member of the Air Force Association during my career, I had always looked at the Association as just a group of people who supported Air Force people and Air Force philosophy. AIR FORCE Magazine was just another magazine that came through the mails monthly in which I looked for pictures of people I knew. But as I sat at my last chapter meeting, I realized the importance of the Association with members of the military and civilian community that a chapter affiliation can bring. I looked back on all that I had been missing in chapter meetings by not fully understanding just how much the close personal association meant.

As I depart the Wichita Falls Chapter for the Philippines, I go with an understanding of what the AFA is really all about, but, more importantly, with a sense of purpose in attending future chapter meetings. They are no wingdings, but are a way for peopl with a common purpose to meet an discuss issues vital to all Air Forc members and citizens.

Keep up the push for chapter affilia tion. At-large membership is nice bu nothing like the solidarity that on gets in being a member of a loca chapter.

Lt. Col. Peter P. Quis
Sheppard AFB, Tex.

STRATEGIC AIR COMMAND CHARTS

Information provided for three organization charts in the May "Almanac" issue was not current. **SAC Chart** (*p. 85*): The 306th Strategic Wing is at RAF Mildenhall, UK. **Eighth Air Force Chart** (*p. 85*): Lt. Gen. Edgar S. Harris, Jr., assumed command on June 28, 1978. **Fifteenth Air Force Chart** (*p. 86*): Lt. Gen. James P. Mullins assumed command on January 1, 1979. —THE EDITORS.

Of Assistance to VFW Advisor

. . . AIR FORCE Magazine is provir to be an invaluable aid to me in r capacity as Military Affairs Advisor the 10,000-member Fourth District the State of Illinois Veterans Foreign Wars. I often find articles ar features that are worthwhile relayir to our membership inasmuch some of the contents are not normal available to the average veteran.

The arrival of the April issue wa especially welcome as I becam aware of the "Defense Issues of th '80s" Symposium scheduled for Ma 11–12. My check and those of some my colleagues [were] forwarded fo this well-planned and timely program Keep up the good work!

Robert B. Hancoc
Evanston, Ill.

A Slide Into Boredom?

Your recent coverage of Air Forc pilot retention problems is very i luminating, and the statement ex cerpted from a speech by Lt. Gen Bennie L. Davis, "A Military Career Not Just Another Job" ("AFA Be lieves . . . ," p. 116, March issue) sums up very well the intangible ben efits of an Air Force career. The prob lems lurking in very high airline pay the high probability of forced retire ment between ages forty and fifty, th even higher probability of losin flight status earlier, and the OER tha

The F-15 Eagle's radar will be able to meet changing threats during the next decade with the addition of a programmable signal processor (PSP) developed by Hughes. The PSP is an advanced high-speed computer that processes reflected radar signals for display on a cockpit scope. It will give the AN/APG-63 radar several new modes to operate in -- track-while-scan, raid assessment, and Doppler beam-sharpened ground mapping. The unit also will offer dramatic flexibility because new features can be added merely by changing the software program (processing instructions). The PSP will be installed on F-15s scheduled for delivery to the U.S. Air Force in mid-1980.

An exotic chip that would alert a pilot when he has been detected by enemy radar promises to open a new arena in modern electronic warfare. The unique wafer, called an integrated optic spectrum analyzer (IOSA), would allow a pilot to prepare for a dogfight, turn on jamming equipment, or take any other appropriate action. The device works by having a surface acoustic wave device convert processed radar signals into sound waves. These sound waves interact with light from a tiny solid-state laser and cause the beam to bend toward a detector array made of charge-coupled devices. The amount of deflection indicates the frequency of the radar signal. The IOSA, only recently made possible by breakthroughs in diverse technologies, is being developed by Hughes for the U.S. Air Force.

The United Kingdom's Royal Air Force and Royal Navy are evaluating an advanced communications system built by Hughes that will enable them to exchange tactical information instantaneously and securely. The equipment employs the technique of time division multiple access, which allows a large network of stations to use the same frequency band simultaneously. This is done by dividing the band into multiple time slots. The approach has sufficient capacity to support command and control operations over an entire combat theater.

Tying the radio network together is the Joint Tactical Information Distribution System (JTIDS) Hughes Improved Terminal. This central unit incorporates a computer, signal processor, and transmitter-receiver into a cabinet almost one-third the size and less than half the weight of previous equipment. The jam-resistant terminal constantly updates network information that is contributed by and available to each station.

A new laser device that will enable U.S. Marines to spot targets for conventional artillery and to direct laser-guided weapons is under development at Hughes. The modular device, called MULE (for Modular Universal Laser Equipment), is man-portable, and tripod-mounted for stabilized target tracking. To designate a target for a laser-guided weapon, a Marine aims an invisible beam of laser pulses at a target so that the laser-guided weapon can home in on the reflected laser light. MULE can also combine azimuth, elevation, and range information into a digital message that can be relayed to an automatic tactical fire control center. The contract is being managed for the Marines by the U.S. Army Missile Research and Development Command.

U.S. Air Force sets another record in F100-powered F-15s.

Now it's a sortie record.

Recently, the 36th Tactical Fighter Wing of the U.S. Air Forces of Europe (USAFE) held a grueling three-day mission capabilities exercise.

During the exercise, the USAFE record was set when 71 F-15 fighters flew 322 separate sorties in a 24-hou period.

The men and women of the "Fighting 36th", the McDonnell Douglas F-15 Eagle, the Pratt & Whitney Aircraft F100 engine—ready to defend Western Euro

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Airmail

irports to measure qualities not eas- demonstrable by the line pilot have been discussed at length. One pes that most of our young pilots in e critical decision stage of three to e years' service have enough self- nfidence to see themselves wear- g eagles or stars, thus beating the erages that otherwise would be de- essing.

One additional factor on which I ve seen little comment could be rrected internally by the Air Force d perhaps deserves consideration. e new pilot has generally spent four ars studying in ROTC or the Air rce Academy, and then about two ars in pilot and crew training. These st two years particularly involve very tense, competitive effort, the ex- ement of learning to fly, meeting w friends, moving to new bases, d the like. Then the pilot gradually des into the routine of the line, pull- g lots of alert, droning through urs of uneventful flying in multien- nes, or finding even the excitement flying fighters beginning to pall, d generally seeing his life become re boring than his nostalgic emories of training.

Much has been said of the concept "officer first, pilot second," but our ung pilot has little opportunity to nction as an officer. He deals pro- ssionally with enlisted people on e flight line, but there the attitude is nerally one of technicians working gether. He will be a "customer" of ople in various shops such as sup- y, personnel, or finance. On most ses, salutes are seldom given to nior officers and nobody likes to be e one who makes an issue of it every me. In this democratic age, he is ite likely to meet enlisted people in tuations of equality at a basketball urt or hobby shop. At the same me, he is precluded from performing ost additional duties, sitting on ards or courts, or otherwise build- g officer skills except in his function s a pilot. His OER reflects those offi- r skills that are generally unused, nd he is only saved by the under- anding commander who assumes at his ability to take off on time and t a target and to be generally agree- le equate to all those good things n the right side of the form.

Thus, while most young profes- onals are working very hard indeed build up a practice and reputation, nd to develop their abilities and knowledge, the pilot slides into that three- to five-year career decision period with a sense of routine, bore- dom, and lack of challenge rather than dynamic professional develop- ment as an officer.

Opportunities should be provided for the pilot to gain administrative ex- perience in various staff function areas and particularly to exercise re- sponsible judgment and authority. Obviously, these opportunities must be significant and meaningful, not just busy-work, and preferably they should involve direct supervision of enlisted personnel. Our friends in the Army, for example, get extensive ex- perience commanding platoons and companies as lieutenants and cap- tains, while the first command an Air Force officer assumes may well be as a lieutenant colonel.

This concept of broadening experi- ence has the advantages of providing him with personal challenge, continu- ing his career development, giving him some supervisory experience, providing his commander with a bet- ter basis of appraisal of OER criteria, helping to bridge the gap between rated and nonrated officers, and providing the Air Force with new ideas from intelligent, aggressive young officers. We should still try to improve material factors, but any offi- cer worth his salt will make his pri- mary career decision based on criteria of challenge, excitement, re- sponsibility, and personal develop- ment, which I hope may be supplied in part by the program I recommend.

Lt. Col. Robert O. Boardman,
Mass. ANG
Boston, Mass.

Final Fly-By

Presently I am very near a big change of duty stations. Mr. Cancer has got the death grip on me. During these past months my prime concern and problem has been, what is going to happen to my wife? Good God, how can I be sure she will be OK when I die?

Then I noticed an article in our AFSA Magazine about Teresa Village and a tough old retired chief master sergeant by the name of Nick Masone. On my next hospital pass we decided to stop by the Village and look things over. Not only did we see a beautiful program, but also met some of the most caring and beautiful people in this world. . . .

With guidance by Sergeant Nick on putting together a little Air Force-type paperwork . . . we were settled in right next door to one of the Air Force's finest cancer specialists at the Eglin Hospital. My immediate problems were suddenly being cared for and my biggest problem was solved. Right now, even with a health condition, I am the luckiest man in the whole USA.

I just happened to notice when Sergeant Nick was explaining what I would have to do, so that he could take care of us properly, there was a little teardrop in the corner of his twinkling eye. "Chief, you are an old softie who loves people." Yes, you and your people do love and care about people and, given half a chance, you do take positive action toward caring for their needs. I am al- ready in heaven; my buddies have brought me home to die with dignity and a good, clear, unworried mind. Yes, we do take care of our own. Boy, am I happy my daughter was smart enough to marry an Air Force NCO. Another problem solved.

In the event there's anyone out there who loves old first sergeants, please get with the program and sup- port our senior enlisted leaders. If you don't love old first sergeants, then do it just to make me mad. Continue to make things better for our Air Force families. Also, the Village can always use an extra buck.

A most grateful old top kick.

MSgt. Pryor L. Fair, USAF (Ret.)
Fort Walton Beach, Fla.

Museum Identity Clouded

The letter from J. P. Flanagan ["Air- mail," pp. 15–16, March issue] may confuse readers interested in the Eighth Air Force Exhibit that has been established near Cambridge, En- gland, at Duxford Airfield, by the Im- perial War Museum in conjunction with the Eighth Air Force Memorial Museum Foundation, Inc. Those who have visited Duxford recently know that it is a well established aviation history exhibition grounds. The Eighth Air Force Exhibit will consist of a coordinated display of equip- ment, uniforms, documents, and other historic artifacts related to the US Eighth Air Force in World War II.

The Eighth Air Force Memorial Museum Foundation was established by the Eighth Air Force Historical So- ciety (made up of more than 4,000 Eighth Air Force veterans) in 1977. The charter for the Foundation pro- poses the nonprofit organization to establish, develop, and maintain museum collections, historic re- search efforts, and other activities that will perpetuate the memory of the mighty Eighth (over 300,000 persons

Airmail

were assigned to the Eighth in WW II).

Persons who have photographs, documents, and equipment related to the Eighth are requested to send a description of the material available.

Lt. Col. John H. Woolnough, USAF (Ret.)
President, Eighth AFMMF
Box 4738
Hollywood, Fla. 33023

We Better Get With It

The March issue's Soviet Aerospace Almanac was a very alarming picture of the US/USSR military balance. The growing sophistication of Soviet weaponry never ceases to amaze me.

Such weapons as the "Super MiG-25," or MiG-29 in some circles, and the AS-10 antiaircraft missile are certainly first-rate weapons in every sense of the word. On the other hand, the US does not spend enough on R&D, though we have seen substantial increases in basic research over the past two years. I fear it shall ultimately catch up with us—the USSR will have superior weapons across the board.

This is of particular concern to me. As an AFJROTC cadet, I will be among the "officers of the '80s" who will have to deal with second-best equipment. The funny thing (if one has a taste for gallows humor) is that we have the capability to be number one and stay there, but that we are not exploiting our technology. The AMRAAM and ASALM missiles, the MX ICBM, the B-1 bomber . . . all make even the latest Soviet weapons seem crude by comparison.

It's far past the time we woke up to the grim realities that confront us in the military balance. If we do not take the necessary steps, the Soviets, I'm sure, will be more than happy to wake us up the hard way.

C/1Lt. Steve Banckert
MA-61 (Quincy) AFJROTC
Quincy, Mass.

Another Phantom Researcher

I am researching the development and operational history of the F-4 Phantom II and would appreciate assistance in obtaining data. The information required concerns wings and squadrons that have operated or are currently operating the aircraft as well as the aircraft markings. Photos, 35-mm slides, or line drawings showing wing, squadron, and personal markings would be helpful.

Any material loaned will be copied and returned as promptly as possible. Postage will be paid both ways.

William R. Peake
584-A Valerie Lane
Addison, Ill. 60101

FIVE WHO MADE IT

Hans G. Onderwater, Director of the Municipal Archives of Barendrecht, The Netherlands, is doing research for a book on the German occupation during World War II. He would like to get in touch with then-Col. Tom Hubbard and Lt. Jack Carnett, who were shot down over Belgium and France. With the help of members of the Resistance, they made their way to Spain with Maj. Don Willis (recently deceased), who had been shot down over Barendrecht, and RAF Pilot Officer Len Barnes and RAF Sergeant Ron Emery. Barnes and Emery have been located. Anyone knowing the whereabouts of or has information on Messrs. Hubbard and Carnett, please contact Mr. Onderwater at:

Director, Municipal Archives
POB 501 - 2992 EA
Barendrecht
The Netherlands

New Branch of Museum

In September 1978, the National Museum and Art Gallery of Papua New Guinea, established an Aviation, Maritime and War Branch, with the aim of developing, restoring, preserving, and promoting a museum collection of relics covering these activities. This new branch will take over the activities of a private organization, the Air Museum of Papua New Guinea, and carry on the work begun by that body.

I am seeking assistance in promoting this new museum in a country that saw so much of the aerial, ground, and naval fighting of World War II. We are endeavoring to preserve in this country a vital part of our history, which, to date, has unfortunately been lost to overseas museums and collections.

We need assistance in the following fields:

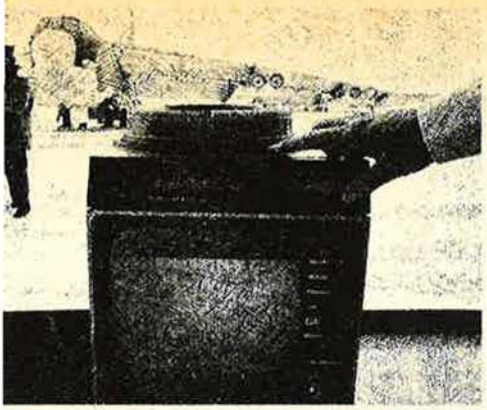
Archive material: such as books, reports, field orders, general orders, special orders, log books (copies o photographs, and anything of a wr ten nature that will help preserve o history during the last war.

Personal reminiscences: very e sential when recording history. Ca be either written or on tape. (We w reimburse the cost of any tapes.)

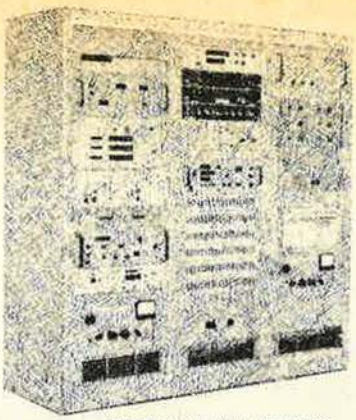
P-38F investigation: we have r cently recovered a Lockheed P-38 3-LO Lightning from a season swamp about eighteen miles nort west of Port Moresby. The airplar bears the numbers "39" on both tai indicating prior ownership by t 39th Fighter Squadron. Its seri number is 42-12647, c/n 7081. A s vice plate on one of the engines in cated it to have crash-landed aft November 1943. Both booms near t national insignia have four to fi large bullet holes. So, too, does t leading edge of the right wing. At t time of its crash, it could have b longed either to the 475th Fight Group or the 80th Fighter Squadro We need any information on the s vice history of this airplane, the nar of the pilot at the time of its cras landing, and what became of him. photo of the plane appears in Ste Birdsall's *Flying Buccaneers*, p. 39

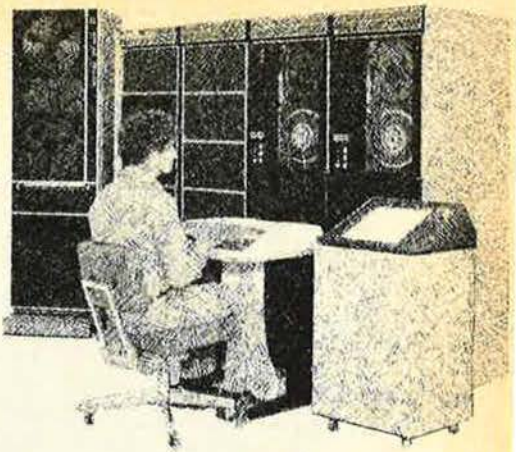
The Museum has plans for the covery of a number of aircraft. The include a B-17E 41-2446 (one of t first six planes carrying out the fi American attack on Rabaul on Fe ruary 23, 1942, although this pla and one other were the only knov ones to reach the target); B-25C 4 12442, ex-3d Bomb Group and 345 Bomb Group (took part in the Batt of the Bismarck Sea); a Fo Trimotor; and a Kawasaki Ki-6 "Tony." Recovery of these valuab and historic airplanes will have to wa until the museum has the financial r sources to do so. For these purpose we are also seeking donations fro overseas, although as yet th museum is not registered with the U Internal Revenue Service for tax-d duction purposes.

In addition to the planes mentione above, our collection includes: CA Wirraway A20-19, RAAF training observation airplane; Piper Aztec (th second to fly in Papua); Douglas DC- VH-SBI; crew hatch from Admir Yamamoto's "Betty" bomber i which he was killed; Allison engin from a P-40E, flown by Lt. W. Hannin while with the 49th Fighter Grou undercarriage leg and wheel from a Aichi Type 99 "Val" bomber; instr ment panels from a Catalina an P-47D; "Zero" drop tank, from th Lae wing, dropped during the early a



AUDIOVISUAL PRODUCTS





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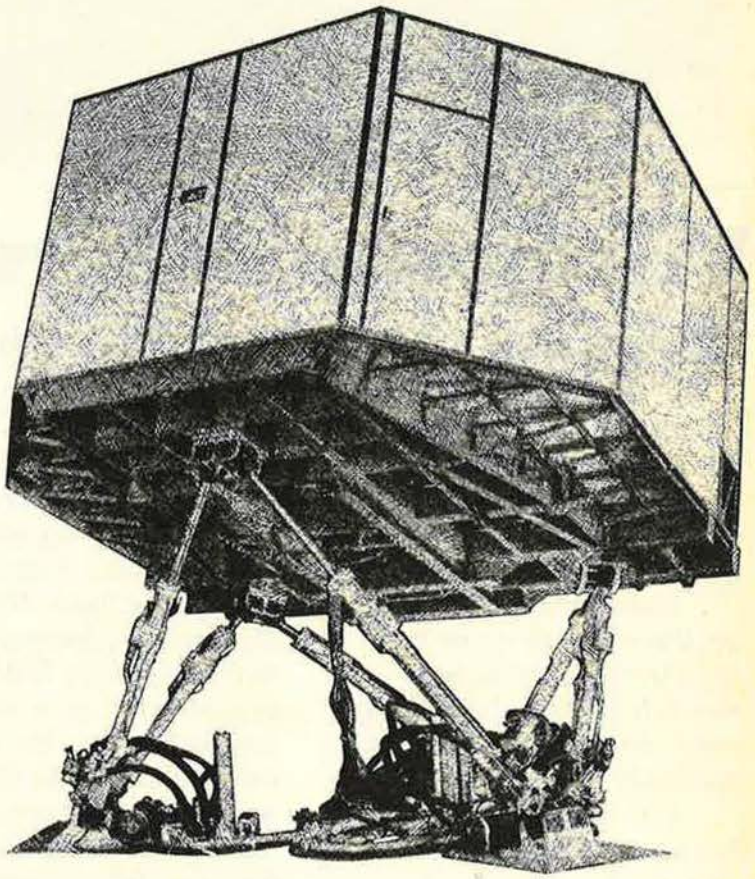
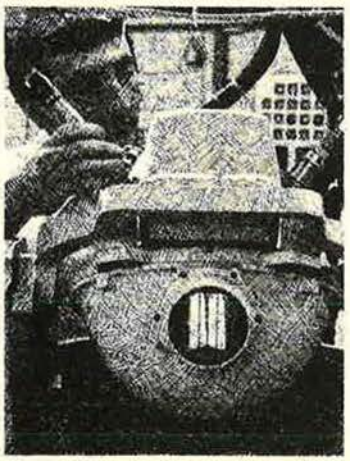


FLIGHT SIMULATORS



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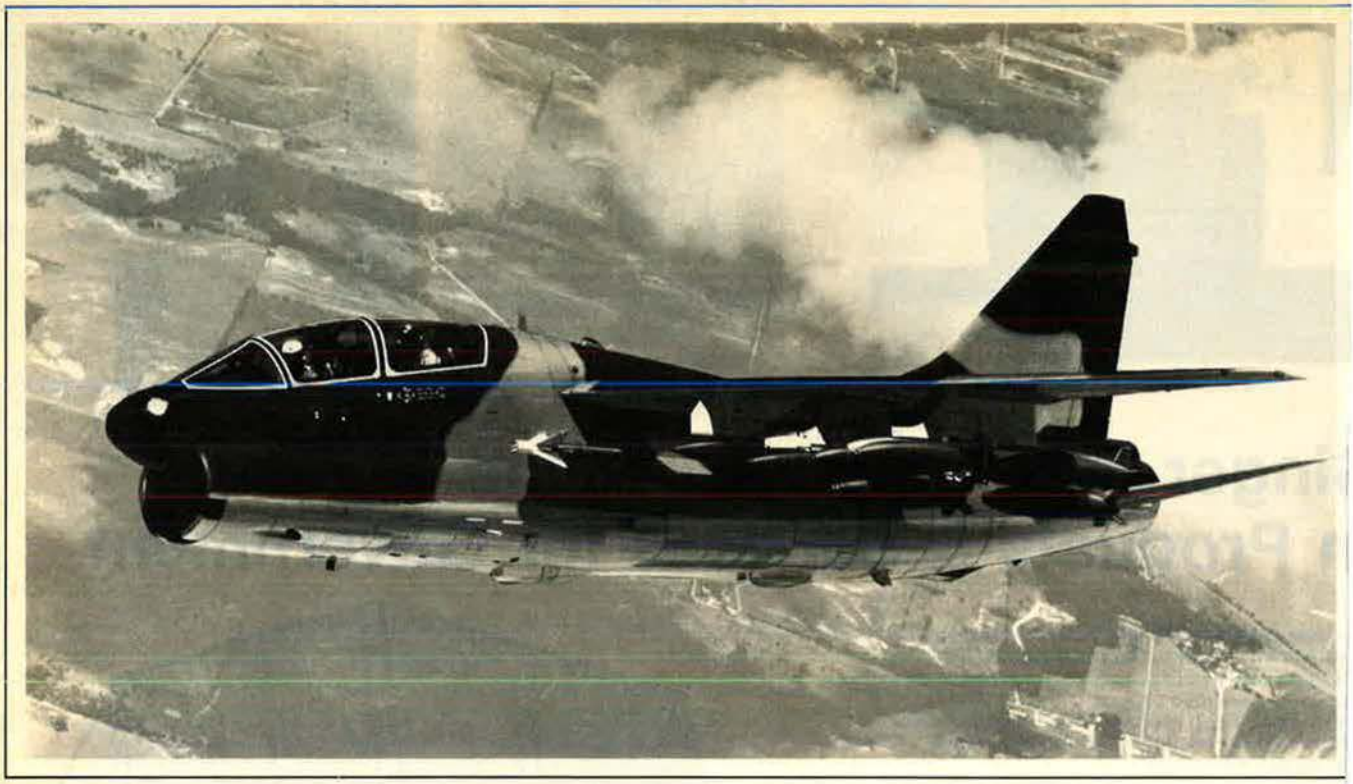

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ittles for Port Moresby; medals, aps, propaganda leaflets, and other nall items.

Although it is small at present, we ope the museum will develop in the ars ahead, to not only become the ajor research facility on the air, ound, and naval war in Papua, but ll also be a worthy reminder to the ople of this country of the sac- ices made by many men from many untries all those years ago.

Bruce D. Hoy
Aviation, Maritime and War Branch
National Museum and Art Gallery
P. O. Box 5560, Boroko
Papua New Guinea

nould Have Been the 394th BG

the "Unit Reunions" section of the oril issue [p. 15] appeared a notice out the 48th Fighter Group and 2d Bomb Group, Ninth Air Force. It as the 394th Bomb Group (M) that as at Cambrai/Niergnies, France, t the 322d. We were there from Oc- ber 1944 to May 1945. I was the oup Radar Officer assigned to oup Headquarters. Our living quar- rs were in the nearby village of eve Coeur. The 48th Fighter Group as there just ahead of us.

Theodore C. Rynda
Dayton, Ohio

IA B-29 Pilot

m looking for information concern- g 2d Lt. Frank A. Hoeksema, serial umber 0771-407. He was a B-29 pilot ported missing in action over Min- anao, Philippines, in late 1944 or arly 1945. Lieutenant Hoeksema was om Oak Park, Ill.

If anyone has any information con- erning him please contact me.

Jan Conard
709 Robinhood
Redlands, Calif. 92373
Phone: (714) 792-7846

pdating Documentary Sources

he Office of Air Force History is pre- aring to review *United States Air orce History—A Guide to Documen- ry Sources,* originally published by is office in 1973.

Seeking to enhance this finding aid for scholars and students conducting research in aviation and Air Force history, the History Office is soliciting assistance in locating documentary and photo collections inadvertently excluded from the current publication.

In addition, two new areas will be added: Oral History Collections, and Aeronautical Museums.

The History Office would appreciate anyone having knowledge of such collections submit information to:

Lawrence J. Paszek, Senior Editor
Office of Air Force History (CVAH)
Building 5681
Bolling AFB, D. C. 20332

Korean War Rescue

I am writing a book about the operations of US Army X Corps in North Korea during October, November, and December of 1950. The Air Force's 314th Troop Carrier Group, 374th Troop Carrier Wing, and the 21st Troop Carrier Squadron flew missions to resupply and evacuate members of X Corps's 1st Marine Division and the 7th Infantry Division. Missions were flown over and into Yudam-ni, the Chosin Reservoir, Hagaru-ri, Koto-ri, Pungsan, Kapsan, Cho-ri, and Hyesanjin. I would like to be contacted by Air Force veterans who worked to save those ground troops from destruction.

I also would like to hear from people who were involved with the Airways and Air Communications Service (AACS) that was stationed in Japan during late 1950.

Maj. Charles P. Stone, USAR
116 North Aberdeen Ave.
Wayne, Pa. 19087

44th BG History

I am preparing a history of the 44th Bomb Group/Bomb Wing/Strategic Missile Wing. I would like to hear from members and former members of the 44th—whether they served in the earliest days of WW II, the '50s, or up to the present. Especially need to borrow photos of 44th aircraft (B-24, B-29, and B-47) and from the early missile days.

All materials loaned will be returned in the original condition.

1st Lt. David H. Klaus
317 Patton St.
Rapid City, S. D. 57701

Randolph/Kelly Class 40-G

The Randolph/Kelly Flying School Class 40-G (November 15, 1940) is missing addresses for the following members: Elmer C. Beach, Jr.; Hartzell R. Birch, Jr.; Grover C. Furr, Jr.; George W. Harris; Stuart A. McLeod; Jerome R. Sawyer; James F. Small; Marion C. Snider; Eugene A. Watson; Robert E. Wegner.

Anyone having knowledge of any of these individuals, please contact me.

Col. H. H. "Gus" Wittrock, USAF (Ret.)
10229 Ridgewood
El Paso, Tex. 79925

Detachment 485, AAS

To all former alumni of Detachment 485, Arnold Air Society, between the years 1954–67—it would be most appreciated if you would respond with your address for our records.

Lazslo Horvath
IO/AAS
9 Senior St.
New Brunswick, N. J. 08903

UNIT REUNIONS

Lawyer-Pilots Bar Association
July 19–22, Grand Hotel, Mackinac Island, Mich. **Contact:** Arthur Alan Wolk, 1712 Locust St., Philadelphia, Pa. 19103. Phone: (215) 545-4220.

Tuskegee Airmen
August 8–12, Continental Plaza Hotel, Chicago, Ill. Civilians, ex-cadets, instructors, dependents, dependents of deceased personnel, AF active-duty personnel, minority cadets of all Academies, and members of the 99th and 553d Fighter Sqdns., 332d Fighter Group, 477th Bomb Group (M), 118th and 126th ABU (SQ-F), and all supporting units WW II. **Contact:** Robert Martin, Chicago Chapter, Tuskegee Airmen, Inc., P. O. Box 53140, Chicago, Ill. 60653.

4th Strategic Air Depot
8th Air Force, England, WW II. Anyone interested in forming an association and having a reunion? **Contact:** Col. Paul P. Gerhardt, USAFR (Ret.), 2602 S. Union, Apt. B-307, Tacoma, Wash. 98405.

79th Fighter Group
Members of the 85th, 86th, and 87th Fighter Squadrons, August 10–12, Marriott West Loop Hotel, Houston, Tex. **Contact:** Edwin Newbould, 1123 East 173d Pl., South Holland, Ill. 60473. Phone: (312) 331-3744.

90th Bomb Group (H)
"Jolly Rogers"—the "Best Damn Heavy Bomb Group in the World," July 26–28, Indianapolis, Ind. **Contact:** Loyde H. Adams, 1208 New Hampshire St., Lincoln, Neb. 68508.

450th Bomb Sqdn., 322d Bomb Gp.
August 13–17, Staten Island, N. Y. **Contact:** John L. Egan, 217 East 200 North, Price, Utah 84501. Phone: (801) 637-1060.

e suggest that readers keep their letters to a maxi- um of 500 words. The Editors reserve the right to ex- rpt or condense as required in the interest of space or od taste. Names will be withheld on request, but un- gned letters are not acceptable.

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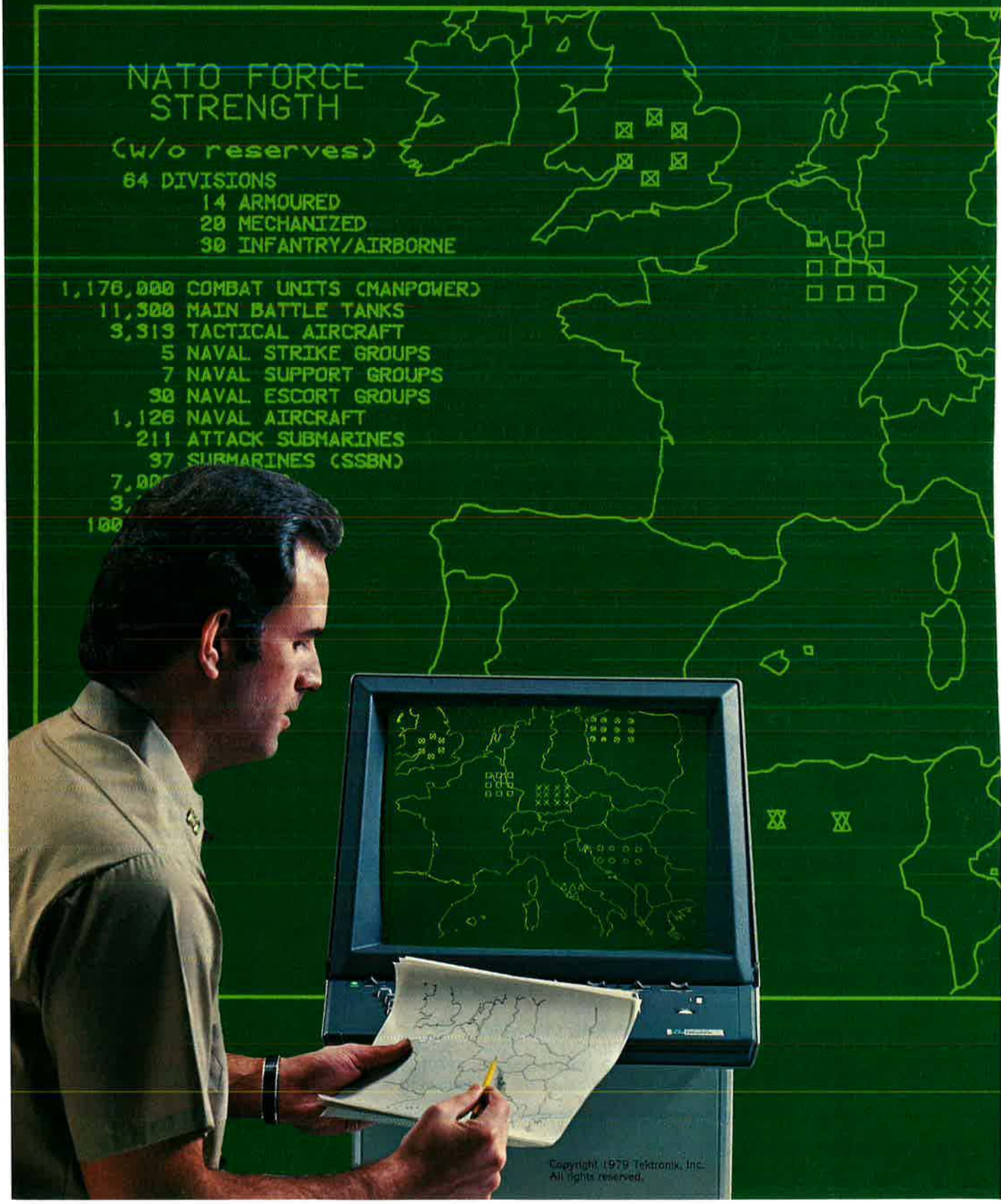

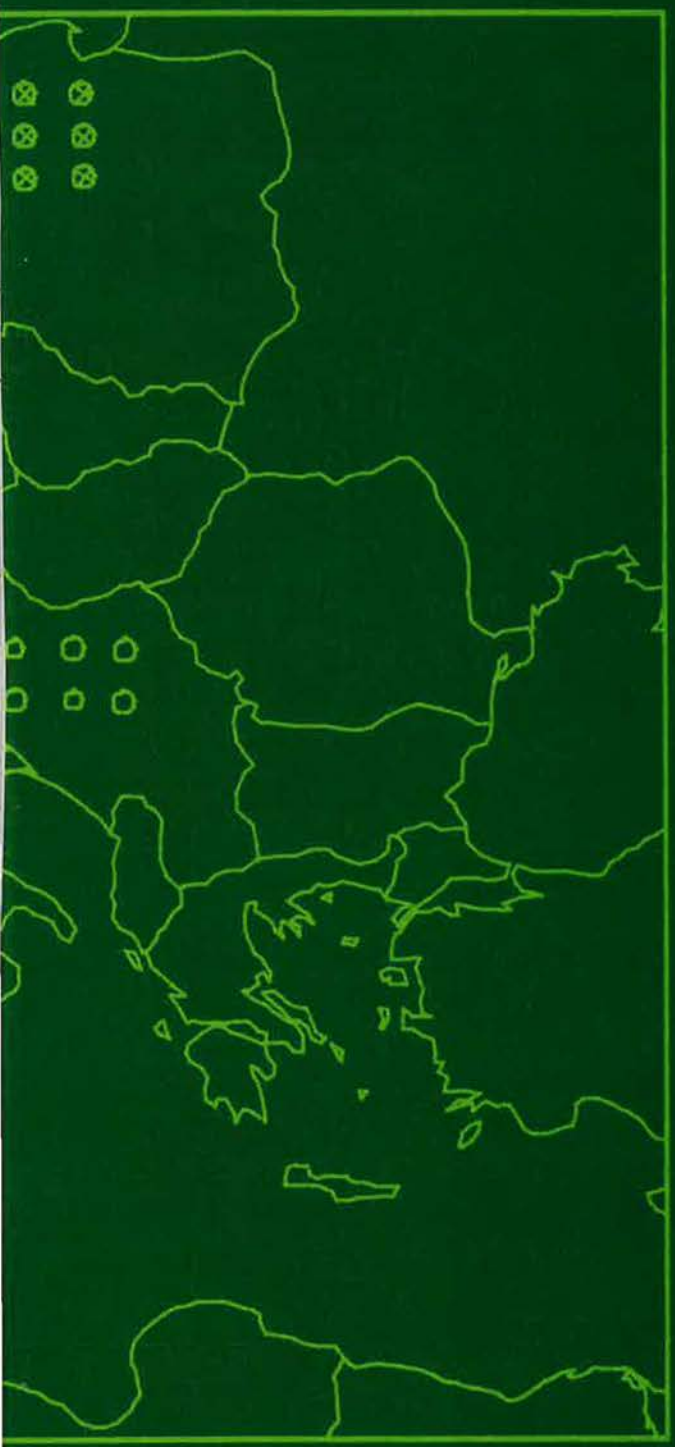

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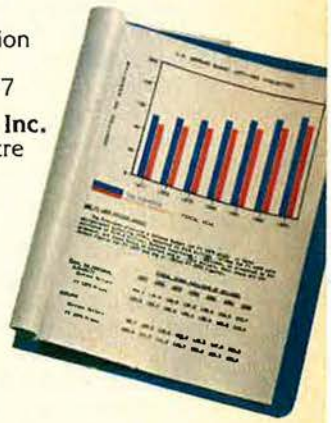

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In Focus...

BY EDGAR ULSAMER, SENIOR EDITOR

Washington, D. C., May 2

Packaging Peace

Well-connected Washington sources say the Administration plans to broaden the apparently imminent Brezhnev-Carter summit meeting beyond SALT II to include a special "peace package" of other accords. Proposed elements include an agreement on chemical warfare capabilities, satellite interceptors (ASATs), and, quite surprisingly, a bilateral arrangement concerning the two countries' conventional and theater nuclear forces assigned to NATO and the Warsaw Pact, respectively. The latter arrangement would seem to preempt the multilateral Mutual Balanced Force Reduction (MBFR) talks that have been going on in Vienna, Austria, for some time and which involve other NATO members.

Deliberately exempted from the "peace package" is the Comprehensive Test Ban Treaty (CTBT), which the Administration reportedly believes could get in the way of SALT II ratification by the Senate if tackled at this time. Nevertheless, the Administration appears to have reached a tentative agreement with the Soviet Union to bring about a dozen Russian seismologists to the US this summer to examine this nation's automatic, unmanned CTBT monitoring stations. Congressional sources view this arrangement with alarm. Ostensible purpose is to find out whether or not installing this type of equipment on Soviet territory would be acceptable to Moscow if CTBT is concluded at some future date. So far, however, the Soviets have made no commitment to permit such facilities.

By being able to inspect these monitoring systems, the Soviet experts would learn important lessons about this country's strengths and weaknesses in detecting underground nuclear explosions and how to prepare countermeasures in advance.

Toward an ASAT Ban

The Administration reportedly is solidifying its negotiating position on a two-phased accord with the Soviet Union to limit or bar the use of satellite interceptors (ASATs). The initial treaty, meant to be of unlimited duration but providing for a one-year cessation of ASAT testing, is to be of limited scope. Principal objective is to prohibit both sides from permanently damaging, destroying, or displacing (taking over physically or by electronic means) each others' satellites, or satellites (such as NATO or Warsaw Pact systems) that either side has an interest in.

From the US point of view, an ASAT testing moratorium in effect for one year only would be mainly cosmetic, since this nation's ASAT program is not yet ready for space demonstration. Conversely, of course, it can be argued that the US arms-control lobby can be expected to crusade mightily to extend a moratorium beyond the year.

The initial agreement, in effect, merely extends to satellites in general the provisions of SALT relative to noninterference with "national technical means of verification." At some future date, probably after the US has demonstrated its own ASAT in space, the two superpowers, according to present White House plans, are to negotiate a "comprehensive treaty" that would seek to do away with both sides' arsenals of weapons and capabilities that can permanently damage, destroy, or displace the other's satellites.

Issues such as the development of electronic space warfare capabilities, ground-based lasers that "illuminate" spacecraft with enough thermal energy to cause them to overhea and space-based beam weapons a not to be covered by the initial agre ment other than by the basic prohib tion against waging war against th other side's spacecraft. (Some d fense experts believe that the U within five years, could develop ar deploy a ground-based high-ener laser capable of putting satellites low altitudes out of commissio There is no consensus on whether not the Soviets are ahead of the US the development of this type of las weapon.)

The Administration's willingness proceed with an ASAT treaty seems be at odds with the generally a cepted findings that Soviet disma tling of its existing ASAT capabiliti and facilities cannot be verified wit out cooperative measures, includir on-site inspection. This is so for tw reasons: The Soviets use a boost for ASAT that also serves as th launch vehicle of several other, unr lated space and missile system Further, the Soviets could launc ASATs from boosters not now us for this purpose. As a senior Defens official told this column, it would "quite easy" to launch an ASAT ridir atop an alternate booster vehic from Soviet sites not associated US intelligence with this type of mi sion. Verification of an ASAT treat he added, is therefore close to impo sible.

But several other considerations, i the view of influential Administratio officials, weigh in on the other side c the argument. The Soviet ASAT sys tem, even though under test since th early 1970s, is still of very limite scope and has encountered severa failures.

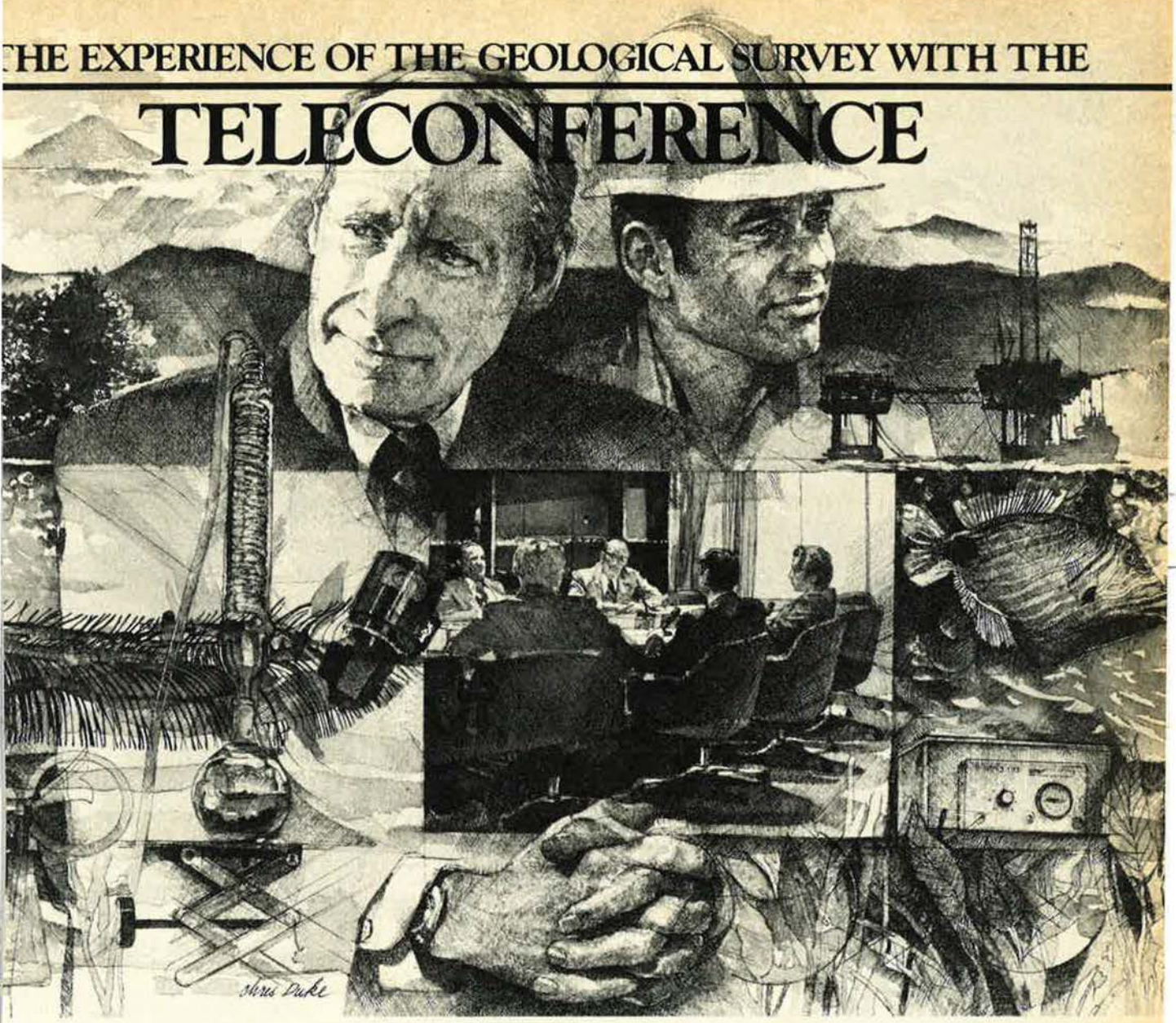
Seventeen test flights of ASAT ar known to have taken place so far. The last one occurred in May 1978 but in volved only a rendezvous with a simu lated target, a Soviet satellite, rathe than exploding the target as had beer the case in some previous tests.

The supporters of a limited ASA accord argue also that while the Soviet ASAT system is being im proved, advances appear to be mini mal. There is no evidence that the Soviets are about to flight-test direct-ascent interceptor (a weapor that can reach as high as the 22,300 mile altitude of geostationary orbits) With Soviet ASAT tests so far con fined to about 600 kilometer altitudes some of this country's most crucia satellites are well beyond the reach o the existing Soviet space weapon, ir the view of these officials. It follows

BLATANT SOVIET SALT VIOLATIONS

Soviet brazenness in provoking the US during the SALT II negotiations earlier this year reached unprecedented levels when several SS-18 test flights involved complete encryption of twenty-nine out of a total of thirty-one telemetry data channels. The tests involved single reentry vehicles released from the newest, "Mod Five," SS-18 post boost vehicle. The new reentry vehicle appears to include terminal guidance elements.

THE EXPERIENCE OF THE GEOLOGICAL SURVEY WITH THE TELECONFERENCE



There's an unusual eleconference network in peration at the Geological Survey—the first of its kind. n its initial six months of peration, this network saved enough in travel to equal ts cost.

Steve Frantz, Bell System Account Executive assigned o the Geological Survey's Conservation Division, explains: "Every Monday morning, the division managers in Reston, Virginia alk to field staffs at four egional offices.

"They conduct a meeting—a teleconference.

"These key people from Reston carry on a round table review of new policy, new regulations. In turn, the field people report in on their programs, problems, and needs.

"All this means that management has more effective control and can react faster than before.

"It means that travel is reduced—and with it, travel costs. Instead of being seated in an airplane, people remain seated at their desks.

"Another unusual thing about this network," Mr. Frantz points out, "is that you can dial a point outside the circuit. So it's easy to call a field location as remote as Alaska. And add it to the conference."

To get the same kind of help that the Geological Survey got, talk to your problem-solving Bell Account Executive. The Account Executive can bring Bell expertise to your problem and is the point of contact that opens the resources of the Bell System to your needs.

Bell System

Sperry Update 7

A timely report of Sperry Flight Systems activities in the airline, defense, space and general aviation markets.

Boeing awards 767/757 FMCS job to Sperry

Sperry Flight Systems' leadership in the supply of major systems to the commercial aviation industry was enhanced recently by the selection of our Flight Management Computer System (FMCS) as standard equipment for the new-generation Boeing 767 and 757 airliners.

The Sperry FMCS represents a major innovation for the modern flight deck, providing a comprehensive automatic enroute and terminal navigation capability. Computing and commanding lateral and vertical flight profiles, the Sperry FMCS maximizes fuel efficiency by electronic linkage to automatic flight control and thrust management systems. In addition, it will interface with electronic attitude director and horizontal situation indicators.

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The initial order calls for 200 shipsets each for the 767 and 757, with delivery to begin in 1981.

Sperry digital air data computers now standard in four airliners.

Selection of Sperry Flight Systems' Digital Air Data Computers (DADC) as standard equipment on Boeing's 767 and 757, Airbus Industrie's A-300 and Lockheed's L-1011-500 has placed us firmly at the forefront in design and manufacture of digital air data systems.

These commercial airline systems utilize technology advanced through development of digital air data computers used in the F-15, F-16 and F-18.

Sperry's DADC systems provide high reliability and enhanced built-in test capability while reducing weight, space requirements and power consumption.

Spanish jet trainers use Sperry avionics

An avionics package will be supplied by Sperry Flight Systems' Avionics Division for Spanish Air Force CASA 101 jet trainers as a result of a recent contract award.

The SPI-402 flight director system, gyroscopic sensors and communication transceivers will be used to equip the trainers manufactured by the Spanish aircraft builder, Construcciones Aeronauticas S.A. (CASA).

The avionics gear includes a Sperry Tarsyn vertical and directional gyro package, dual HZ-444 attitude director indicators, RD-500A horizontal situation indicators with remote course selection, RH-405 radio magnetic indicators and 807A communication transceivers.

Sperry needs engineers.

If you would like to go where the action is, come to Sperry. Send your resume to Sperry Flight Systems, Professional Employment (U-7), Box 21111, Phoenix, Arizona, 85036.

Advanced 737-200's get digital flight control.

British Airways and Lufthansa will receive the first Boeing jet airliners with digital flight control computer in an update of Sperry's SP-77 integrated automatic flight control system for the advanced 737-200.

Known as the SP-177, the new system will digitally control all crui flight modes and is designed for Category IIIA automatic landings. It combines in two digital flight control computers the functions which would require six separate analog computer boxes.

The Sperry system provides fas complete monitoring and fault diagnosis of system components f simplified maintenance. Flight director and autopilot functions a handled by the SP-177, including altitude and heading hold and VO track.

First deliveries to Boeing are se for late 1979. British Airways and Lufthansa have placed firm order for more than 50 of the airliners.

Last year Sperry updated the analog autopilot system aboard th Boeing 727, providing greater reliability, while reducing system weight and power requirements. Once known as the SP-50, it is no the SP-150.

Remember us.

If you're interested in these programs, or you have an avionics project you'd like to discuss, talk to the good listeners at Sperry. Sperry Flight Systems of Phoenix, Arizona is a division of Sperry Rand Corporation, where listening is mo than a word in our advertising slog – it's a philosophy of doing busine *We understand how important it is to listen.*

SPERRY
FLIGHT SYSTEMS

nFocus...

ey contend, that it would be in the 3 interest to persuade the Soviets to eeze their ASAT development and st program before it can take a ajor technological step forward.

Buttressing this line of reasoning is e further contention—possibly unded more on optimism than cer-inty—that the US has at its disposal chnologies that will outdistance the oviet ASAT capabilities once the hite House authorizes program -ahead. One bootstrap option ought to be rapidly available in-lves converting the Trident I SLBM d its star-tracking guidance system r the ASAT role, presumably by add-g infrared homing and a nonnuclear l mechanism.

Further, since the homing and tercept requirements of conven-nally armed exo-atmospheric bal-tic missile defense (BMD) intercep-rs far exceed the "skill levels" eded to kill satellites on a fixed or-, some experts contend that the US AT program gets a free ride from MD research and development. us, they claim, an ASAT treaty is not ntamount to technological stagna-n so far as these space weapons e concerned.

Conclusion of some form of ASAT cord appears to be a high-priority ncern of the Carter Administration d is said to be part of the "peace ckage" described above.

X in Question Again

At this writing, the prospects of MX, e long-delayed survivably based BM, must be rated somewhere be-veen hazy and grim. Defense Secre-ry Harold Brown is expected to re-rt orally and privately—following a pecial National Security Council eeting on May 3—to President mmy Carter early in May on the nge of MX design and basing op-ons that the Air Force, the Defense epartment, and other elements of e government have restudied over e past few months.

Earlier this year, Congress man-ated that a decision on MX be made y the White House by mid-May. Yet, Washington insiders predict that the hite House again will defer a deci-on on the basing mode. The fact that e White House rejected a plan for e President to give the graduation ddress at the Air Force Academy on May 30 is being seen as a tipoff for either a deferral or a decision to retreat to an "enhanced dyad," meaning that the air-breathing and sea-based components are to be strengthened to absorb the role of the ICBMs.

Congressional experts familiar with the current mood of the White House on MX are concerned that the President has heard mainly from the detractors of the MX program and has not received a full briefing on this complex and crucial issue.

SALT Technology Transfer Ban

One of the most controversial features of SALT II is the prohibition of "technology transfer," meaning mainly sharing with other NATO member nations US cruise missile technology. Since the defense industries of such countries as France, Germany, and Britain probably could build the missile and develop the requisite advanced fuels without US assistance, the real issue is the satellite-derived digital terrain information essential for the weapon's guidance system.

The area of targeting concern to NATO is the western sector of the USSR up to the Urals, especially the second echelon of the Warsaw Pact forces. Generally overlooked is the fact that a sizable portion of the area in question was occupied by the Nazi Wehrmacht during World War II and meticulously surveyed by German cartographers and topographers. These old maps, which are in the possession of the European NATO powers as well as of the US, are detailed enough to be of considerable use for the cruise missile's TERCOM (terrain contour matching) guidance system. The quality of the maps is attested to by the fact that until the US developed technology to carry out highly accurate surveys from space, this country used these maps for some of its strategic targeting. But since the German maps don't extend to the Urals, the European NATO powers continue to be interested in obtaining US terrain information.

SALT Verification Issues

Loss of US intelligence facilities in Iran can't be made up adequately by three reactivated monitoring sites in Turkey, in the view of highly qualified experts. For one, the Turkish installations are of limited value in monitoring Soviet ICBM tests because the Caucasus Mountains shield the Russian launch sites from line-of-sight monitoring and because the distances involved are significantly greater than from the lost sites in Iran. Continued availability of the Turkish sites is in question since the current one-year agreement with Ankara will expire this fall. Turkish willingness to renew the site agreement is uncertain.

The recent brouhaha over who leaked the Administration's "quick fix" for the lost Iranian sites—a modified U-2 aircraft, presumably equipped with SLAR (side-looking sensors), operating from such standoff areas as Turkey, Afghanistan, Pakistan, or even Germany—was tinged with farcical overtones. As Sen. Jake Garn (R-Utah) pointed out, almost concurrent with a hush-hush Administration briefing of a select group of Senators on this allegedly supersecret scheme, the New York *Times* ran a front-page account of the program with detail greater than had been made available to the lawmakers. Senator Garn accused the Administration of leaking this information to counteract public concern about the loss of the Iranian SALT verification sites. The Administration's "SALT sellers," he claimed, "are in a virtual state of panic over the verification issue. They know that the US Senate will never approve an unverifiable treaty, and SALT II is just that." The Administration countered by suggesting that the news leak came from the Senate.

The Administration probably has not helped its case by contradictory testimony on the issue. In classified congressional testimony—promptly leaked to the press—the government's intelligence experts conceded that it might be 1984 before the country can field systems that might restore US verification capabilities to their original levels. Even this claim probably is optimistic and based on the uncertain feasibility of accelerating by about two years a new high-resolution satellite system that is predicated on advanced, risky technologies involving synthetic aperture sensors, as well as some highly classified clandestine schemes of a very tenuous nature.

On April 19, Defense Secretary Harold Brown countered this damaging admission by asserting that "the Iranian monitoring sites supplied us with various kinds of information on Soviet missile programs. . . . Regaining all of the monitoring capability (with or without a SALT II agreement) will take until 1983 or 1984, depending on how much we are able to accelerate programs already under way.

In Focus...

Regaining enough of it to verify adequately Soviet compliance with the provisions of SALT II, I estimate, will take about a year, again depending on how fast we can carry out monitoring programs under development."

Many congressional experts are skeptical concerning Dr. Brown's contention, especially so far as the finely drawn SALT distinction between "new types" and modified ICBMs is concerned. With the loss of the Iranian sites—the only means for gauging the performance and nature of the first two stages of Soviet ICBMs under test—apparently only major changes of this type will be detectable.

Some congressional SALT experts argue, therefore, that the Soviets could build a totally new missile as long as the permissible margin is not exceeded (or the excess is not proven by the US) yet not have the new weapon count as "new" under the treaty. The consequences of this loophole could be enormous on either side. If Minuteman III, for instance, were to use the newest, so-called Class Seven propellant, in place of the older material, its throw-weight could be doubled. Additional improvements in other fields that also would not affect volume or missile weight could further boost throw-weight. The so-called fifth generation of Soviet ICBMs reportedly concentrates precisely on such advances in propellants, rocket motors, and nozzles, and according to some intelligence estimates may quadruple throw-weight without a change in missile size. Under the pertinent SALT II language, these technology advances could be "retrofitted" to some or all Soviet ICBMs.

The proponents of SALT II, of course, can argue that the US is at liberty to follow suit. The catch, though, is that the US does not plan to deploy its only new ICBM under early development, the MX, until after SALT II expires in 1985.

Washington Observations

• Rep. Robin Beard (R-Tenn.), in a recent House floor speech, stressed the importance in the context of SALT II of the shipboard-based Cobra Judy phased-array radar system that the Air Force is developing for the intelligence community and the US Army's Ballistic Missile Defense Agency. Cobra Judy, scheduled to achieve operational status in about a year, he said, will "lead to a capability to gather reentry data on Soviet flight-test vehicles that does not exist now. These particular sensors will become more significant as the impact of the loss of access to radar located on foreign soil is realized."

A negative note was struck in the same context, however, by the former Director of the Defense Intelligence Agency, retired Army Lt. Gen. Daniel Graham, who maintains that sale of the operations manual for the KH-11 intelligence satellite to the Soviets by a former CIA employee had dealt the US verification capability a crunching blow. Recovery from this setback, General Graham believes, will take many years.

• In a widely noted speech, Sen. Sam Nunn (D-Ga.) elegantly but firmly delivered a message of deep concern to the Administration. Generally interpreted as reflecting the views of the numerically strong and politically decisive centrist elements of both houses of Congress, the Nunn speech before the National Chamber of Commerce focused on specific US defense capabilities in need of shoring up to "prevent the Soviets from gaining [military] superiority." The influential Georgia lawmaker charged that "we have not competed effectively with the Soviet Union. Unless we and our allies are prepared to do so, we can expect future arms-control agreements with Moscow to do little more than ratify an emerging Soviet superiority."

The Senator cited seven tasks "essential" to national security:

"With or without SALT, we must modernize our tactical nuclear posture and improve NATO's conventional warfare capability.

"With or without SALT, we must accelerate our shipbuilding program, and our ability to move quickly by sea and air.

"With or without SALT, we must not allow the Soviet Union to hold our land-based ICBMs at risk.

"With or without SALT, we must insist that our NATO allies and Japan increase their share of the Free World's defense burden.

"With or without SALT, we must call a halt to the self-destruction of our intelligence community.

"With or without SALT, we must soberly address the dismal realities of the All-Volunteer Force and rekindle the obligation of every citizen to serve his nation, not just in fighting war but in preventing them.

"With or without SALT, we mu make real increases in defens spending."

The Senator's message to th White House concerning SALT II wa unambiguous. Terming arms contr a "moral imperative," Senator Nur nevertheless warned that "we cann hope to obtain effective arms-contr agreements in the 1980s and 199(in the shadow of Soviet military dor ination."

• A recent study by the Congre sional Research Service of the Libra of Congress on the potential use US armed forces to protect this n tion's oil supply and other interests the Persian Gulf makes grim readin Prepared by two of the Library's ran ing defense specialists, John M. Cc lins and Clyde R. Mark, the study co cludes that the nation's active statu strategic reserves "are too few fight even a modest war in the Midd East without accepting calculate risks that uncover crucial interes elsewhere. Even 'best-case' forc would probably prove insufficie against the Soviets, whose abilities project offensive power beyond the frontiers have improved impressive in recent years."

• Sen. Lloyd M. Bentsen (D-Te: introduced legislation as part of tl defense authorization bill that cou keep ten Polaris SSBNs—and the 160 SLBMs—in the active inventory the US Navy for several years beyor the scheduled decommissioning th year. The move is meant to reduce th "threat window" in the early 198(that results from the increased vu nerability of the ICBM force, the al sence of MX, and delays in bringin Trident SSBNs into the inventory.

• Production of nuclear weapon material in FY '80, in the view of cor gressional experts, is underfunded b about $40 million, when measure against the President's own forecas the so-called stockpile memoran dum. Nuclear weapons testing ap pears to be underfunded by about $9 million in terms of budget authorit even though Congress added $27 mi lion to the budget request. There i acute danger that the US will not b able to produce some of the theate nuclear weapons scheduled fo NATO assignment as a result of thi cutback. In contrast, Soviet nuclea weapons materials production re portedly is at an all-time high. Thre nuclear tests over the past year wer in excess of the 150-kiloton limit o the so-called Threshold Test Ban.

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Boeing developed, produced and assisted with field deployment of the Short Range Attack Missile (B) at SAC bases. SRAM is a highly effective system already at work as an air launched missile on (A).

Boeing is now developing the AGM-86B long-ra Air Launched Cruise Missile (C).

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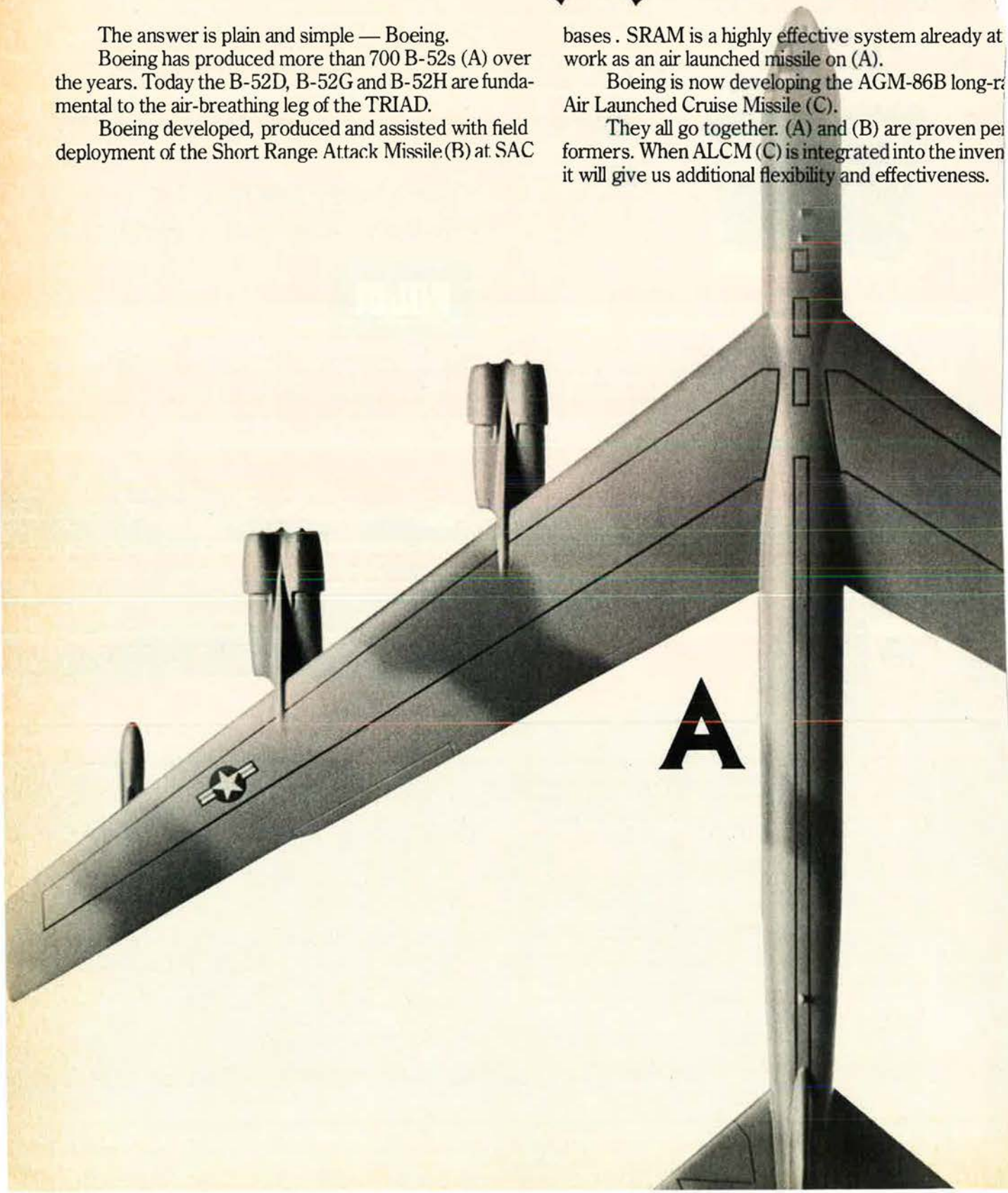


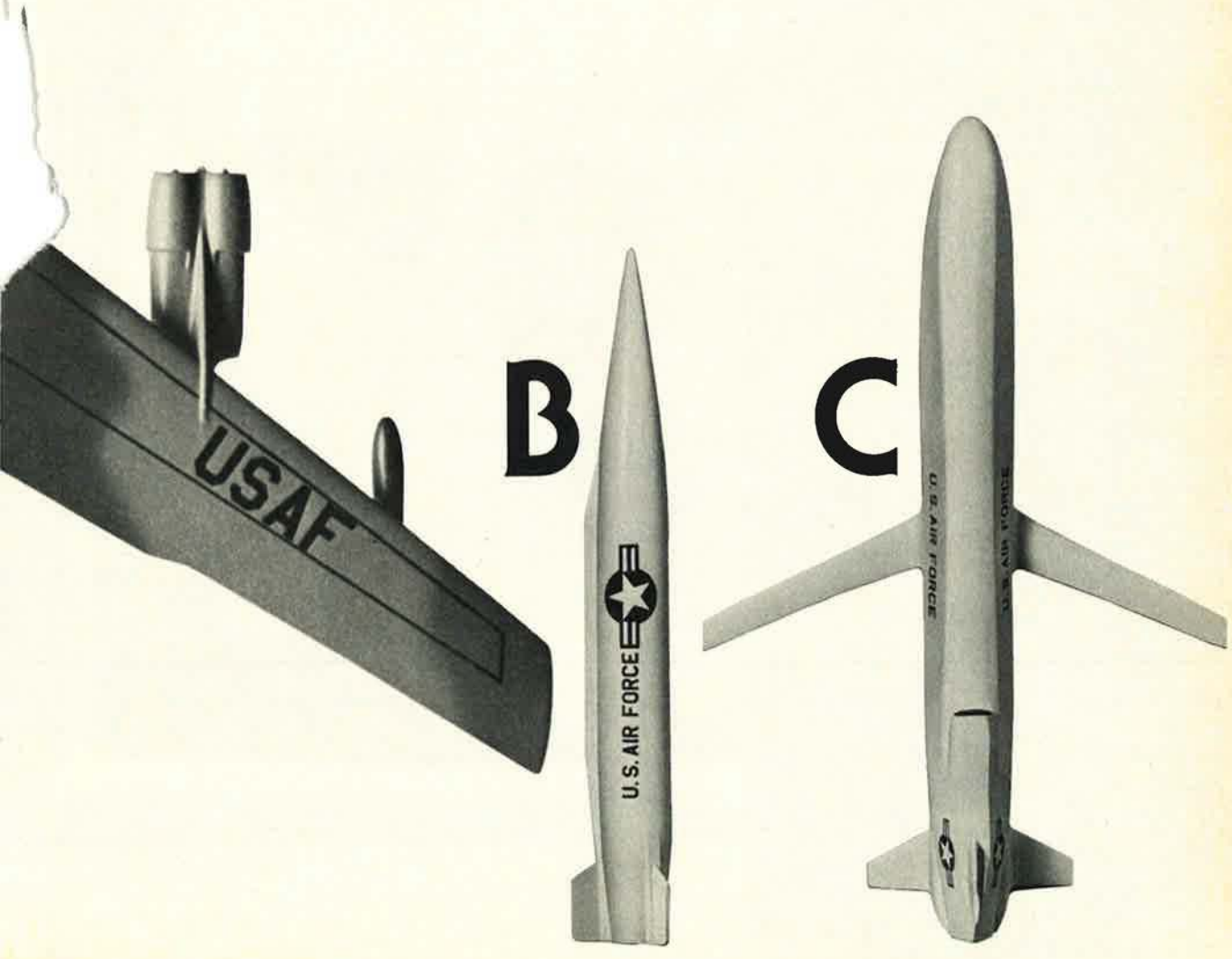
WHAT (A), (B) AND COMMON?

ALCM is more than an air launched missile that flies arget with pinpoint accuracy. It's a system of aircraft, port equipment, people, technical data and, of course, sile, designed to help B-52s destroy a wide variety of gets. All this has been tested in flights of the shorter- ge ALCM-A during the ALCM advanced development gram.

Result: The specifications were met or bettered.

The experienced Boeing team now at work on the ALCM program is an unparalleled resource in the development and fabrication of air launched strategic missiles.

One thing for sure, if anybody is going to put it together right, (A), (B) and (C), it's Boeing.

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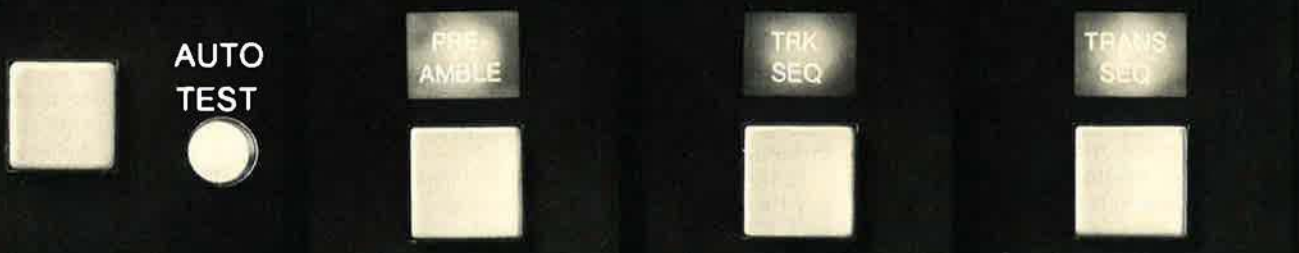

Auto Test. Initiate this automatic routine and the Model 101 tells you if it's correctly calibrated. If not, the control panel display identifies the required adjustments.

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The Model 101 also offers such advanced features as an adjustment-free triplanar tape path for exceptionally gentle tape handling, microprocessor control of operation and checkout functions, wideband and intermediate-band 3000-hour heads of solid ferrite, large reels for up to 32 hours of recording time, and up to 32 data channels in a single unit.

For more information on the Model 101, just call Darrell Petersen at (303) 771-4700. Or write for a free illustrated brochure that describes all our magnetic tape systems and other instrumentation products. Honeywell Test Instruments Division, Box 5227, Denver, CO 80217.

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Aerospace World News, Views & Comments

By William P. Schlitz, ASSISTANT MANAGING EDITOR

Washington, D. C., May 7

★ DoD has given the Air Force a green light to develop a highly reliable and secure communications satellite network that would link all US military nuclear-capable forces.

The satellites in the system would occupy high-altitude polar orbits and could be operational by the mid-1980s, officials said.

Once orbited via the Space Shuttle, the satellites will link the National Command Authorities and crews controlling ICBMs, aircraft, and ships having nuclear capabilities to "ensure fail-safe communications during crisis and wartime conditions," USAF said. The satellites will be designed to relay messages to each other independent of a ground station, providing faster communications and increased resistance to jamming.

Under supervision of the Space and Missile Systems Organization (SAMSO), two parallel contracts will be let authorizing design and technology risk studies to take about a year. An aerospace firm will then be selected for full-scale development.

Each satellite is visualized as having twenty-five channels, fifteen for ultrahigh frequency and the rest for superhigh and extreme-high frequency. The system is to transmit both data and voice communications.

★ In another communications matter, Rome Air Development Center, Griffiss AFB, N. Y., has initiated development of a jam-resistant voice communications system for tactical aircraft.

The system—dubbed SEEK TALK—would use new modulation techniques to make UHF radio signals resistant to electronic jammers, and sophisticated antennas to "selectively" open communications "paths" through enemy interference, officials said.

Under contracts totaling $13.6 million, advanced models of the system are to be built by E-Systems, Inc., St. Petersburg, Fla.; General Electric Co., Utica, N. Y.; and Hazeltine Corp., Greenlawn, N. Y.

Following testing, two of the firms will be picked to produce prototypes, which will be evaluated to determine the production contractor. Operational systems of SEEK TALK are expected by mid-1983.

★ The longest production run of any aircraft type in history ended recently in Japan when the final Lockheed-designed Neptune patrol aircraft rolled off the assembly line. The first version was built in Burbank, Calif., thirty-four years ago.

The last Neptune was the eighty-third built in the P-2J series, and was produced at Kawasaki Heavy Industries' Gifu Aircraft works near Nagoya.

Through the years, the antisubmarine warfare plane has been powered by combinations of piston, turboprop, and pure jet engines, and has served in the military forces of ten nations. Since 1945, 1,182 Neptunes have been built.

The P-2J is expected to serve with the Japanese Maritime Self-Defense Force into the mid-1980s, when it will be replaced by a version of the Lockheed P-3C Orion built under a license agreement. Under last June's agreement, three Orions will be produced in Burbank and, under a special contract, purchased by Japan from the US Navy. In addition, four unassembled P-3Cs will be built by Lockheed and put together in Japan. Another thirty-eight will be produced entirely in Japan by Kawasaki. The production run is expected to be completed by 1989.

★ On to bigger and better simulation

Air Training Command is now operating a revolutionary new simulator that can duplicate the flying activities of an entire airport.

Developed by AFSC's Electronic Systems Division, Hanscom AFB, Mass., the system is being used to train USAF's control tower operators in controlling air and ground traffic.

A total of sixteen projectors are two special-effect stereo speakers simulate the typical daily activities a busy flying base on a panoramic screen that curves around the trainees. Students can be exposed to sights, sounds, and situations they later experience for real at flight control facilities.

The new simulator is currently in operation in a specially constructed building at ATC's Technical Training Center, Keesler AFB, Miss.

Involving as many as twelve simulated aircraft activities at one time, the system can be made to initiate in-flight emergencies as well as create such adverse weather conditions as rain and fog. The system can also re-

The second of two XV-15s built by Bell Helicopter Textron under US Army/NASA sponsorship. Conversion from helicopter to airplane flight mode is expected during tests later this year, when a safe operating envelope will be established and performance, dynamic stability, and handling qualities evaluated.

op, the first F-15C Eagle is currently undergoing flight trials at Edwards AFB, Calif., to etermine handling characteristics changes brought about by aircraft modifications, cluding a new fuel system that provides an additional 2,000 pounds of internal fuel. bove, the second F-18 Hornet on recent maiden flight. The Navy and Marine Corps now an to procure 1,377 Hornets, a seventy percent increase in the planned production run of e strike aircraft.

roduce the speeds, turn radius, and imb rates of current and future mili- ry aircraft.

The system was developed under SD supervision by AAI Corp., Balti- ore, Md.

The Air Force has given Vought orp. the go-ahead to begin fabrica- on of a two-seat version of the Cor- ir II, to be known as the A-7K.

Under an initial contract for $18 mil- on, Vought will convert an A-7D to e A-7K prototype, the model for a ubsequent twelve new A-7Ks to be elivered through late summer 1981.

Vought already has started conver- ion of about sixty early model A-7B and A-7C Corsairs to two-place TA-7C trainers for USN. The Greek Air Force, which originally bought sixty single-seat A-7Hs, has ordered five two-seat TA-7Hs.

DoD's FY '79 budget has allocated a total of $120 million for the A-7Ks, including funds for government-furnished components.

As now planned, the A-7Ks, fully combat capable and adaptable to a variety of missions, are to be assigned to ANG squadrons under TAC jurisdiction. ANG units in ten states and Puerto Rico now fly A-7Ds.

★ Under a program sponsored jointly by USAF and the Navy, contracts have been awarded for development of the F101 Derivative Fighter Engine as a potential powerplant for the Navy's F-14 Tomcat, USAF's F-16, and perhaps other aircraft.

The $79.7 million award to GE, part of USAF/USN's overall joint propulsion effort, calls for development and flight tests of the engine, in the 29,000-pounds-of-thrust class. Components will be drawn from the F101 engine originally designed for the B-1 bomber and the YJ101 and F404 plants developed for the YF-17 and F-18 fighters.

★ USAF has modified eight F-4E Phantoms and two EC-135N Advanced Range Instrumentation Aircraft (ARIA) to support the flyoff competition between General Dynamics' AGM-109 and Boeing's AGM-86 cruise missiles scheduled to begin in June at Edwards AFB, Calif. (*See also pp. 67–71.*)

The F-4s will act as chase planes and exercise command and control over the missile under test. The ARIAs will fly ten to twenty miles behind the missile and relay telemetry data from it to ground stations along the missile's flight path. The ARIAs will be capable of tracking the cruise missile continuously for up to six hours. Also, voice communications from the F-4s will be relayed through the ARIAs to the mission control center at Edwards.

★ In recognition of the twenty-fifth anniversary of the first flight of the C-130 Hercules, an "International Air Tattoo" is being held at Greenham Common near London, England, on June 20–25.

The event will feature a fly-in of some thirty commercial and military

Intelligence Briefing...A Roundup

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

The Russians have built up their military holdings in Libya dramatically over the last year. A cautious estimate calculates their investment over this period at $3 billion to $4 billion.

The Russians had already built two huge air bases in Libya, together with radar stations and harbors with anchorages, dry docks, and provisioning facilities for Soviet warships and submarines. They are now pumping in large quantities of tanks, different types of artillery, and missiles (including long-range surface-to-surface missiles, some with multiple warheads).

Until twelve months ago, some 2,000 Soviet tanks, aging T-54s and T-55s, were parked in the Libyan desert without cover and without maintenance. . . . Over the past year, the old tanks have been replaced by new models, mostly T-62s, T-64s, and T-72s. Up-to-date shelters have been built with air-conditioning and precise humidity control instruments for desert conditions. Special maintenance units have been set up manned by Polish, Czech, and East German technicians . . . under the command of a Russian general. . . . More tanks are coming in all the time . . . today, five Soviet (or East European) divisions would find not only enough tanks ready for use in battle, but plenty of other hardware as well. . . . Russia's Libyan arsenal is today the third largest at its disposal, surpassed only by the concentrations on the Chinese border and in central Europe.

Aerospace World

versions of the aircraft from more than twenty countries. According to the Royal Air Force Benevolent Association, sponsor of the Tattoo, it will be "perhaps the greatest international gathering of a transport aircraft ever staged."

Since 1954, Lockheed-Georgia Co. has delivered more than 1,500 "gooney birds of the jet age" to civil and military customers around the world.

★ Among the recently honored:

• **Neil A. Armstrong,** engineer and first man to walk on the moon, has been named first recipient of the National Engineering Award, sponsored by the Engineers Joint Council, a federation of thirty-three US engineering organizations. Armstrong, currently engaged in teaching and research at the University of Cincinnati, was cited for his part in utilizing technology for the advancement of mankind.

• **Gen. George S. Brown,** former Chairman of the JCS, has been named the first posthumous recipient of the Thomas D. White National Defense Award (for 1979). General Brown, who died in December 1978, was cited by the sponsoring Air Force Academy for his contributions to US security.

• **Maj. Raymond Fowler,** 57th TTW, Nellis AFB, Nev., has been selected to receive the American Legion's Aviator's Valor Award for 1978. Major Fowler, although almost blind from injuries received from a shattered aircraft canopy, was talked by his wingmate to a virtually flawless landing on the first attempt.

• **1st Lt. Christopher C. Soto,** 35th TFW, George AFB, Calif., is recipient of 1978's Cheney Award for valor. In the rear seat of an F-105 that crashed on takeoff, he escaped from the burning aircraft and rescued the pilot.

• **1st Lt. Steven A. Stich,** 71st ARRS, Elmendorf AFB, Alaska, is being presented the Helicopter Heroism Award, sponsored by Avco Corp. and the Aviation/Space Writers Association. Lieutenant Stich successfully landed and retrieved his pararescue team during an extremely dangerous mission to save an injured park ranger stranded beneath a cliff.

SECRETARY OF THE AIR FORCE JOHN C. STETSON RESIGNS

Washington, D. C., May 14

On May 7, Secretary of the Air Force John C. Stetson announced that he had submitted his resignation, effective May 18, "in order to return to business activities in the private sector." The Secretary commended Air Force people for "their willingness to make personal sacrifices for the Air Force and the nation."

Prior to his appointment as Secretary on April 7, 1977, Mr. Stetson had been president of A. B. Dick Co. Earlier, he had headed the Houston Post Co., and before that had been a partner in the consulting firm of Booz, Allen, and Hamilton.

Mr. Stetson's relations with two Chiefs of Staff who served under him—Gens. David C. Jones and Lew Allen, Jr.—were close and cordial. He believed in decentralization of decision-making, and that the function of a civilian secretary should be to assist the military in getting the people, equipment, and operating funds needed to defend national interests. He was particularly concerned with developing better long-range planning to meet the demands of an approaching period of raw-material shortages, a shrinking population of military-qualified youths, and expanding Soviet military power.

In a letter of May 10 accepting Mr. Stetson's resignation, President Carter wrote: "Throughout your two years at the Department of Defense, your managerial expertise and genuine concern for our Air Force personnel and their families has been of invaluable assistance to our country. In particular, I would like to commend you for your outstanding efforts in bringing about significant improvements in our air posture to meet our North Atlantic Treaty Organization commitments."

It is expected that Mr. Stetson will be succeeded by Under Secretary Hans M. Mark, but no announcement has been made as of this date.

The Air Force Association extends to John Stetson its appreciation for his contributions to the security of this nation. Our best wishes for happiness and continued success to Mr. and Mrs. Stetson.

—THE EDITORS

• **Col. Emil Sturmthal,** USAF (Ret.), has been named recipient of 1978's Octave Chanute Award in honor of his contributions to aerospace sciences as director of the B-1 joint test force and chief engineering test pilot.

• **Sam B. Williams,** president of Williams Research Corp., Walled Lake, Mich., will be presented the 1978 Collier Trophy for designing and developing the world's smallest high-efficiency fanjet engine—a key component of the cruise missile concept. The trophy, since 1911 the nation's oldest aviation award, is spon sored by the National Aeronautic As sociation.

• **The twenty-five-member aug mented C-5 aircrew** from the 436t MAW, Dover AFB, Del., is to receiv 1978's Mackay Trophy. Members c the unit's 3d and 9th MAS were cite "for overcoming fatigue, limited en route support, mechanical problems and adverse operational conditions i a hostile area" to deliver supplies t war-torn Zaire. The annual award i presented to an Air Force person

The Order of the Day: "Go Fly a Kite!"

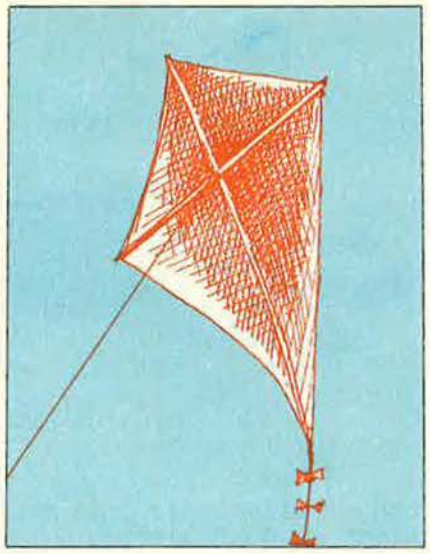
The warm and sunny spring day was almost perfect for the event at hand: the Smithsonian Resident Associates' annual Kite Festival, conducted on the Mall by the Washington Monument in the nation's capital.

With a strong, steady breeze to assist, kites flew everywhere. In midafternoon, an observer counted more than two hundred kites of all sorts in the air at one time.

The kites ranged in size from a conventional diamond-shaped kite not much bigger than a postage stamp to a behemoth with an eighteen-foot wingspan that required a ground crew to launch. Wowing the crowd was a "Rainbow Stunter"—eighteen diamond kites strung together in a stack that, when airborne, performed as a single kite in swooping and soaring, precisely controlled with a double-string rig by its handler. A crew of five was needed to get it airborne.

In evidence in the sky were box kites and cobra kites, sled kites and kites that—like the bumblebee—seemed to defy the laws of aerodynamics and yet flew beautifully.

Central to the Festival—the thirteenth annual—was the contest among



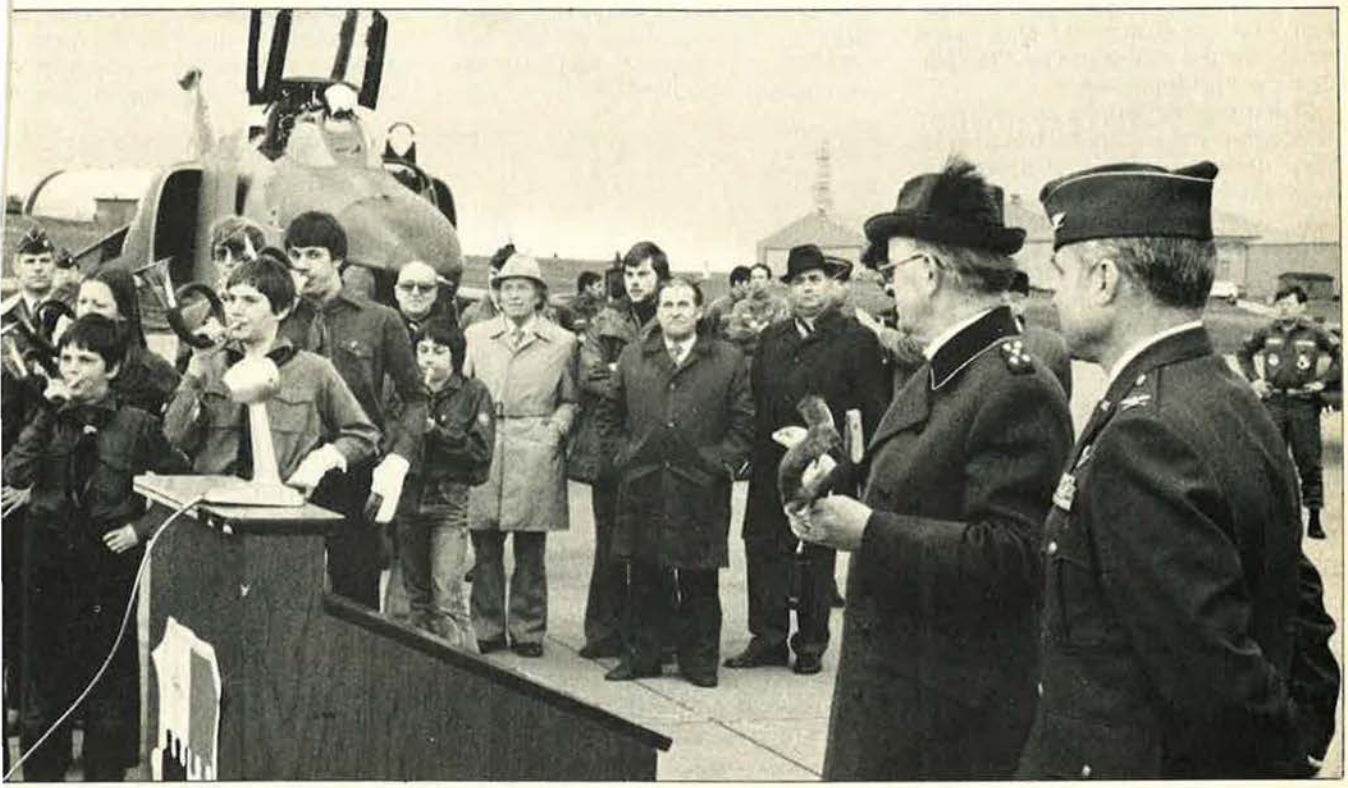
"home-made" kites in categories ranging from the funniest to those demonstrating the most ingenuity. In recognition, twenty-five trophies were awarded, including one sponsored by AFA in the "Patriotic Senior" category. To reward the best kitemakers achieving the highest overall scores in the contest—as judged by a panel of experts—ribbons representing four age groups were presented: age eleven and under, twelve to fifteen, sixteen to fifty-nine, and age sixty and older.

Each year preceding the Festival is a related event—a lecture by Paul Garber, Historian Emeritus of the National Air and Space Museum and the country's leading authority on kites. In his discussion, Mr. Garber traces the history of kites—they are, after all, the earliest manmade aircraft—and reviews kitemaking the world over.

Mr. Garber, the guiding hand behind the Festival who also acts as master of ceremonies, as a small boy received a lesson in kite construction from another devotee—inventor Alexander Graham Bell.

The annual Kite Festival is a major milestone in the Smithsonian's "people"-oriented programs; prior to its initiation, kite flying on the nation's Mall was prohibited. Since then, two other leisure activities that stress aerodynamic properties—and the skill of participants—are presented: the annual Frisbee and Boomerang Festivals.

The day-long Kite Festival was marred by a number of mishaps, however: the kite-eating trees bordering the Mall ate heartily.



With the traditional "Song of the Hunt," young German buglers welcome two newly modified F-4G Wild Weasels to Spangdahlem AB, the first such aircraft to be stationed in Europe. The "G" versions will replace the "C"s flown by the 81st Tactical Fighter Squadron. At right in photo are Forestmeister Klaus Moll and 52d TFW Commander Col. Leland K. Lukens.

Aerospace World

persons, or organization for the year's most meritorious flight.

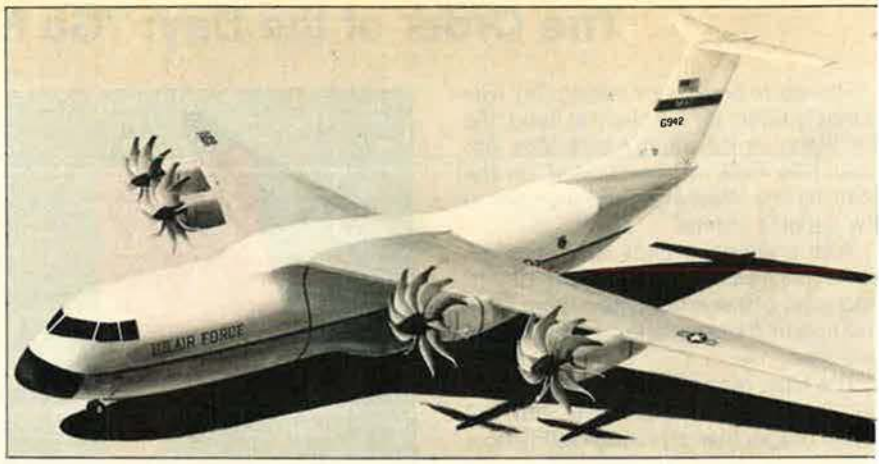
★ **NEWS NOTES**—In addition to Secretary Stetson's resignation (*see page 32*), the Air Force is losing **Dr. John J. Martin,** Assistant Secretary for Research, Development and Logistics. Dr. Martin, one of the most able engineering executives to hold this post, is returning to industry. The current Deputy Under Secretary for Research and Engineering (Communications, Command, Control, and Intelligence), **Robert J. Hermann,** has been named to succeed Dr. Martin. The nomination has not been acted on by the White House at this writing.

Under development is a **computerized weather satellite data distribution system** capable of supplying forecasts in seconds to commanders around the world. To be installed at Air Force Global Weather Central, Offutt AFB, Neb., the $10.3 million system **is expected to be operational by 1982.** Saving both labor and time, the system will also share data with the civil National Weather Service, Washington, D. C.

In the second largest aircraft purchase in history, Korean Air Lines in April **agreed to pay $1.3 billion for eighteen Boeing 747 jumbo jetliners,** with first deliveries in 1980. (The largest sale was last July when United Airlines agreed to pay $1.6 billion for sixty Boeing-built aircraft.) The 747s are to be equipped with the Pratt & Whitney JT9D engine under a contract that could total $92 million.

Citing maneuvering problems, **Soviet Soyuz-33 spacecraft aborted its mid-April attempted linkup with orbiting space station Salyut-6** and returned to earth. Manning Soyuz-33 were mission commander Nikolai Rukavishnikov, a space veteran, and a Bulgarian cosmonaut, Air Force Maj. Georgi Ivanov. Aboard the space station since February 26 have been Lt. Col. Vladimir Lyakhov and engineer Valery Ryumin. Speculation is that a major goal of the Soviet space program is continuously manned orbiting laboratories.

In early April, **a Trident ICBM failed its first at-sea test firing** from a submerged nuclear sub when its first stage malfunctioned soon after launch and it was destroyed by the range officer. The setback to the Trident development program occurred about fifty miles off the Florida coast and was witnessed by a Soviet intelligence vessel.



Under NASA sponsorship, Lockheed-Georgia Co. is to study the fuel efficiency and reduced noise capability of a unique form of propeller propulsion dubbed the "Prop-Fan," shown above in artist's concept.

Air Force information specialists won top **Aviation/Space Writers Association awards for 1978: Maj. Doug Kennett,** SAF/OI, was presented the AWA Public Information Award as Public Affairs Project Officer for PAVE PAWS, the new radar system; and **Lt. Col. Rallin Aars,** Hq., USAF Security Service, was named top USAF IO for his outstanding information program of USAFSS.

DoD announced that, beginning i June, the military services' **groun beef servings will contain twent percent soy product extenders.** Th decision came after a review of test of the new product in selected mil tary dining facilities. DoD expects t save **twenty-two cents a pound c $6.2 million a year,** without depreci tion of nutritional value.

Military Airlift Command plans establish an airlift museum at Sc AFB, Ill., site of the command's hea quarters. MAC's Historian (AUTOVC 638-5754) is seeking artifacts a memorabilia to illustrate the histori of MAC's predecessors—the Army A Corps Ferrying Command, the A

Four buoys like the thirty-five-ton behemoths shown above are to provide the cornerstones of a computerized dogfight training system encompassing 700 square miles off the coast o Sardinia, Italy. The three-dimensional system, built by Cubic Corp. and known as the Air Combat Maneuvering Range/Instrumentation, will be used to test the skills of US Navy and USAF fighter pilots and those of our allies. The range will be operational this summer.

Capt. Kathy LaSauce, left, among the first group of women UPT graduates and the first active-duty C-141 copilot, was recently honored by the Los Angeles YWCA as one of eight outstanding women leaders. Here, she receives her Achievement Award from Judge Joan Dempsey Klein. Captain LaSauce has also been named California AFA's Military Woman of the Year.

Transport Command, and the Military Air Transport Service. Artifacts, accompanied by brief descriptions, can be sent to HQ MAC/HO, Scott AFB, Ill. 62225.

Gen. Robert H. Barrow, a decorated veteran of three wars and a key man in the reformation of Marine training practices, **has been named new Commandant of the US Marine Corps,** replacing retiring Gen. Louis H. Wilson. ■

Index to Advertisers

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The reliable source

Capitol Hill

By the Air Force Association Staff

Washington, D. C., April 27

Army Secretary Challenged

Congressman Robin Beard (R-Tenn.) has challenged Army Secretary Clifford Alexander to a debate, "in any public forum at any time," on the status of the all-volunteer Army. Mr. Beard, ranking minority member of the House Armed Services Subcommittee on Investigations, said that "despite overwhelming evidence to the contrary," Secretary Alexander maintains that the all-volunteer Army "is working and working well."

The challenge follows Secretary Alexander's harsh rebuke of statements by the Joint Chiefs of Staff in support of a return to some type of draft system. "Secretary Alexander's attitude raises serious questions about his continued service in that high office," Mr. Beard said. "I'm challenging him to a debate. . . . If he can't or won't defend his claims, he should resign."

Congressman Beard's office told this column that the response from the Army Secretary was a letter stating that a public debate was not necessary, since he had pointed out his views on the all-volunteer Army in his posture statement to Congress.

Ethics in Government

During hearings before the House Judiciary Subcommittee on Administrative Law and Government Relations, Deputy Secretary of Defense Charles Duncan testified regarding the Ethics in Government Act (Public Law 95-521). Of particular concern is Title 5 of this act, pertaining to post-employment conflicts of interest. Secretary Duncan told the subcommittee that the act had caused problems in the recruitment of senior scientific and technical personnel.

Additionally, Secretary Duncan said that the Office of Research and Engineering alone could lose one-third of its senior personnel as a result of this legislation. During discussion of technical amendments proposed by the Administration, Secretary Duncan said that these amendments would solve DoD's concerns.

The amendments, as passed by the Senate, would make three technical changes to the act. The first two ease restrictions concerning contact by a former employee with the government. The amendments make clear that this prohibition applies only when an individual makes a personal appearance before an executive department. The third change eliminates discrimination against military officials.

Under the new language, prohibitions would apply automatically only to lieutenant generals and above. Only those brigadier generals and major generals whose duties involve "significant decision-making or supervisory responsibility" would be included. This provision is not included in the House bill.

While passage of the House bill is expected in the near future, it is likely that a joint conference will be required to work out differences in the two bills. The major issue will be easing of prohibitions for military officials below the grade of lieutenant general.

FY '80 MilCon Request

Maj. Gen. William D. Gilbert, Director of Engineering and Services, USAF, appearing before the Senate Appropriations Subcommittee on Military Construction, discussed the FY '80 military construction request connected with Air Force strategic programs. General Gilbert said that construction funding is for the air-launched cruise missile (ALCM) and the MX. He explained that $14.2 million was requested for the "initial alert capability of the B-52G/ALCM." Included are an integrated maintenance facility and munitions storage igloos.

For the MX, $5.4 million is being sought for construction to support full-scale rocket motor development and engine testing. This will involve modification of existing propulsion test facilities at Arnold Engineering Development Center.

Defense Supplemental Request

Earlier this month, the Armed Services Committees completed markup on the FY '79 Defense Supplemental Budget Request. The President's amended request totaled just over $2,149 million and included $147 million for military construction. The Senate committee, in approving some $2,103 million, deleted the mil-con request and recommended increases in RDT&E and procurement.

The House version of the bill, which excluded the military construction request, agreed to a reduction of $544 million, for a total of $1,458 million. Both the Senate and House approved the $265 million requested for the MX missile and basing mode and included specific provisos.

The Senate committee instructed the Secretary of Defense to report to the Armed Services Committees by May 9, concerning his "best judgment and preference as to missile design characteristics and basing system which would be developed."

The House directed the Secretary to "proceed with full-scale engineering development of the Multiple Protective Shelter (MPS) concurrently with full-scale engineering development of the MX missile unless and until he certifies to Congress that a alternative mode is militarily c technologically superior, is mor cost-effective than MPS, or the Pre ident informs Congress that the MP system is not consistent with US n tional security interests."

Middle East Assistance Progran

Following signing of the Middl East Peace Treaty in March of th year, the Administration sent to Cor gress a proposal to assist Israel an Egypt in the modernization of thei armed forces. Defense Secretary Harold Brown explained to the Sen ate Foreign Relations Committee tha the Administration request extends $800 million in grant aid and $2.2 bil lion in foreign military sales (FMS credits to Israel. Egypt is to receive $1.5 billion in foreign military sales credits and $300 million in economic aid. The total appropriation is $4.8 bil lion. Of this amount, more than two thirds will be repaid to the US. The total US contribution will be $1.47 bil lion.

Republicans Win Special Elections

Special elections in California and Wisconsin to fill vacant House seats as a result of the deaths of Reps. Lec Ryan (D-Calif.) and William A. Steiger (R-Wis.) were recently won by Republicans Bill Royer (Calif.) and Tom Petri (Wis.). ■

YOU ARE NEEDED

A quarter of a century ago, a handful of dedicated men and women accepted a challenge to create an unprecedented dimension in national defense. These people of the Air Force Western Development Division were joined in their task through the years by thousands of others at the Ballistic Missile Division, Space Systems Division and more recently the Space and Missile Systems Organization (SAMSO) of the Air Force Systems Command.

Perhaps you were or are a member of the Air Force-Industry team which has created the ballistic missile force which is the main thrust of our Nation's strategic strength. Your team has developed military space capabilities in nuclear detection, communciations, early warning, meteorology, and navigation. You also helped create peaceful uses of space for the benefit of all mankind. You are justly proud of your unique contribution to these magnificent accomplishments. Today's SAMSO team, numbering some 17,000 military, civilian and contractor people worldwide, is carrying on this tradition of excellence.

Activities commemorating the Silver Anniversary of America's military space age have been launched. As part of that commemoration, the California Air Force Association is erecting a monument to honor the accomplishments of those who made it all possible.

The symbolic structure of stainless steel and concrete was conceived by Jack Brogan, one of America's brightest designers, and will be unveiled at SAMSO headquarters at Los Angeles Air Force Station on 3 August 1979.

As Directors of this project, we ask you to make a commitment to the monument's completion and other Silver Anniversary activities. Every level of gift is needed, be it $5, $10, $25, $100 or more. Each contribution pushes us closer to the goal.

All contributors will have their names inscribed on a scroll of honor to be enshrined with the monument in a time capsule. Those contributing $25 or more will also receive a beautiful certificate attesting his or her role in this effort. Join us in this important work. YOU ARE NEEDED.

SAMSO SILVER ANNIVERSARY ASSOCIATION

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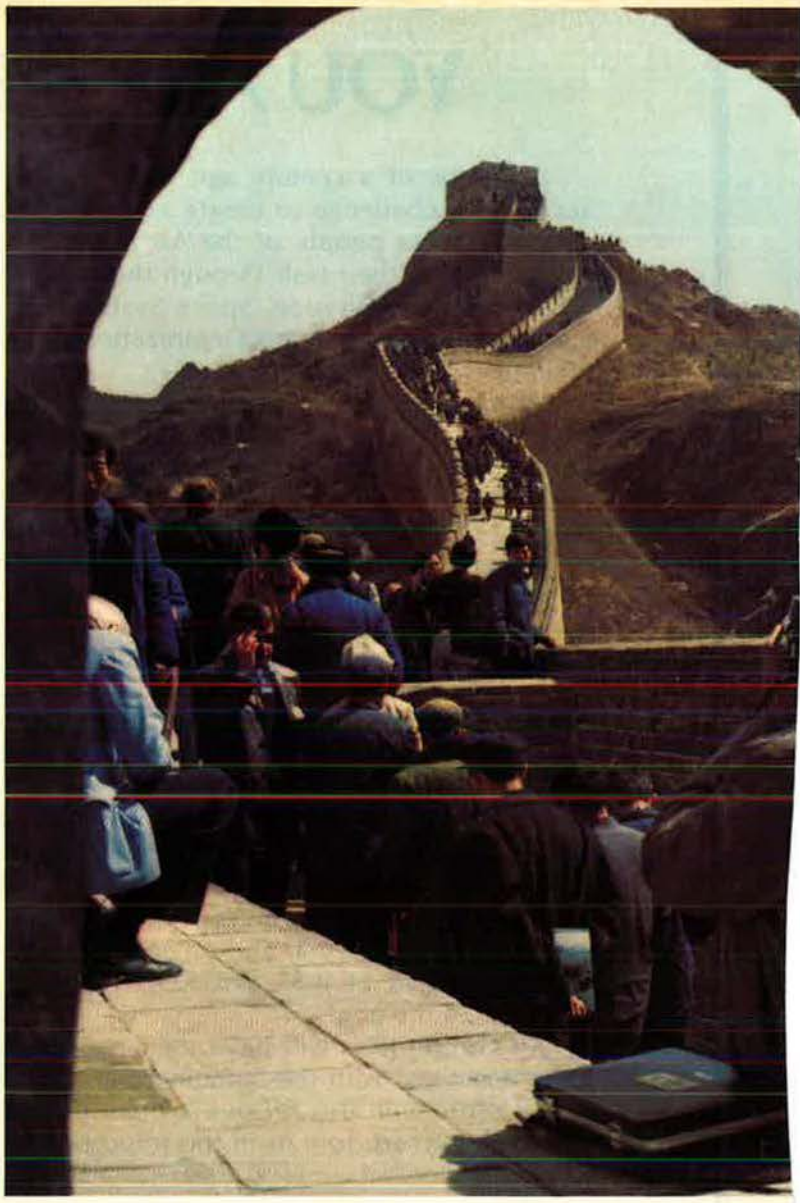


Clockwise from top: The Great Wall, begun nearly two centuries B.C.; Army enlisted men in the ubiquitous green uniform; the author at the Great Wall near Peking; martial exercises are popular in the PRC; two Army enlisted women sightseeing in Peking.

In April, while visiting the People's Republic of China, the author interviewed senior officials of China's Ministry of Defense in what is believed to have been the first such interview granted a foreign writer. The officials discussed PRC strategy, modernization plans, the recent military action against Vietnam, and relations with both the US and the USSR.

CHINA TOUCHES THE TIGERS' BOTTOMS

BY MAJ. GEN. ROBERT N. GINSBURGH, USAF (RET.)
Photos by Gail Winslow Ginsburgh

AN OLD Chinese proverb says: "The tiger won't let you touch its bottom." Referring to the February border war between China and Vietnam, a senior Chinese military official cockily states: "We have touched the bottoms of the Soviet and Vietnamese tigers."

This capsulizes the Chinese view of the border conflict, as it was expressed to me in the course of a two-week visit to the China mainland in mid-April that included an unprecedented meeting with senior officials of the Chinese Ministry of National Defense. The day before the scheduled meeting, an American Embassy official expressed surprise that the Chinese had agreed to such a meeting in the first place and cautioned us not to be surprised if it never took place. In fact, the meeting did not take place as scheduled. Instead of meeting with the designated Chinese official, the meeting took place with his boss.

Although the Chinese apparently do not look forward to an early conclusion of the negotiations, which began while we were in Beijing (Peking), they feel that they have "punished" the Vietnamese and "taught them a lesson." This lesson was necessary, according to a Chinese "general," because of "muddle-headed" thinking of the Vietnamese "swell-heads," who boasted that they have the third largest armed forces in the world.

Incidentally, "general" must be put in quotes, because theoretically the Chinese have abolished military grades. Officers and enlisted men all wear the same basic uniform, red-tabbed Mao jackets over loose-fitting slacks, with assorted types of footgear. Jackets for Army and Air Force personnel are green, with Air Force personnel wearing blue rather than green trousers. Both wear Mao caps, with the Red Star of the People's Liberation Army. Women's uniforms are the same as for the men except for a beret that replaces the male cap.

Naval personnel are somewhat more distinctive. Over the standard blue trousers, sailors wear the traditional blue sailor's blouse and a sailor's hat along traditional British lines. Naval officers wear the blue Mao jacket, but sport a typical captain's cap with red star. At first, it seemed to some of our group that there was an inordinately large number of naval officers in evidence in view of China's small Navy until they learned that naval officers could be distinguished from policemen only by different cap insignia.

In part, the lesser importance of the Navy in China was explained in historical terms to us by one of our tourist guides. She noted that in order to finance the rebuilding of the Imperial Summer Palace at about the turn of the century, the Dowager Empress had diverted funds

earmarked for naval construction. With funds left over, the Dowager Empress built an imposing concrete ship, which to this day firmly reposes at the lake shore of the Imperial Summer Resort.

More relevant is the fact that, unlike the other services, the Navy is not represented on the Political Bureau of the Central Committee of China's Communist Party.

We soon learned to distinguish between officers and enlisted personnel of the Army and Air Force. Officers sport four pockets on their Mao jackets, while enlisted men do not have the two breast pockets. We also learned that since the People's Liberation Army (PLA) has an age-in-grade policy, you can generally assume that an older officer is senior. This is not always an accurate gauge since Westerners have difficulty in determining ages in Oriental people. If you could determine that an officer was over fifty-five, you could be sure that he was a general. Otherwise, he would have retired. This judgment could be corroborated by the fit and texture of his uniform.

The Chinese military themselves have no difficulty in determining relative seniority. One of our guides, after explaining at some length that the PLA has no ranks, happened to say that he knew some PLA generals. When I asked how this could be in a gradeless army, he explained that these officers had been generals before the grade system was abolished.

The senior officials with whom I met possessed all the necessary attributes of generals—age, hierarchical positions, and well-tailored uniforms.

At the outset of a meeting with one "general," I indicated that I was interested in learning something about the military situation on China's northern and southern flanks. After some thought he replied that he did not think he would be able to satisfy my specific curiosity, but that I should be interested in a general exposition of the philosophy and military strategy of the PLA.

Chinese Strategy

Chinese military strategy, he began, has evolved from the thoughts of Mao Tse-tung and the revolutionary experience beginning in 1927. (By this time, I had learned that there were four minimum essential elements in the Chinese answer to a question on any subject: repeated references to the wise thoughts of Mao Tse-tung, a comparison of before and after the 1949 "Liberation," vilification of the "Gang of Four," and reference to the Four Modernizations.)

The general went on to explain the three general principles of Chinese military strategy and philosophy: active defense, overcoming superior forces with better strategy and tactics, and People's War.

Chinese military strategy is based on "active defense" because it is held to be impossible for the PLA to wage an aggressive or imperialistic war like some other countries. Thus, in Chinese publications China's attack on Vietnam is usually described as a defensive counterattack—a description that seems to give the Chinese no intellectual difficulty.

The principle of active defense and the principle of overcoming superior forces by better strategy and tactics arose out of the PLA's early experience in fighting with the Kuomintang (KMT) forces. The PLA's unsuccessful attempts to defend their base areas against the KMT prior to the Long March convinced them that positional warfare—as opposed to mobile operations—should only be undertaken by superior forces. Thus, their philosophy is to defend against ten of the enemy with one of their own, and to use ten of their own to annihilate the enemy's one. "It is better to cut off one enemy finger than to injure ten." My observation that this sounded like Napoleon or Von Schlieffen drew a knowing smile, but no response.

In commenting on the principles of People's War, the general, with some urging, went beyond the normal slogans to discuss organization. PLA forces are divided into three types:

- Main or mobile forces, which can be used wherever needed to defend China;
- Local forces, which are locally recruited and in principle do not move outside their provincial borders;
- Militia, which are essentially local paramilitary forces.

In the event of hostilities in a particular province, the local forces and the militia would come under the command and control of the main forces commander.

Recruiting for the various forces from a population of 900,000,000 or more is apparently no problem. Although the Chinese have a system of compulsory military service, they cannot begin to accept into military service all men and women reaching the draft age of sixteen. Thus, according to our sources, unlike some other countries, men don't cry because they are in the military service. Instead they cry if they can't get in.

After three years in the PLA (four for the Air Force, and five for the Navy), personnel not destined for higher rank are returned to the militia. Women serve in the militia from age sixteen to forty and men from age sixteen to forty-five. (Retirement from the labor force occurs at age fifty for women, age fifty-five for men. Those engaged in intellectual rather than manual labor can retire five years later.)

Militia units exist in all kinds of organizations: communes, factories, and universities. The backbone of the militia consists of an armed contingent of sixteen- to thirty-five-year-olds. Most of the militia are not armed. They receive no allowances for their service

Clockwise from top: Soldiers at rifle drill in front of the Great Hall in Peking; civilians in typical street dress; a few of China's 900,000,000 people; an enlisted member of the small 300,000-man navy; concrete ship at the Imperial Summer Palace; more soldiers of the People's Liberation Army, which numbers more than 4,000,000 men and women.

unless their training keeps them away from their work for long periods. Militia training normally involves one month out of the year, but training periods normally are spread out so that a member is not away from his regular work more than a week at a time. Training is conducted under the guidance of regular officers, who apparently pull tours of duty similar to American officers assigned to duty with National Guard units.

With this information as background, I was in a position to understand current Chinese military policy, which is based on the three principles of modernizing China's self-defense, uniting with others, and nonaggression.

Maj. Gen. Robert N. Ginsburgh graduated from the US Military Academy in 1944. Following World War II duty in Europe, where he was awarded the Silver Star and Purple Heart, he earned a doctorate at Harvard University. Subsequent assignments included Assistant Executive to the Air Force Chief of Staff, Research Fellow at the Council on Foreign Relations, member of the Policy Planning Council of the Department of State, Air Force Member of the JCS Chairman's Staff Group, senior staff member of the National Security Council, Commander of the Aerospace Studies Institute, Air Force Director of Information, and Deputy Director of the Joint Staff. General Ginsburgh retired in 1975 to become editor of Strategic Review. *He is the author of several books and many articles on military/political affairs. Since 1977 he has been a financial consultant and is involved in natural gas development.*

Four Modernizations

Modernizing China's military is one of the programs of Four Modernizations announced by the Chinese in 1977. The other three are agriculture, industry, and science and technology. The Four Modernizations essentially envision China's becoming a major world power by the end of this century, and achieving specific interim goals by 1985.

The Chinese emphasize that military modernization is related to, and supported by, the other three modernizations. As far as the production of light arms is concerned, the Chinese intend to emphasize their traditional principle of self-reliance. However, self-reliance no longer means that they will ignore the experience of other countries. They indicate that in the military, as in the other modernizations, they are eager to learn from other countries those experiences that can be adapted to the Chinese situation. As in other areas, they are especially interested now in importing advanced military science and technology. The general pointed out that they don't have enough money to import all of the modern items necessary to equip their forces—even if the US had the capability of manufacturing them. The implication was that they would not be opposed to buying a few high-technology items, but that they didn't want to ask unless they were confident of a favorable response on favorable terms.

A few days later the foreign press reported that Vice Premier Deng Xiaoping (Teng Hsiaoping) had told a delegation from the US Congress that China would have the courage to buy modern weapons from the US if the US had the courage to sell them. They appear to be even more interested, however, in the possibility of licensed production or coproduction arrangements for modernizing their forces.

To achieve their Four Modernizations, the Chinese say that a period of stability is essential. According to the Chinese, this stability was threatened, unfortunately, by the desire of the imperialistic Soviet Union and of Vietnam for hegemony. The Vietnamese had demonstrated their aims in pushing for an Indochinese federation under their hegemony. Furthermore, according to the Chinese, the Vietnamese had been mistreating the overseas Chinese, many of whom were Vietnamese citizens, and had actually expelled numbers of them from Vietnam. Also, border incidents were increasing from in the tens in 1976, to the hundreds in 1977, and the thousands in 1978. According to Chinese reports, these incidents resulted from Vietnamese failure to honor the long-time border agreements reached between China and France.

According to the general, these aggressive actions by the Vietnamese fitted in nicely with the imperialistic aims of an aggressive Soviet Union bent on achieving world hegemony. With the Soviets maintaining pressure on China's northern borders, Vietnamese pressure on the southern border would cause an instability that would make it difficult for China to achieve its Four Modernizations and would advance the Soviet-designed security system for Asia while furthering Soviet ambitions for hegemony.

Thus, the Chinese concluded that their own interest, regional interests, and world concern for stability required that the Vietnamese be taught a lesson. Some Chinese said they could not continue to criticize the US for its failure to curb Cuban aggression, if they did not take appropriate action to deal with China's Cuba—Vietnam.

Soviet Reaction

According to the general, the decision to launch a "defensive counterattack" against Vietnam was not a hasty or casual one. He emphasized the care, caution, and prudence with which China planned the attack. China's leaders carefully analyzed possible Soviet reactions, and discounted the possibility of an all-out Soviet response. They calculated that because the USSR places priority on Europe, there would be no large-scale redeployment of Soviet troops from their European to their Asian front. The Chinese anticipated the probability of small-size border reactions, but concluded that these could happen anyway, at any

time, and could be contained without a major effort.

Of greatest concern to the Chinese was the possibility of a medium-size reaction. With fifty Soviet divisions (only one-third at full strength) along the border, the Chinese estimated that the Soviets could launch as much as a ten-division attack. However, the general said that the Chinese were prepared for such an attack and felt that they could contain it without having to redeploy any of their own forces.

Having decided that the risks were acceptable, China designed a punitive campaign limited in geography, in time, and in use of weapons (no air). The Vietnamese chose to observe the same limits. According to the general, the counterattack moved slowly at first because of deficiencies in intelligence, since the campaign had not been planned a long time before. By the end of the first three or four days, however, the Chinese forces had acquired the necessary terrain intelligence and the campaign proceeded as scheduled.

The Vietnamese displayed good tactical sense and competence in guerrilla and small-unit actions—as a result of their extensive experience gained from fighting the Americans. However, the general felt that the Vietnamese were not very good in larger-unit actions. Although he felt that Vietnamese equipment was somewhat superior to China's, he thought the Vietnamese were unable to fully exploit the equipment received from the Soviets and captured from the Americans because of problems with maintenance, spare parts, and logistics.

Hanoi Negotiations

Having achieved their limited objectives, the Chinese withdrew according to plan. The Chinese press insisted that despite Vietnamese lies, all Chinese troops had been withdrawn from Vietnamese soil. As negotiations got under way in Hanoi in mid-April, with considerable acrimony on both sides, neither side expressed much optimism about an early satisfactory conclusion to the talks. The Chinese noted that while Vietnam had redeployed some troops from Laos, they were not counting on the talks to lead to additional redeployments. Nevertheless, the Chinese seemed to feel they had achieved their objectives. They had taught the Vietnamese a lesson, they had hindered the Soviet drive for hegemony, and they had restored stability so that China could get on with its Four Modernizations. The Soviet tiger had roared, but it hadn't done much other than conduct some military maneuvers along the border and send a few ships into the China seas. The Chinese had dared to touch the bottoms of the Vietnamese and the Soviet tigers—and they had gotten away with it.

Now the Chinese political, economic, and military experts look forward to developing mutual Sino-American interests (if we would leave the Taiwan question to be settled by the Chinese as an internal matter) and "everlasting ties of friendship between the American and Chinese people." No longer is there any reference to America's being a paper tiger.

While expressing his great displeasure with the recent congressional action (signed by President Carter) in support of Taiwan, Vice Premier Deng noted that China would not be in a position to impose a military settlement of the Taiwan question for at least five years. In any event, the Chinese are looking forward to expanding economic and military cooperation with the United States.

They approach such cooperation with some caution, however. For example, at the time of my arrival in China, the Chinese government apparently had been considering for some time the possibility of a visit by selected members of the faculty and students of the US National Defense University. On my last day in Beijing, I was informed both by representatives of Luxingshe (China's tourist bureau) and by Chinese Defense officials that China was looking forward to receiving members of the National Defense University as tourists. Both agencies took pains to indicate that the trip was the responsibility of Luxingshe and not sponsored by the Ministry of National Defense.

The Chinese want military (as well as economic) advanced technology, and they would not be opposed to acquiring some advanced technology end items (military or industrial). They are counting on the US to provide a counterweight to Soviet aims of hegemony because of US interest in support of NATO. They seem to feel that there is a kind of implicit, *de facto* alliance between China and the US because of mutual interest in containing the hegemonistic ambitions of an imperialist Soviet Union.

But they wish that we were not afraid to touch the bottoms of the Cuban and Soviet tigers. They wish that in dealing with Cuba we would learn from their experience in dealing with Vietnam. They wish that we were better negotiators in dealing with the issues of strategic arms limitation. And the general said that, while a SALT treaty is a decision to be made by Americans, he hopes we understand that such a treaty will not deter the Soviets from imperialism, aggression, and the quest for hegemony.

Americans need have no fear about the possibility of a Sino-Soviet rapprochement, according to the Chinese, because the Soviets have permanently abandoned the true Marxist-Leninist thought in their aggressive, imperialist drive toward world hegemony.

Nevertheless, the day after I left China I noted that the Soviets had responded favorably to a note from the Chinese looking toward the possibility of talks to improve Sino-Soviet relations. ■

The Air Force and other elements of the Defense Department, over the coming year, will be pursuing a

DEFENSE TECHNOLOGY

BY EDGAR ULSAMER, SENIOR EDITOR

THE annual trek of Pentagon witnesses to Capitol Hill in support of the Defense budget has produced important new information about Soviet military growth—in progress, planned, or theoretically feasible. The universal theme of this year's testimony is that in terms of military technology the Russians aren't coming—they definitely have arrived.

Dr. William J. Perry, Under Secretary of Defense for Research and Engineering, characterized the problem for Congress:

- The Soviet Union is *outproducing* us by more than two to one in most categories of military equipment.
- The Soviet Union is now deploying equipment that in most cases matches our deployed equipment in *quality*.
- The Soviet Union is investing twice as much as we are in its military technology base program, leading to a real risk of technological surprise.

During the last five years, the Soviets, he said, "have produced 10,000 tanks to our 3,600, over 1,000 ICBMs to our 280, about fifty submarines to our twelve, and 3,000 aircraft to our 1,400. . . . Their modernization program includes virtually every category of weapon system, including those in which our lead was undisputed a few years ago."

Qualitative improvements have been evidenced in a "highly accurate guidance system, a look-down, shoot-down interceptor, an improved antisatellite system (ASAT), an advanced submarine, and a new family of high-speed computers," according to Dr. Perry.

The Soviets, the Pentagon's ranking technologist pointed out, also are concentrating on several unconventional technologies, such as "high-energy lasers, charged-particle beams, and surface effects vehicles. . . . In the high-energy laser field, they may be beginning the development of specific weapon systems."

Even in precision guided weapons—a discipline pioneered by the US on the strength of its comprehensive lead in microminiature electronics—the Soviets are beginning to catch up. Because of the prodigious Soviet catch-up effort, "we are beginning to see significant progress in weapons now under test, and we expect to see precision-guided weapons entering Soviet [inventories] in quantity in the early 1980s. Even these first-generation weapons will present us with a significant problem," Dr. Perry told Congress.

Near-term trends in military weapons development and acquisition, Dr. Perry testified, "will continue to move toward the Soviets' favor" because the USSR, unswayed by either domestic opinion or arms-control agreements, seems bent on relentless expansion of its military investments.

The primal consequence of this steadily increasing military spending is that Moscow's military acquisition process "has been extraordinarily successful in producing large quantities of steadily improving weapon systems."

Dr. Perry pointed out, however, that despite the Soviet Union's ability to develop and produce high-technology weapon systems "they continue to experience difficulties in mass production and maintenance of certain high-technology systems." He cited specifically Soviet aircraft which he termed "overweight by US standards."

The Strategic Sector

No such deficiencies are evident, however, in the all-important strategic sector, where Soviet investment over the past four years "nearly tripled that of the US."

In reporting on the offensive strategic balance, Dr. Perry punctured two of the defense critics' most cherished myths—that the US somehow is endowed with a permanent superiority in ICBM accuracy and, similarly, with an insurmountable numerical lead in strategic nuclear warheads. On the latter point, Dr. Perry told Congress that if the Soviets continue to "deploy the MIRVed version of the SS-N-18 [SLBM] on all of their Delta submarines, they will match us in the number of strategic warheads by the mid-1980s, while maintaining their lead in delivery vehicles and nuclear yield."

The term "overkill" is a favorite crotchet of those who maintain that deterring strategic nuclear war should be confined to the ability to hold the other side's population hostage to massive retaliation. The contention here is that any capability in excess of destroying a certain number of Soviet population centers is "overkill." The validity of this logic is questionable and evidently not accepted by the Soviets. But there is a form of overkill that most strategic analysts—US as well as Soviet—do consider valid. A condition of overkill exists whenever strategic weapons combine accuracy and yield significantly greater than needed to destroy even the hardest targets.

"The Soviet Union's new operational ICBMs achieve a level of destructiveness that would seem to place further improvements in combined yield and accuracy in the overkill range."

In practical terms, whether or not a target is inside the crater or fireball generated by a detonating warhead is decisive; but since any target within the perimeter of either can be presumed to be destroyed, it doesn't matter

nologies and development programs that promise to enhance this country's military strength significantly.

MOVING INTO SPACE

where within this zone the target might have been. Typically, a one-megaton surface burst craters a circular area with a diameter of about 1,300 feet. This area also would be covered by an average of fifty inches of debris. There are other gradations of devastation that are important to target planners: Within a radius of 700 feet from the burst, concrete and rock will start to liquefy. Within a 900-foot radius any buried concrete/steel structure would be torn apart. And within a 1,200-foot radius any structure would experience about forty inches of vertical and horizontal displacement.

Singly or combined, these effects must be rated as "lethal" to any ICBM, regardless of the hardness of its sheltering silo. The Soviet Union's new operational ICBMs achieve a level of destructiveness that would seem to place further improvements in combined yield and accuracy in the overkill range. As Dr. Perry testified, the Soviet Union "has developed greatly improved guidance systems for their SS-18 and SS-19 ICBMs. These systems demonstrate accuracies less than the lethal radius of the SS-18 and SS-19 MIRVed warheads, even against hard targets like silos. Therefore, when large numbers of these guidance systems are introduced into their ICBM forces, our silos will no longer protect our ICBM force, and no feasible improvement in hardening will restore their ability to survive a mass attack of SS-18s and SS-19s."

The ominous quality of the Soviet military technology program also affects space. Lt. Gen. Thomas P. Stafford, USAF's Deputy Chief of Staff for Research, Development and Acquisition, in discussing the recently completed 139-day manned space mission involving the Soviet Salyut, Soyuz, and Progress spacecraft, testified: "I am concerned that they may be developing a manned, military space capability about which we know very little. They understand the force enhancement available from space and have devoted considerable effort to the development of space systems."

One facet of the Soviet military space program of grave concern to US intelligence is that the Russians seem well on the way toward a manned command and control spacecraft that can perform along the lines of the US E-4B National Emergency Airborne Command Post. Such a capability, coupled with clearcut Soviet efforts to capitalize on this country's lopsided dependence on sophisticated command control communications and intelligence (C^3I) systems with relatively vulnerable nodes in space as well as on the ground, could handicap decisively the US in the opening phase of strategic nuclear war.

This development, in the view of most experts, is doubly dangerous because of doctrinal and force structure-related advantages that accrue to the Soviets. This asymmetry stems mainly from the USSR's commitment to a preemptive strategic posture as well as her heavy reliance on ICBMs that can be controlled and launched far more reliably—and through a far more survivable C^3 system—than SLBMs and air-breathing strategic weapons.

It follows that a US antisatellite system capable of threatening manned Soviet C^3 spacecraft is needed to deter Russian attacks on this country's command and control system, either in space or on the ground.

"One facet of the Soviet military space program of grave concern to US intelligence is that the Russians seem well on the way toward a manned command and control spacecraft that can perform along the lines of the US E-4B National Emergency Airborne Command Post."

Some US military space experts believe the Soviet Union's ASAT antisatellite interceptor lags behind the technological sophistication and lethality that could be incorporated into equivalent, proposed US space weapons. Yet the fact that the USSR has this operational capability—and the US does not—creates an asymmetry of far-reaching consequence. As Dr. Perry told Congress, "the President desires to achieve a comprehensive and verifiable ban on ASAT systems, and we hope that negotiations on ASAT limitations lead to strong symmetric controls. In the meantime, however, we have placed emphasis on our research-and-development activities to increase our survivability against attacks should they occur, and to be able to destroy Soviet satellites if necessary."

Miniature Satellite Killer

The initial ASAT weapon under development—$80.5 million in USAF's FY '80 budget is earmarked for space defense—is a miniature vehicle that can be launched either by ground-based missiles or aircraft. An offshoot of a homing interceptor developed by the US Army as part of its ballistic missile defense program, the miniature interceptor weighs about thirty-five pounds and "kills" hostile satellites merely by impact, without explosives. Impact speeds range from 10,000 to 40,000 feet per second, depending on the altitude and location of the satellite to be attacked.

For ballistic attack on satellites in lower orbital altitudes, such as photoreconnaissance spacecraft, the miniature interceptor would be launched by heavily mod-

ified variants of such missiles as AGM-45 Shrike or AGM-69 SRAM, which in turn would be fired from F-15 aircraft. The US, therefore, could have an ASAT capability wherever F-15s are deployed. The homing interceptor uses small rocket motors that, on command from the weapon's seeker, bring it on a collision course with the target satellite.

For intercepts at high orbital altitudes, the miniature ASAT would be launched by a space booster from either Cape Kennedy or Vandenberg AFB. General Stafford reported to Congress that the Air Force, if so directed, will conduct operational space tests of this weapon against a cooperating target satellite carrying special instrumentation to evaluate ASAT's performance. General Stafford added "we are also pursuing advanced ASAT systems. These alternate approaches will provide a mixed force that will complicate Soviet defense and exploit new technology."

"The US... could have an [antisatellite] capability wherever F-15s are deployed."

A developmental model of the miniature vehicle is nearing completion and is slated to undergo a number of drop tests that simulate actual flight tests. Also, he said, "advanced weapon system program definition will identify technical issues and schedules for achieving alternate follow-on capabilities. Finally, hardware for our orbital target vehicle, the instrumented test vehicle, will be developed and a critical design review conducted."

Since General Stafford referred to the miniature weapon also as a "conventional vehicle"—in contrast to "our advanced weapon system efforts [which] will concentrate on kill verification, pointing, and tracking"—it can be adduced that the long-term US ASAT effort centers on directed energy weapons, in the main high-energy chemical lasers.

ACDA's report to Congress defines the advanced ASAT systems as weapons "which could provide a high payoff in the future on the assumption that associated technology could be developed sufficiently." Dr. Robert R. Fossum, Director of DARPA (Defense Advanced Research Projects Agency), told Congress that current US research in laser weapons "concentrates upon high-efficiency infrared chemical lasers, large lightweight telescopes, and a precision pointing system for long-range military applications." The latter obviously alludes to space missions. Counting the FY '80 funding request of about $211 million, the Defense Department to date has invested almost $1.5 billion in high-energy laser technology. Current negotiations with the Soviet Union, according to ACDA, could, however, confine laser and other beam weapons to "research and development short of testing against target satellites."

Directed Energy Weapons

A grouping of technologies known as directed energy weapons—encompassing high-energy lasers, particle beams (both charged and neutral), and microwaves—continues to be in the forefront of US and Soviet advanced military R&D. While it is possible to point at circumstantial—albeit vague and isolated—evidence that suggests the contrary, most US defense scientists remain skeptical about claims of an appreciable Soviet lead in this military technology and its imminent operational feasibility. Others maintain that the Soviets, by the early 1980s, may well be able to intercept the warheads of US ballistic missiles in flight with lasers or particle-beam weapons.

The US Directed Energy (DE) technology program—carried out by DARPA and the three services under the control of Dr. Ruth M. Davis, Deputy Under Secretary of Defense for Research and Advanced Technology—in the main seeks to demonstrate the feasibility, as Dr. Davis told Congress, "of transmitting significant quantities of energy through the atmosphere or space and concentrating the energy on the target. . . . I believe that if the difficult technical hurdles facing directed energy technology are surmounted, the application of this technology to military needs may revolutionize both strategic and tactical warfare."

Of the two approaches being pursued—high-energy lasers and particle beams—"lasers are by far the most mature," Dr. Davis said. Last year, the US Navy achieved a significant advance toward operational laser weapons when its high-energy laser laboratory test-bed shot down an Army TOW missile. Full demonstration of the "lethality" of laser weapons—involving an investment of about $1 billion over the next few years—is to be completed by 1985.

Particle-beam technology is, according to Dr. Perry, "in the very early research and exploratory phases." The difference between laser and particle beams is that the former directs a thermal shockwave against a target while the latter adds the more lethal factor of mass (*i.e.* particles) to the process. A total of $29.5 million, to be used mainly by DARPA and the US Army's Ballistic Missile Defense Technology Program, is allocated in FY '80—in addition to some $17 million this year—to particle-beam weapons research. DARPA has taken over from the Navy the "Chair Heritage" program that led to the development of an Advanced Test Accelerator by the University of California's Lawrence Livermore Laboratory. The objective of "Chair Heritage" is "to obtain a fundamental understanding of the physics of beam propagation" and to find out if a weapon ultimately might be developed for close-in point defense of surface ships against antiship cruise missiles.

The operational—as opposed to the theoretical—feasibility of particle-beam weapons has yet to be demonstrated, according to Dr. Perry and other Defense Department witnesses.

DARPA is known, however, to be working on an EMF (electromotive force) gun that is expected to propel ammunition to hypersonic velocity without explosives.

The use of directed-energy weapons for the ASAT mission or ballistic-missile defense is questionable in light of certain provisions of SALT, according to ACDA's report to Congress. The Soviets have already indicated during bilateral talks with the US that they view particle-beam systems as "weapons of mass destruction." The Russians claim, therefore, that they are banned from use in space by the provisions of the Space Treaty.

Satellite Survivability

Countermeasures to the Soviet ASAT include a range of techniques and devices to boost the survivability of US military satellite systems. These include, according to Dr. Perry, "proliferating the number of satellites that perform a given mission; designing satellites so that they are not easily observed, and placing them in orbits beyond sensor surveillance range; hardening satellites against laser radiation; and employing decoys to deceive or a maneuver capability to evade an attacking interceptor."

The Air Force, General Stafford told Congress, is developing on-board sensors to "detect impact or laser energy to identify that a satellite has been attacked by a nonnuclear ASAT or a laser weapon. [These sensors] will also detect radar or laser-tracking energy to give warning that a satellite is a potential target." USAF's FY '80 budget request includes $30 million for satellite survivability measures. These devices are to become operational within five to seven years. Six individual projects are involved, most tailored to counter present or projected Soviet ASATs.

"Because of the possibility of less than all-out missile attack — implicit in Soviet strategic doctrine and force structure — the Air Force is refining this nation's attack assessment capabilities, especially under conditions of protracted war involving multiple exchanges. A key step here is real-time assessment of a nuclear attack anywhere in the world by means of IONDS...."

Included are "laser energy distribution/rejection techniques for spacecraft, jam-resistant telemetry and control links, more survivable ground terminals, electro-optical and electronic countermeasures, and survivable launch systems" that can rapidly replace lost spacecraft. One or more of these emerging technologies will be incorporated in the Defense Support Program (DSP—also known as the Early Warning System), the NAVSTAR Global Positioning System, and the Defense Meteorological Satellite Program, General Stafford told Congress.

Space surveillance, closely related to both active and passive space defense, receives special attention in the new budget. DARPA is about to complete two space surveillance programs that will be transferred to USAF by the end of FY '80. TEAL AMBER uses an advanced sensor technology—charge-coupled arrays—for wide area search and tracking of deep space objects from terrestrial stations. The Compensated Imaging System uses adaptive optics—also called "rubber mirrors"—to remove the image-degrading effects of atmospheric turbulence. The goal is high-quality viewing of spacecraft in near-earth orbits.

Since ground-based surveillance sensors are intrinsically handicapped, Dr. Perry suggested that the long-term trends are toward the use of spaceborne LWIR (Long-wave Infrared) systems. The Air Force Satellite Infrared Experiment (SIRE), scheduled for initial probe launch early in 1981, is to demonstrate some of the associated technologies and help formulate the specific design of spaceborne surveillance systems.

C^3 in Space

The Defense Support Program, for the foreseeable future the single most important space-based system, provides early warning of ballistic-missile attack on the continental United States (CONUS). The three DSP satellites deployed in geostationary orbit over the Eastern and Western hemispheres to cover Soviet ICBM and SLBM launch areas also serve—along with other spacecraft—as host satellites for the current NUDETS (nuclear detonation) sensors.

While DSP has performed well so far, Dr. Perry testified that "it is nevertheless fragile." Some of its vulnerability stems from the two fixed and unprotected ground sites. The Air Force, therefore, is developing "mobile truck-mounted terminals [that can be] easily proliferated and [are] indistinguishable from other service vans." An ancillary project involves a data transmission "down link" that is compatible with the small antennas of the mobile terminals.

Also, sensors for standby and new DSP satellites are being modernized to increase "raid and warning performance," according to Dr. Perry. Two each of the standby spacecraft are being modified for launch by a combination of Titan III and USAF Inertial Upper Stage (IUS) as well as by a Space Shuttle/IUS combination. The IUS will take payloads to high orbits, beyond the altitudes that Titan or the Shuttle can reach.

Because of the possibility of less than all-out missile attack—implicit in Soviet strategic doctrine and force structure—the Air Force is refining this nation's attack assessment capabilities, especially under conditions of protracted war involving multiple exchanges. A key step here is real-time assessment of a nuclear attack anywhere in the world by means of IONDS, the integrated operational NUDETS detection system. IONDS, according to Dr. Perry, involves the deployment of NUDET sensors as secondary payloads on NAVSTAR Global Positioning System satellites to detect nuclear explosions, from low-yield tactical warheads to multi-megaton strategic weapons.

Dr. Perry reported to Congress that IONDS will give the NCA (National Command Authorities) rapid warning of the use of nuclear weapons to "provide information via the World-Wide Military Command and Control System (WWMCCS) for estimation of strike damage and indirect assessment of residual capability, and contribute to nuclear test ban treaty monitoring." By about 1986, he said, the full complement of twenty-four IONDS-equipped NAVSTAR satellites will be operational and provide worldwide coverage. Eventually, IONDS will be linked to USAF's Warning Information Correlation (WIC) program, which melds and displays information

from various missile warning and nuclear detonation detection systems.

Space-based Warning Systems

DARPA and the Air Force also are working on long-term, technologically advanced, space-based warning systems. The reason, according to General Stafford, is "that the existing missile surveillance system may not be capable of providing adequate data to support confident selection of appropriate and timely retaliatory responses through the next decade." USAF's Missile Surveillance Technology (MST) program will improve significantly US ability to detect and track Soviet ballistic-missile launches. The driving force behind MST is recent Soviet technology advances "that require corresponding improvements in our capability for missile detection, data transmission, and accuracy of reentry vehicle impact point prediction," General Stafford said.

"This system uses a sensor technology called mosaic focal plane that in effect copies the way humans see; that is, it stares over a wide arc as opposed to the 'scanning' sensor techniques currently employed."

The Mosaic Sensor Program (MSP), a key element of MST, is one of several candidates for eventually replacing the present generation of DSP. This system uses a sensor technology called mosaic focal plane that in effect copies the way humans see; that is, it stares over a wide arc as opposed to the "scanning" sensor techniques currently employed.

Termed by Dr. Perry a "possible operational prototype" for a second-generation DSP, MSP would "not only provide reliable early warning but, unlike the present system, it could be less vulnerable than [the ground-based multisite Ballistic Missile Early Warning System] BMEWS." After initial tests this year on balloon and rocket platforms, MST/MSP should be ready for space launch in FY '81, according to General Stafford.

Beyond MSP, but competing against it in terms of R&D priority, funding, and congressional support, is DARPA's high-altitude large optics (HALO) program. Its central feature is broad coverage of the infrared spectrum as well as "smart" spectral filters to suppress the effects of interference. On-board data processing eliminates the need for wide-band data links, which leads to markedly improved data survivability. Cashing in on recent advances in silicon materials—the result of commercial work on large-scale integrated circuits—HALO uses large silicon arrays with integral signal processing to boost resolution and capacity. First step toward HALO is Hi-CAMP, a test project centered on operating mosaic detector arrays aboard a high-flying U-2 aircraft. The lessons of Hi-CAMP will be applied to two space experiments of far-reaching potential.

TEAL RUBY will demonstrate technologies for detecting strategic targets and aircraft from space by means of an infrared sensor containing thousands of detectors combined with some on-board signal processing. The TEAL RUBY sensor will be launched by USAF's Space Test program aboard the Space Shuttle, probably in 1981. TEAL RUBY is expected to have an on-orbit life of eighteen months.

The Mini-HALO experimental satellite is to demonstrate the feasibility of the ambitious HALO detector array technology involving a very large focal plane operating in tandem with spectral filters, on-board signal processing, and the cryogenic (supercold) cooling of the detector arrays, filter, and telescope. The sensor system, scheduled for launch by USAF in 1984, is designed to detect and track a wide range of targets from space. On-orbit life of Mini-HALO is expected to be about two and a half years.

Another rather ambitious space project is DARPA's technology program probing the feasibility of active space-based radar systems. This program probably is related to a new US space-based surveillance system that employs synthetic aperture radar (SAR) and that is being touted by the Administration as a replacement—by about 1984—of the ground-based SALT verification facilities in Iran. Impelling the DARPA program is the fact that all-weather capabilities and accurate target range information are crucial for many strategic missions. These objectives are beyond the ken of IR systems.

Primary goals of the radar satellite program, Dr. Fossum told Congress, are improved phased-array radars (steered electronically rather than mechanically) and ways to spread the radar functions over several satellites to increase the system's survivability. DARPA expects this program to have major impact on a range of military missions, including air vehicle surveillance, and to do away with the need for large networks of ground-based radars. DARPA, according to its director, "will press for developments that can handle targets with small radar cross-sections, such as cruise missiles, and can defeat sophisticated ECM [electronic countermeasure] systems."

"DARPA expects [the radar satellite] program to have major impact on a range of military missions, including air vehicle surveillance, and to do away with the need for large networks of ground-based radars."

New Ballistic Missile Defense Systems

Recent USAF and Defense Department studies show that the MX ICBM, deployed in multiple aimpoint basing, could benefit in a major way from an associated ballistic missile defense (BMD) system. This conclusion, plus evidence of a vigorous Soviet BMD technology program, have reinvigorated the US Army's BMD program. The FY '80 budget request for BMD research—about evenly divided between systems technology (near term)

and Advanced Technology (longer term)—comes to about $230 million. The BMD program, according to Dr. Perry, primarily explores concepts and technologies "for the defense of our land-based missile forces in the 1980s." He added that the most promising approach involves a "layered defense system . . . which employs an exo-atmospheric, homing, and nonnuclear interceptor as an overlay to a conventional terminal system." While he did not say so, it would seem obvious that the exo-atmospheric system will share many features of the ASAT miniature homing vehicle.

Last year, the Defense Department and the US Army initiated a program to "demonstrate the capability to destroy a reentry vehicle outside the atmosphere with a nonnuclear interceptor using a long-wave infrared (LWIR) homing sensor." The program, according to Dr. Perry, goes by the name of Homing Overlay Experiment, or HOE, and during FY '80 is to concentrate on equipment design and component testing "in preparation for the first flight test." HOE's optics acquire targets in flight "over relatively long ranges," differentiate RVs from accompanying chaff, penetration aids, and booster fragments, and guide the interceptor accurately enough to assure destruction of the RV without needing a nuclear warhead.

Other elements of the BMD program are low-altitude, nuclear-armed terminal defense systems that could be "rapidly deployed" as well as, over the longer term, a technology program that could lead to an interceptor with the capability to perform nonnuclear intercepts within the atmosphere. A major achievement of the BMD program is the new Systems Technology Radar at Kwajalein Island that, according to Dr. Perry, could be employed "as the underlay radar in the Layered Defense System." The STR radar, linked to an advanced digital signal processor, differentiates between RVs and harmless objects rapidly and with high precision and also tracks a large number of RVs simultaneously.

The BMD program also explores the use of directed-energy weapons. Parallel investigations are under way on neutral-particle beams, charged-particle beams, and high-energy lasers. Basic objective of this long-term high-risk program is to prevent technological surprise.

The ABRES Program

Another countermeasure to potential technological surprise in the BMD field is the USAF-managed ABRES (Advanced Ballistic Reentry System) program. Purpose of this program—funded to the tune of about $105 million in both FY '79 and FY '80—is to develop reentry and penetration technology in "support of the SALT, intelligence, and ballistic missile defense communities," according to Dr. Perry.

Among the options under development by ABRES, he said, are "preprototypes giving systems designers the capability to penetrate enemy defenses, more effective subsystems that permit more efficient RV designs, and proven materials and designs for RVs that can survive hostile environments." Current work on penetration aid preprototypes will permit quick response to advances in Soviet BMD technology, Dr. Perry testified.

ABRES is made up of four major elements. In the subsystem area, work is under way to improve nosetip, heatshield, and nuclear hardness features. Other work in this category involves arming and fuzing components in order to reduce the volume, weight, and susceptibility of RVs to countermeasures while at the same time increasing their accuracy and reliability.

Two distinctly different RV development programs are part of the current ABRES program. Both incorporate the results of recent advances in subsystem technology. The Advanced Ballistic Reentry Vehicle (ABRV) is sized for MX and Trident II missiles. Key concerns are with reduced aerodynamic dispersion—basically ways to reduce the influences of the atmosphere and its anomalies on ballistic trajectories—and with warhead designs that produce greater yield yet use considerably less Oralloy than the 335-kiloton MK 12A. Oralloy, named for the Department of Energy's Oak Ridge nuclear weapons facility, is the fissile trigger needed to ignite thermonuclear fusion. This material is in short supply now and will become scarcer yet in the years ahead. Three test flights of the ABRV are scheduled this year.

"[The Homing Overlay Experiment's] optics acquire targets in flight 'over relatively long ranges,' differentiate RVs from accompanying chaff, penetration aids, and booster fragments, and guide the interceptor accurately enough to assure destruction of the RV without needing a nuclear warhead."

The Advanced Maneuvering Reentry Vehicle (AMaRV)—a follow-on to the Navy's MK-500 Evader—is designed to fly nonballistic reentry trajectories in a preprogrammed manner in order to evade advanced BMD inceptors, to improve accuracy, or both. Three test flights of this system are scheduled between now and 1981. The initial accuracy of the system is to be equal to current ballistic RVs.

Terminal sensors are being developed to improve accuracy significantly by updating the guidance system with relative position and velocity information as the RV approaches its target. The result could be precision-guided reentry vehicles (PGRVs) of uncanny accuracy even though they perform elaborate evasive maneuvers.

There are no plans at present to move either AMaRVs or PGRVs into full engineering development. Both programs will offer options, however, to graft quickly and with low risk onto present and future ballistic missiles the ability to thwart advances in Soviet BMD systems or to improve drastically the accuracy of these weapons if that is required.

Development of penetration aids is another key concern of the ABRES program. Advanced radar and optical penetration aids as well as decoy concepts are being developed that could be deployed on existing or future RVs. ■

AWACS' OP

In its planning stage, the E-3A represented a major advance in air combat. In operational status, it is setting a remarkable record

E-3A display consoles provide crews with real time radar and computer information.

AFTER two years in operational status, the E-3A Sentry airborne warning and control system (AWACS) is proving even more effective than Air Force planners had hoped.

The question among policymakers, in view of the dramatic increase in surveillance and command and control capability the new plane provides, is whether the thirty-four E-3As Defense plans call for will be sufficient to meet military needs.

In missions in Saudi Arabia, Iceland, and along the southern borders of the US, the E-3A has provided radar surveillance that never before has been possible. But the planes and their equipment also are setting performance records far above Air Force standards of reliability.

The first E-3A was delivered to Tactical Air Command's 552d Airborne Warning and Control Wing at Tinker AFB, Okla., in March 1977.

Today, E-3As are on NORAD alert duty in the US, assisting the US Customs Service to combat smuggling, and keeping track of Soviet aircraft in the North Atlantic. This spring, two of the planes were flown in Saudi Arabia to monitor jet fighters flying in neighboring South Yemen.

In the months ahead, Air Force plans call for the plane to be deployed to Okinawa and Alaska. Aircrews from the 552d also are expected to train crews to man the eighteen E-3As NATO has agreed to buy, in an eight-year, $1.8 billion program. NATO deliveries are not scheduled to begin until 1982.

The Air Force is building from the present force of eighteen E-3As now stationed at Tinker to the twenty-five Congress has authorized, but future plans call for a minimum of thirty-four in the 1980s.

When this force level is reached, plans call for one-third to be based

rotion

BY BONNER DAY, SENIOR EDITOR

Distinctive rotodome, housing radar antennas and associated equipment, identifies the modified Boeing 707-320B as an E-3A.

overseas, providing early warning of the deployment of potentially hostile combat planes. The other two-thirds will be stationed in the US, on continental air defense missions, or held in reserve for emergency deployment.

Air Force planners say that at least thirty-four planes would be required to set up a radar barrier around the North American continent in times of international tension. As this would leave no aircraft for other missions, US policymakers are already debating the need for more E-3As.

Performance Records

The Sentry was designed with two dominant features in mind, survivability and flexibility, and performance is proving out the design. Survivability is significantly better than a ground-based radar. And if an E-3A is lost, a replacement can be dispatched rapidly to the same area.

The excellent performance record of the aircraft itself was expected as it is a modified version of the Boeing 707-320B commercial jet, which has been in service for fifteen years. But there were some initial problems with mod-

ifications, including hydraulic lines that eventually had to be replaced, and fuel booster pump failures.

Still, the performance of the complete system has been remarkable. Over a two-year period, which represents the early stages of the learning curve for air and ground crews, the planes flew 1,219 of 1,425 scheduled missions.

On the 206 flights canceled, weather was the principal cause. The radar system, though the most complex ever designed, caused flights to be scrubbed only eight times.

Of the missions flown, only forty-three were judged ineffective by Air Force standards. The radar was at fault thirteen times, and the computer twice. Weather, mechanical disorders of the aircraft, command decisions, and other causes were blamed for the other failures.

Maj. Gen. John L. Piotrowski, Commander of the 552d Airborne Warning and Control Wing at Tinker, says the aircraft, radars, and computers have consistently exceeded standards set by the Air Force, although the system and crews are still in the early part of the shakedown period.

As of mid-April, 8,600 flight hours had been recorded for all E-3As in the inventory. During this period, the aircraft were in proper orbit for warning and control missions only 1,903 hours. The rest of the flight time was consumed in flight-crew training, or flying to or from exercises.

As additional hours are chalked up, performance continues to improve, says General Piotrowski. Each month, operationally ready rates have gone up.

The Sentry outperforms by several orders of magnitude the Soviet Moss aircraft and other AC&W planes produced by the West, say Air Force officers. The quality of the computer-generated radar image and the radar's consistent reliability are particularly praised. Demonstration flights have shown that five Sentry planes in overlapping orbits can provide NATO with 100 percent radar coverage extending well into Warsaw Pact territories—something the Alliance never had with its network of ground radars and older control and warning planes. At 30,000 feet, the radar covers more than 300 times the area of a typical ground-based radar and has exceeded standards set during the development stage of the system.

Perhaps more important, electronic countermeasures experts say the radar is virtually impossible to jam with current technology.

Continental Defenses

E-3As are being added to US defenses at a time when US strategists increasingly are concerned about the nation's air defenses. Retired Adm. Thomas H. Moorer, former Chairman of the Joint Chiefs of Staff, recently stated: "The US has no air defense worthy of the name."

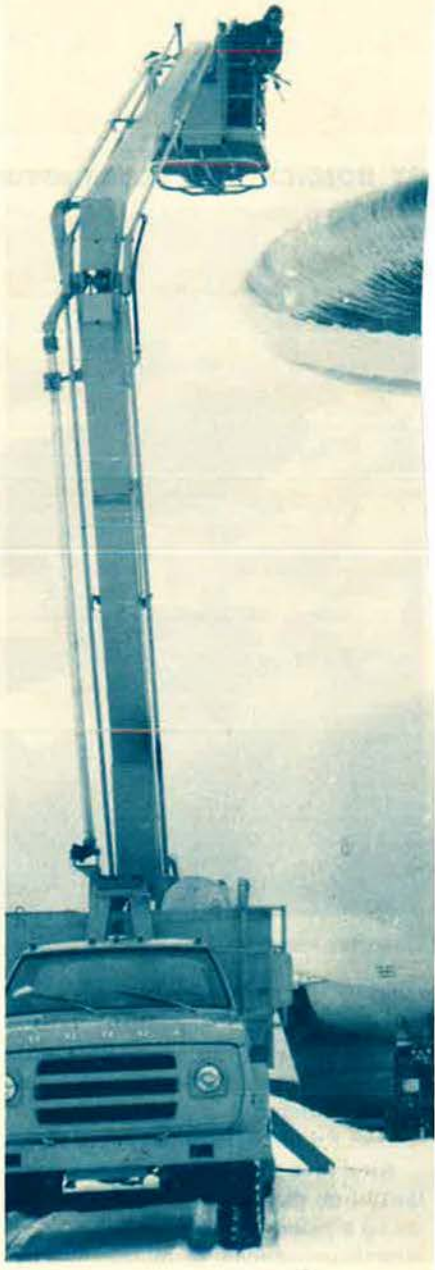
But because the Russians have insisted that their supersonic Backfire bomber not be included in any strategic arms ceiling, the Joint Chiefs of Staff have been pressing for a beef-up of continental air defenses.

"At 30,000 feet, the radar covers more than 300 times the area of a typical ground-based radar and has exceeded standards set [by the Air Force] during the development stage of the system."

A modernization program calls for updating the DEW Line radars across Northern Canada, a new joint civil and military radar network known as the Joint Surveillance System (JSS), and modernization of the American and Canadian interceptor forces.

An integral part of this program is the Sentry, which will fill in gaps in the ground-based radar barrier with its look-down radar's ability to spot low-flying bombers that otherwise would escape detection.

One Sentry stands NORAD alert twenty-four hours a day at Tinker AFB, and NORAD air battle staff officers are being trained on the Sentry's radar equipment. A minimum of twenty to twenty-five Sentry aircraft

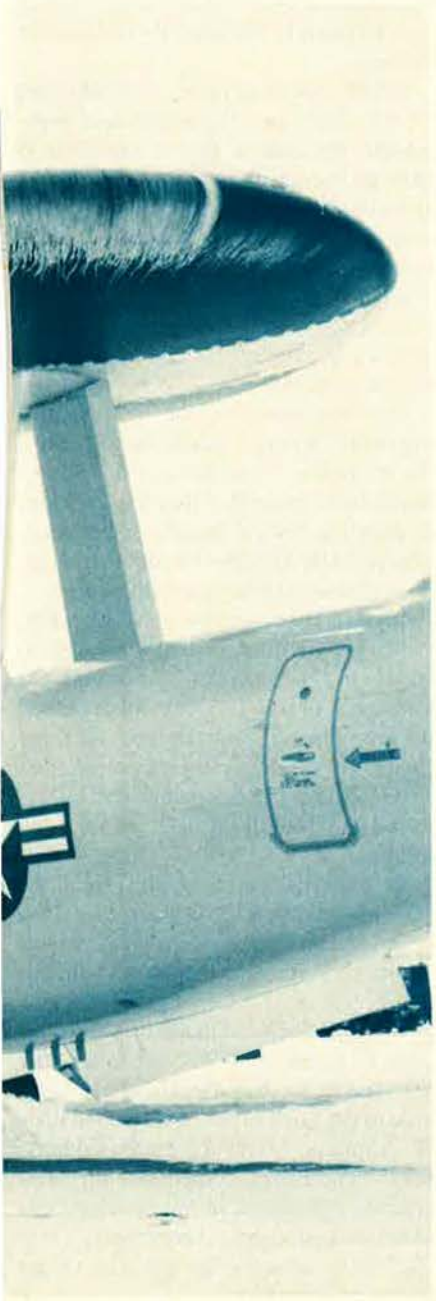


A spray-gun operator removes snow and ice that could alter the rotodome's balance or damage the tail section during flight.

eventually is expected to be detailed to NORAD and US continental air defenses.

Saudi Deployment

On March 8, two Sentry planes were dispatched to Saudi Arabia to conduct demonstration flights and exercise with Saudi F-5E and Lightning jets. A collateral, but important, mission was to keep a close watch on Soviet-built jets in South Yemen that were threatening neighboring North Yemen, an ally of Saudi Arabia. The two Sentries were diverted from Kadena AB, Okinawa, where they had flown to participate in an exercise over South Korea. The planes had just set a record for E-3As, flying nonstop from Tinker to Kadena in eighteen hours, with three aerial refuelings.



While in Saudi Arabia, the planes were opened for inspection to Saudi military and civilian leaders. The planes were flown fifty miles within the Saudi borders, but were able to provide a radar picture of air activities several hundred miles away. The planes are credited with easing the minds of Saudi officials about military activities in South Yemen. The deployment also was a visible expression of US interest in Saudi Arabia in particular and the Middle East in general.

Operations in Iceland

The deployment to Iceland has successfully demonstrated the Air Force concept of permanently basing the entire E-3A wing in Oklahoma, and deploying individual aircraft worldwide as required by theater air commanders.

The single-base concept enables the entire force to be supported by one central facility for heavy maintenance, and decreases the number of airmen required for support crews on deployments.

Detachment 2, the ground support unit for the Iceland deployment, was first to arrive at that strategic island. The detachment, activated in April 1978, consists of eight officers and 155 airmen.

On September 23, 1978, the first E-3A from the 552d Wing departed for US Naval Station, Keflavik, Iceland, to augment surface radars on the island. The second arrived September 27. On October 1, the aircraft replaced the Air Reserve unit flying older EC-121 AC&W planes. The move represented the first continuous deployment of the Sentry outside the continental US. The following day, an E-3A scrambled on its first operational mission.

Three aircrews are assigned on thirty-three-day temporary duty to operate the two planes. One crew is replaced every eleven days. Normally, one crew is on one-hour alert, a second crew is on two-hour alert, and the third crew is off duty. The planes are deployed for twenty-two days in Iceland before being replaced.

The mission of the Sentry crews is to supplement ground radars in spotting Soviet aircraft and to direct F-4 jets from the 57th Fighter Interceptor Squadron at Keflavik to identify and keep them under surveillance. E-3As are on ground alert and scrambled upon command. Sentry flights range from seven to thirteen hours in Keflavik missions.

The Soviet Union regularly launches planes from its bases in the Murmansk area, sending them through the Greenland-Iceland-UK (GIUK) Gap down the East Coast of the US, and recovering them at airfields in Cuba.

The Soviet planes usually are picked up first by NATO units in Norway. They are passed off either to British fighters based in the United Kingdom, or to the US aircraft based in Iceland.

A strategic location for the deployment of some NATO E-3As would be in Norway, so that Soviet planes could be picked up almost the moment they left Soviet soil. In March, one of the US E-3As assigned to Iceland was flown to Norway and demonstrated for Norwegian officials. During the demonstration, Norwegian ECM aircraft were unsuccessful in jamming the E-3A radar. Though Norway may be one of the eventual locations for NATO E-3As, US Defense officials say NATO basing is still in the early planning stages.

Drug Smugglers

Since June 1978, US Customs Service officers have been permitted to fly on Sentry missions along the US southern border as part of a Customs program designed to spot airborne drug smugglers.

The Customs Service asked permission to fly on E-3A missions after a series of test flights the previous year demonstrated the superiority of the plane's look-down radars over ground radars in spotting low-flying aircraft. Last fall, Customs officers began training on Sentry radar display consoles, and have been averaging twenty flights a month since January. The Customs Service maintains an office, manned by five air officers, at Tinker AFB.

An updated agreement supplements previous agreements that provided Customs with information from ground-based radars operated by the North American Air Defense Command. US law limits Air Force cooperation. It permits the Air Force to allow Customs officers aboard if they do not interfere with Air Force training or missions. But the Air Force, as a military service, cannot apprehend civilian smugglers itself or otherwise actively engage in the criminal investigation of civilians.

In the period between January and April, twelve radar intercepts of suspicious planes were made by Customs

Aerial refueling, in this case by an Air National Guard KC-135, extends the range and endurance of missions flown by the E-3A.

officers aboard Sentry planes. But the Customs Service has had difficulty in following up with arrests. In one incident on January 15, a suspect aircraft was detected south of Florida. A Customs aircraft was directed by Customs officers aboard a Sentry on an intercept pattern. But when the suspect realized he was being chased, he crash-landed the plane in Florida and escaped before he could be captured. Approximately 1,600 pounds of marijuana was confiscated at the scene.

Customs officers, while praising the Sentry's radar, attribute the low arrest record to inadequate communications with Customs interceptor planes and to the relative lack of speed of the Customs planes. These shortcomings are being addressed with the scheduled July delivery of four T-39 jets purchased from the Air Force.

No one knows how many flights to the US are made by smugglers. It is estimated that about 600 such flights occur each month. Customs officers say that in Fiscal '78, there were 648 airplane crashes in the US in which narcotics were found. In 1977, Customs officers detected fifty-seven planes and seized marijuana worth $16 million. Customs officers say, however, that for every airborne smuggler caught, eight or nine get through undetected.

The sheer numbers involved make the E-3A an increasingly important tool to Customs. Customs Officer Bob Kessler says there are gaps in ground-based radars along the southern borders that make the E-3A invaluable in the work of Customs. With improved interceptor aircraft, Customs officers hope to tighten border security significantly in the next twelve months.

Future Sentry Deployments

The Air Force has announced plans to assign three Sentry planes to Kadena AB, with the first to arrive in July 1980. Eventually four of the radar planes are expected to be based at Kadena. The aircraft are scheduled to be stationed at the base on 120 to 150 days of rotational duty while US aircrews will be assigned for thirty to forty-five days' TDY. The ground personnel are scheduled to be deployed sometime this summer.

Some $1.5 million has been appropriated to provide facilities for maintenance. Plans also call for construction of a $1.1 million squadron operations facility.

"In Norway, Saudi Arabia, and the Philippines, the E-3As have exercised with local aircraft to demonstrate their ability to command and control the air battle."

The E-3As are scheduled to monitor aircraft throughout the Western Pacific. Air Force officials say flights will average ten to twelve hours.

The aircraft are expected to train with South Korean and with Japanese fighter units, in addition to US units in the region.

Long-range plans also call for E-3As to be sent to Alaska, to assist in providing coverage of the northern approaches to the US, and to monitor Soviet planes flying from Siberian bases.

Defense officials say deployment in the Mediterranean is being studied. While orbiting over international waters, the planes would be capable of plotting aircraft from the Soviet Union and Warsaw Pact countries bound for Middle East and North African countries.

Basing the planes in this sensitive region poses a major diplomatic problem, one that may be difficult if not impossible to resolve in today's unstable Middle East climate. But strategically the planes could provide a radar barrier along the eastern end of the Mediterranean that would be an important addition to the security of Western Europe.

Radar experts say that as the abilities of the plane are improved and reassessed, the system also is expected to play an increasingly important role in surveillance of the world's oceans. The long loiter time of the plane, seven hours or more without refueling, and its sophisticated radar, already being improved upon, would enable the E-3A to provide oceanic radar coverage never before possible.

In a war, however, the E-3A's most important function would be to control the air battle. In exercises, the Sentry has demonstrated that it can spot planes marshaling behind enemy lines, position friendly fighters for defensive action, and manage the ensuing battle.

In one major exercise at Nellis AFB, Nev., 134 friendly aircraft were able to stand off 274 "enemy" planes with the assistance of two E-3As, which picked up the "enemy" aircraft and vectored "friendly" fighters on intercept patterns. All attempts against the E-3As failed, including efforts to jam the radars.

In Norway, Saudi Arabia, and the Philippines, the E-3As have exercised with local aircraft to demonstrate their ability to command and control the air battle.

It is this ability to make up the difference in numbers of aircraft in a battle that makes the E-3A particularly valuable to the Air Force. Maj. Gen. James H. Ahmann, USAF Director of Plans, says: "The E-3A is one of the most significant milestones in the development of combat airplanes. It represents a revolutionary advance in the use of air forces in a conflict." ■

THE SOVIET KGB IN AMERICA

The number of Soviet spies in America has increased significantly in recent years, raising concern about the ability of US counterintelligence to cope.

BY HOWARD HANDLEMAN

AT THE very time that American counterintelligence is under attack at home, the Soviet Union's spy service, the KGB, is mounting a major offensive on this country.

Since 1966, the Soviet government has doubled the number of its espionage agents in the United States. In the past year, the Kremlin has stepped up the pace. And Washington is the battlefield for this cloak-and-dagger war.

Meanwhile, US counterintelligence forces are on the decline. A knowledgeable assessment of the problem comes from W. Raymond Wannall, former Assistant Director for Intelligence for the Federal Bureau of Investigation: "Fifteen or twenty years ago, we used to average about four FBI counterintelligence agents for every known or suspected Soviet agent. Now, the ratio is down to one to one, or even a bit less."

That gives reason to doubt that the US can keep up with KGB agents in America. A counterintelligence authority says it takes ten to fifteen men to shadow a single enemy agent. Sometimes, far more are needed. About 140 FBI agents were in on the arrest of US Navy Yeoman Nelson Drummond in 1962. Drummond was convicted of espionage charges and sentenced to life imprisonment. About the same number were used the following year when the FBI caught the American engineer, John Butenko, who was convicted and sentenced to thirty years.

Intelligence Targets

Targets of the KGB—the Committee for State Security—have been altered over the years. A dozen years ago, the KGB focused on getting information about the intentions of the US and its allies, with the basic question being: "What are they going to do next?"

The KGB still keeps this target in mind, but there has been a shifting of priorities. Today, the emphasis is on policies with international connotation, with less concern for domestic programs with no direct impact beyond US borders. FBI Director William M. Webster was speaking of the KGB in a recent speech in Chicago when he said:

"The interests of foreign governments center primarily upon technological, political, and scientific intelligence, as well as economic, sociological, and geographic information. Also of interest is personal information about individuals who have the capability of setting opinions or who might be recruited by a foreign power in an effort to gain additional information of value.

"Obtaining our most recent scientific advances in areas such as microelectronics, computers, lasers, nuclear energy, and, of course, military and space technology is the major thrust of this activity."

Counterintelligence agents say current KGB priorities place industrial secrets high on the list of targets. This international version of industrial espionage subverts US efforts to control the transfer abroad of technology with military applications.

Mr. Webster's reference to "personal information" reflects the KGB search for Americans in key spots who have an exploitable weakness. KGB agents know they have a better chance of subverting an engineer who is a homosexual, a military officer with a yen for wine or women, or a diplomat who needs money.

Recruiting spies is a prime function of a KGB agent. He looks for two types: the person of influence, and the person with access to confidential documents. Government employees are the favored targets, but scientists, engineers, even hotel

maids, and others also are objects of recruiting efforts.

A low-ranking person, like CIA watch officer Michael Kampiles, can be especially useful, if he has access to important documents. Kampiles is appealing a conviction for selling to the Soviets a manual detailing secrets about a US satellite. In the eyes of the KGB, such documents are far superior to a spy's verbal report.

Counting Spies

The numbers of KGB agents and their allies alone are enough to cause concern. As one yardstick, the Soviet Union and its Warsaw Pact allies have twice as many official personnel in this country now as they did a dozen years ago. These are not only diplomatic personnel but also others who are posted to the US.

The FBI's Webster says the exact number of Soviet and other Communist agents is unknown, "but you may be sure that the number is greater than the number of our own special agents assigned to foreign counterintelligence work."

There are about 1,900 Soviet-bloc officials currently on assignment in the US. These include not only diplomats, but employees of the Soviet Union's TASS news agency and other Soviet news correspondents, of Amtorg and other trading companies, and of other Soviet and Warsaw Pact missions that keep personnel permanently posted to the United States.

The FBI estimates that forty percent of the people in the US on Soviet or Warsaw Pact passports are professionals assigned to the KGB or other Communist spy units. That would mean about 760 full-time professional agents. But that's not all. The FBI assumes that the remaining sixty-five to seventy percent of the officials in the US representing Warsaw Pact countries are forced to work at least part-time on Soviet intelligence chores. That's another 800 agents the US must keep an eye on.

And there are more, including:

• **Merchant seamen.** Forty American ports have been opened to Soviet-bloc merchantmen since 1972. About 20,000 Soviet-bloc seamen annually have the freedom of the ports on shore leave. The FBI assumes there are spies among them, but nobody knows how many.

• **Delegations and other visitors.** This category includes exchange students, scientists, technicians, trade groups, educators, artists, and others who regularly make the trek to America. The FBI assumption is that KGB officials or agents of the GRU, the Red Army spy organization, are with every group. One function of these agents is to keep an eye out for defectors. Another, particularly among trade missions visiting American industrial plants, is to spy. All told, 30,000 Soviet-bloc visitors came to the United States last year. And US counterspies are frank to say the number of spies among them is unknown and unknowable.

Then there are "illegals" who slip into the country with forged or stolen passports. KGB Col. Rudolf Abel was one of them. He conducted spy operations in New York for more than eight years before he was exposed.

Cuban Cooperation

Also among the "illegals" are Cuban agents, posing as refugees, but actually in the employ of Cuba's Dirección Generale de Inteligencia (DGI) for the Soviet KGB. They are made welcome in the unsuspecting communities of the 700,000 or so legitimate refugees from Fidel Castro's Cuba. These "illegals" have advantages over KGB agents from the Soviet Union. They can melt into the Cuban population and need no training to disguise their origin. Some reveal themselves only when they return to Cuba. By then, however, it is too late for US counterintelligence to act. The FBI doesn't even have an estimate as to how many Cuban spy "illegals" there are in America.

Russian espionage has a long history. The Okhrana, the Czar's dread secret police, worked against dissidents and revolutionaries in nineteenth and twentieth century Russia. When the revolutionaries went abroad, so did the Okhrana, to infiltrate and spy on emigré conspiratorial groups.

The Communists carried on in the same tradition after they took over the government in 1917. Some of the Czar's spies, in fact, were recruited by the Communists for their newly formed Cheka. The Cheka quickly became as feared as the Okhrana, and for much the same reasons.

Cheka was succeeded by a whole series of organizations. But while the names changed, the duties, functions, and authority remained constant. Among them were the GPU, OGPU, NKVD, MGB, MVD, and, today, the KGB.

The KGB came into existence on March 13, 1954, as part of the governmental overhaul that followed the death of Joseph Stalin just a year before. It took over the more important duties, functions, and authority of the MVD. The MVD, Ministry of Internal Affairs, was relegated to more routine police and fire-fighting duties.

US counterintelligence experts say the KGB is responsible for border guards, the internal secret police, the watch over all military and some of the more sensitive in-

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Howard Handleman is a veteran Washington and foreign correspondent. After reporting on the Pacific Theater of Operations in World War II for International News Service, he established the agency's bureau in Tokyo. As chief Far Eastern correspondent for INS, he covered the fall of China, the reconstruction of Japan, the Korean War, and the recall of General MacArthur. He later had assignments in Washington and Europe. During the 1956 Suez War, he landed with French troops. In 1960, he joined U.S. News & World Report *and later covered the Dominican crisis, the Vietnam War, and other international stories until his retirement in 1978.*

dustrial units, and, of course, the espionage agents and spymasters sent abroad. The US intelligence community estimates KGB's total manpower at 400,000. Close ties with Warsaw Pact countries, Cuba, and other Soviet satellites provide many more agents.

One key advantage the KGB once had but now is losing is the ability to recruit Americans—as well as others—for idealistic reasons. This phenomenon is hard to measure, but the evidence of a decline is clear to the experts. One authority explains: "The Soviets no longer inspire people as they did in the 1920s and 1930s. KGB can buy, flatter, seduce, or blackmail a spy. But communism has been so discredited in the West that Soviet agents no longer can get many to work for them for reasons of Communist ideology."

This does not mean Americans cannot be recruited, but the motivation is likely to be other than Communist ideals.

Motivation to Spy

One counterintelligence authority says bitterness over the Vietnam War, for example, can serve as a motivation. People who are disenchanted with American values because of the war may be potential spies for the Soviet Union, not out of love for the Soviet system, but in reaction against the US, counterintelligence experts claim.

The KGB also is benefiting from current public opinion demanding "clean hands" in counterintelligence and intelligence operations, a trend attributed to public reaction not only to the Vietnam War, but also to the Watergate scandal.

Today, eight groups in Congress oversee CIA and FBI operations: House and Senate committees on Appropriations, Armed Services, Foreign Affairs, and Intelligence. The committees together have more than 200 members. Some serve on more than one committee. In addition, hundreds of staff members working for the committees or for individual members have access to the kind of sensitive information that is a target of the KGB.

But federal security procedures that protect and restrict such information do not fully apply on Capitol Hill. Congressmen themselves are not investigated for security clearances. They are "cleared" automatically for the most secret information by the simple fact of their election.

Staff members are cleared if they need to handle classified information. But government security officials express concern that others do not require clearance, even though they may be working in an office where classified material is available. Some of the most secret information of the government is made available to members of Congress.

KGB officers make frequent and open visits to congressional offices. They collect the published records of hearings on foreign affairs, military weaponry, the budget, or any of the many other subjects that are of interest to the Soviets. It is all legal, but it annoys many congressmen and staffers.

Some KGB operations on the Hill are illegal, however, such as attempting to listen in on closed-door hearings. Government agencies, at the request of congressional committees, make it a practice to examine a hearing room before classified information is discussed. Such "sweeps" have turned up "bugs"—electronic listening devices.

US experts say other targets of KGB agents are the stenotypists who work for commercial companies hired to make transcripts of hearings for Congress. These firms must satisfy government security standards before they are considered for contracts.

Counterintelligence experts say these and similar efforts to exploit such potential sources of intelligence have been uncovered. Secret testimony in Congress could enable the Kremlin to learn whether the US is planning a new missile, what is being proposed in new defense programs, or what changes are being considered in strategic plans for the defense of the nation.

Soviet Audacity

Another way of gathering intelligence on the Hill is to quiz the people who work there. One Senate staffer tells of conversations with Russians: "They come all the time, but the number increases with the urgency of the information they want. You can see them asking the same groups of questions, as though they had memorized them. When US relations with China were coming to a head, the Soviets literally swarmed over the Hill."

Offsetting the potential for espionage on the Hill has been the patriotism of Hill employees. Mr. Wannall says that while he headed counterintelligence for the FBI, many staffers in congressional offices and committees willingly cooperated with his agents. Counterintelligence sources say a number of Hill staffers have acted as double agents, pretending to cooperate with the KGB, while reporting to the FBI.

Other government agencies, including the State Department and the Pentagon, are also KGB targets. To penetrate these departments, the Freedom of Information Act is used, not only by American citizens, but also by foreigners. CIA Director Stansfield Turner tells of getting a request for sensitive information from the Polish Embassy, the first Soviet-bloc country to use the act. As the report requested was not classified, the agency was required by law to release it.

The Freedom of Information Act has been a source of complaints among government security officials partly because of the increased danger of inadvertently releasing sensitive information. A number of cases have occurred where release of documents, supposedly cleared of sensitive information, allowed criminal suspects and foreign agents to figure out the identity of informants.

The KGB also tries to buy information, or to bribe Americans to hand over sensitive materials. In one case, a company made an offer

"A target of the KGB is people in political parties."

to help an American firm with a Navy contract that dealt with classified material. The offer, made through the mail, seemed legitimate. But a check revealed there was no such company.

Secret Documents

The KGB here and its center in Moscow put the greatest value on documents classified "secret" or "top secret." That is why a Michael Kampiles, who didn't rank high in the eyes of the CIA, ranked very high on the KGB target list.

Army SFC Jack Edward Dunlap didn't have access to such documents. But he knew a secretary who did. Dunlap was a messenger in the top-secret National Security Agency that devises communications codes for the US government and tries to break the codes of other governments.

The secretary's job required her to pick up documents in another part of the sprawling NSA headquarters building. Dunlap, after gaining her confidence, suggested that he could pick up the papers and take them to her, as he had to walk by them in the normal course of his job. His government clearance as a messenger satisfied established security regulations. She accepted. What he didn't say was that he had a market for copies—the KGB. FBI officials said he was paid $60,000, over several years, for delivering copies of the highly classified documents. He blew the money on a cabin cruiser, a racing hydroplane, two Cadillacs and a Jaguar, and other luxuries. It is thought he began to feed secrets to the Soviets in 1960. He committed suicide on July 23, 1963, when the FBI was on his trail.

The KGB is so eager for classified American information that some Americans have collected Soviet money for innocuous papers on which they stamped "secret" or "top secret."

To penetrate US security in Washington, KGB agents loiter in the bars of better hotels, where VIP visitors check in. Their object is to eavesdrop and to spot potential recruits. In the hotels they also attempt to recruit maids and bellboys, who have ready access with passkeys to guest rooms.

In the bars, KGB agents strike up casual conversations with Americans, and pick up a name, or some detail about their work. "Every little bit helps," says one expert. "They can fit it in with other things that are heard and reported. The American doesn't have to be in government. He can work for a contractor and still unwittingly provide valuable information."

US Political Parties

Another target of KGB agents is people in political parties, particularly promising young people. The KGB sometimes will place a "sleeper" agent with a politician as a volunteer worker. If the politician wins office, the "sleeper" is in a good position to be hired.

In one case, a young lawyer was elected to the New York State Legislature. A member of the Soviet mission to the United Nations approached him and asked him to do some legal work. It wasn't much—but the Soviet agent paid about three times what it was worth. This was followed by more job offers and more extravagant payments. The payments became so extravagant that the lawyer became suspicious and reported them to the FBI.

Then there is the case of James Frederick Sattler. Born in New York, he had a promising career as a political scientist. He studied in Germany and Poland; taught in New Zealand, Canada, Germany, and France; and did business in Britain, Switzerland, and other European countries.

When he worked for the pro-NATO Atlantic Council in Washington, he was known as being too anti-Communist and was cautioned several times about this tendency. The Council later gave him an excellent recommendation when he applied for a job with the International Security Subcommittee, a sensitive section of the House International Relations Committee.

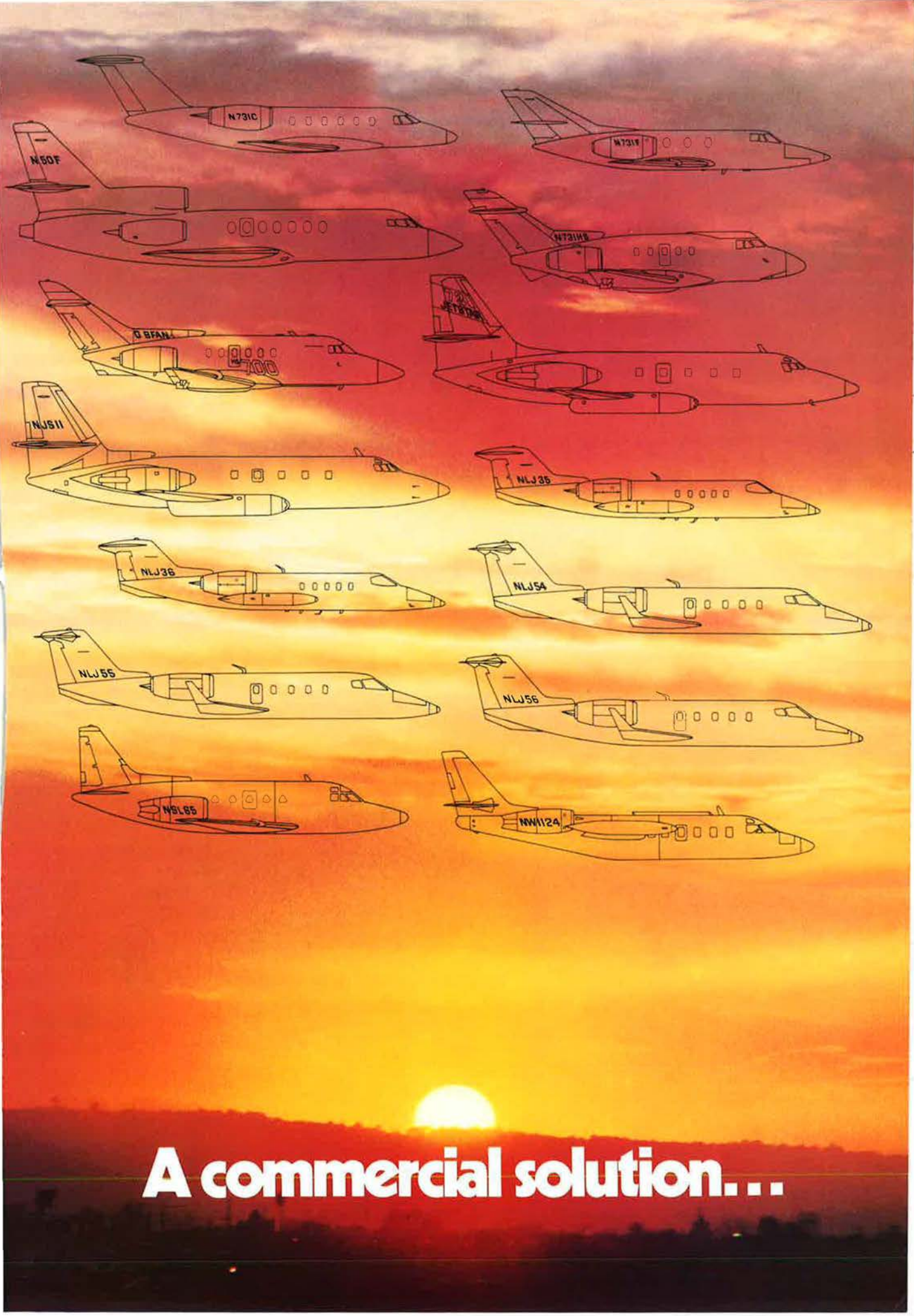
His career fell apart when Rep. Paul Findley (R-Ill.) asked the FBI to check on him. The FBI didn't have to check. It already knew that for years Sattler had been working for East Germany. Alerted by the Committee rejection, he immediately registered as an East German agent, signing and swearing to the registration statement on March 23, 1976. He told authorities he was recruited in 1967 by a man who said he represented the Warsaw Pact Association. Later he learned that the recruiter was linked to the Central Committee of the Socialist Unity Party, the East German Communist Party.

Over the years he was paid $15,000 and decorated by the East German Ministry for State Security. For more than eight years, Sattler said, he transmitted "information and documents which I received from the North Atlantic Treaty Organization and from individuals in institutions and government agencies in the Federal Republic of Germany, United States, Great Britain, Canada, and France."

He confessed he had been photographing information with a microdisc camera and mailing the film to West Germany, where it was forwarded to his "principals" in East Berlin. He also admitted carrying some film personally to East Berlin. On a visit to East Germany in November 1975, he was told to get a position in the US government that would give him access to classified information. That's what he was trying to do when his cover was blown.

The story ends with some mysterious loose ends. How did the FBI learn about him before he applied for the House job? Why wasn't he prosecuted? Where is he today?

This is only one example of the complicated cases US counterintelligence agents must deal with, at a time when the growing forces of the KGB are straining the resources of the US agencies responsible for keeping watch on foreign spies. ■



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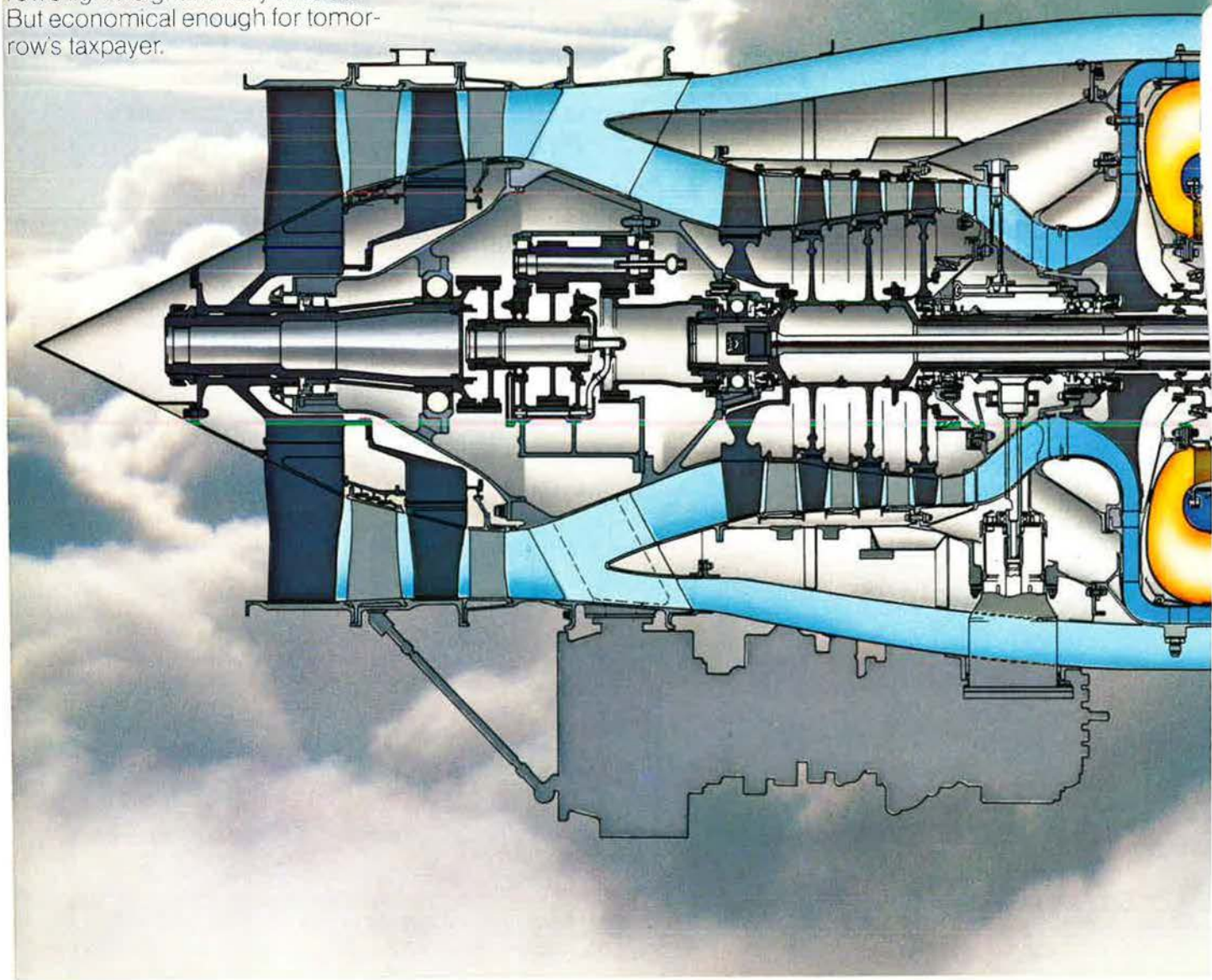
From Garrett comes the basic core of the commercial TFE731, an engine that's already demonstrated its excellence in *over a million hours of operation*—in 15 different civilian and military aircraft.

From Volvo Flygmotor, the afterburner technology gained from manufacturing the highly successful RM6 and RM8 powerplants for the Draken and Viggen fighters. These afterburning engines have also seen *more than a million hours of service.*

In its 4,260 lb. thrust "dry" version, the TFE1042's mixed flow cycle is optimized to provide high performance at low altitudes. With exceptional economy.

While an aircraft equipped with the TFE1042 6,790 lb. thrust afterburning engine will approach the awesome performance capabilities of today's first-line fighters. For considerably less.



the air, 30% less fuel nsumption. With low natures and high safety.

mpared with similar-sized ojets, the TFE1042's thrifty use uel means more than just lower costs.

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And, because the heart of this ine is a commercial turbofan e, designed to meet the most ngent environmental standards,

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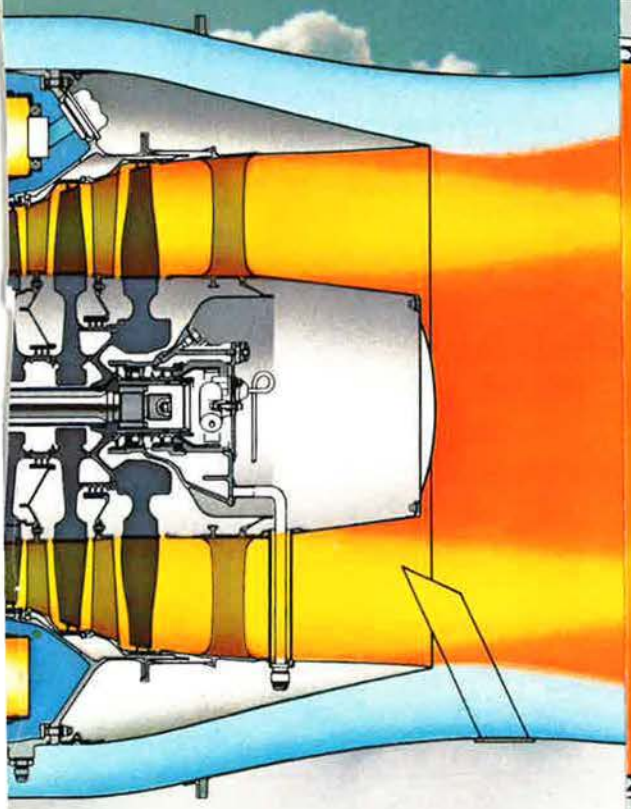
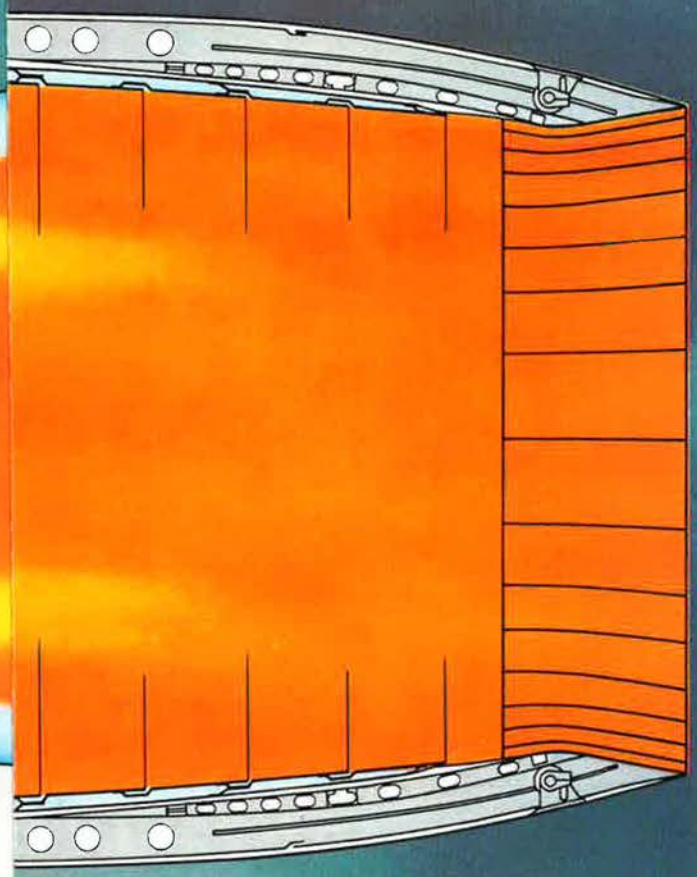
identical to that used on the commercial TFE731. The main engine fuel pump is increased in capacity and the afterburner pump is mounted on an existing drive pad.

The afterburner design is based on technology developed by Volvo Flygmotor for several Swedish military aircraft engines, including the highly successful RM6 and RM8 systems. It is a three zone afterburner with continuously variable thrust capability and the convergent exhaust nozzle modulated by fuel pressure driven actuators.





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Volvo Flygmotor captured worldwide attention by creating the RM8 turbofan that powers the Swedish Viggen fighter aircraft. A powerful, efficient engine, the RM8 is a military version of the JT8D that's found in many of the world's leading commercial airliners, like the Boeing 727/737 and the McDonnell-Douglas DC-9.

For more information about the commercial solution to a military problem offered by these two technological leaders, write or contact: Manager, TFE1042 Program Sales, The Garrett Corporation, P.O. Box 92248, Los Angeles, California 90009; or Marketing Manager, 1042 Program, Volvo Flygmotor AB, S-461 81 Trollhattan, Sweden.

GARRETT TFE1042 low bypass turbofan

The Garrett Corporation One of The Signal Companies and VOLVO FLYGMOTOR AB

The ALCM Decathlon

BY MAJ. CHARLES G. TUCKER, USAF, CONTRIBUTING EDITOR

This month will see the start of USAF's latest competitive flyoff. For the next seven months, two competitors will maneuver through a variety of tests and routes, and early next year, Defense Department hopes to name a winner.

THE air-launched cruise missile (ALCM), part of the modernization of US strategic nuclear forces, is entering a crucial phase in its development. A flyoff between two competing missile designs begins in June at Edwards AFB, Calif. The competition, scheduled to last twenty-seven weeks, will help determine whether the missile will go into production, and which of two aerospace companies will become prime source for more than 3,400 ALCMs under current defense planning.

By the time the flyoff is completed in November, more than $800 million in research, development, test, and evaluation funds will have been invested. More than $3 billion will be committed if a production contract is awarded. Should the Defense Department decide to deploy a force of Cruise Missile Carrier Aircraft (CMCA) in addition to the B-52, the production totals could double.

The history of cruise-missile research dates back to World War I and led to the German V-1 buzz bombs of World War II. From the postwar period to the late '50s, the

The Boeing AGM-86B missile (top) originated from the USAF SCAD program. The General Dynamics AGM-109 is a modified USN Tomahawk.

US pursued the notion of a pilotless, armed aircraft. Out of these efforts came the Air Force's Snark, Matador, Mace, and Hound Dog, and the Navy's Regulus and Talos. In the '60s, interest shifted from air-breathing engines powering cruise missiles to the development of rocket-powered ballistic missiles. The ballistic missiles' accuracy and survivability made them a more attractive weapon concept at the time.

The Air Force and Navy continued to look for ways to apply cruise-missile technology, however, developing the Supersonic Low-Altitude Missile (SLAM), Low-Altitude Penetrating Attack Missile (LAPAM), Subsonic Cruise Armed Decoy missile (SCAD), and the Harpoon missile.

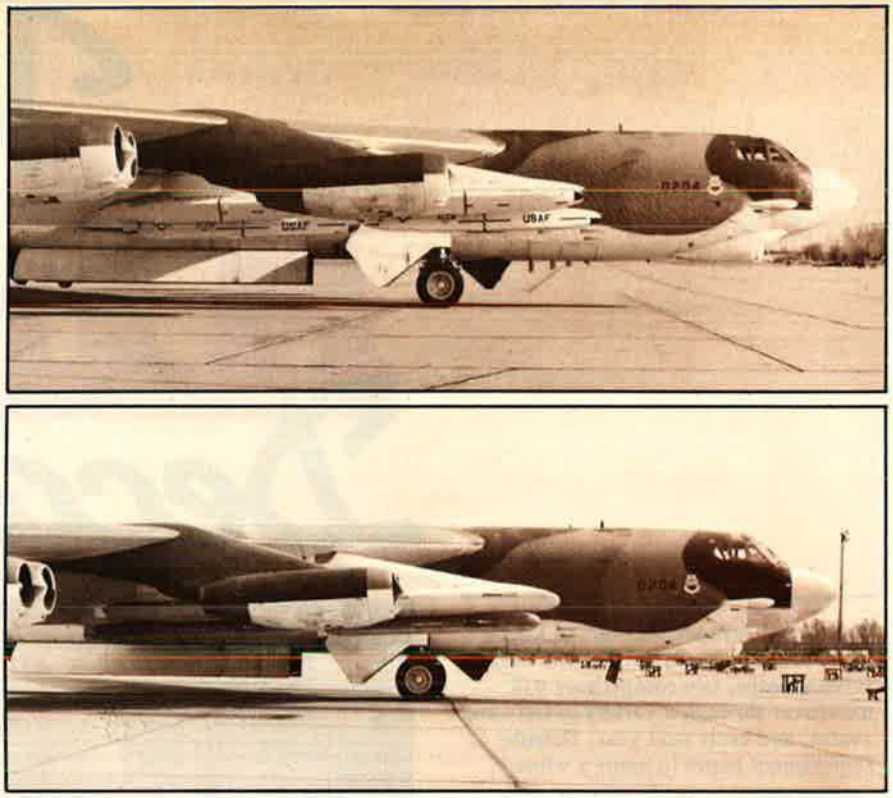
New Cruise Missile Interest

For a number of reasons, the '70s ushered in renewed interest and fiscal support for cruise-missile research. Monumental technological strides made it possible, for the first time, to think in terms of cruise missiles that were cheap, small, long-range, and accurate. Size was a considerable breakthrough. Through the use of highly efficient miniaturized components and engines, cruise missiles could be built considerably smaller than earlier versions that had been about the size of Air Force fighter aircraft.

William Clements, then Deputy Defense Secretary, and now governor of Texas, was a strong supporter of cruise-missile technology during his tenure in the Pentagon. Mr. Clements's view of the strategic cruise missile as "the best buy for the dollar" led to his directing USAF and the Navy to speed up research programs to exploit the technological breakthroughs applicable to such missiles. The Air Force resurrected its SCAD program, which had been canceled, and the Navy stepped up work on the Tomahawk missile. The missiles that ultimately came from these programs, the Boeing AGM-86B and the General Dynamics AGM-109, are the flyoff competitors.

Differences and Similarities

The two missiles use common warheads and nearly identical guidance and power systems. Because the General Dynamics AGM-109 is derived from a missile designed to fit a torpedo tube and the Boeing AGM-86B evolved from a missile designed for the rotary launcher of the B-52, their exterior appearance is strikingly different.



In addition to launches from the B-52 bomb bay, AGM-86s (top) and AGM-109s will be released from pylons on the B-52 wings.

The accompanying comparative analysis of the two ALCMs along with the Ground-Launched (GLCM) and Sea-Launched (SLCM) Cruise Missiles highlights component commonalities and unique features.

Although the General Dynamics AGM-109 cruise missile's first flight will be in the flyoff, the sea-launched Tomahawk from which it is derived has more than forty hours in the air. The Boeing AGM-86B also has not flown. It is a long-range successor to the AGM-86A which had six flights. Neither competitor's missile has been integrated with B-52 electronics or launched from a B-52. The Defense Department has chosen variants of the General Dynamics Tomahawk for its ground- and sea-launched cruise missile programs. The GLCM, assigned to the Air Force, went into full-scale development in Fiscal 1978. The SLCM is a Navy program.

The AGM-86A, the short-range predecessor to Boeing's competition missile, was successfully integrated with B-52 electronics and launched from the aircraft. Project officers say the Tomahawk's edge in flying time and the AGM-86A's launch experience appear to be offsetting so that the two missiles start even in the competition.

DoD has scheduled February 1980 for the Defense Systems Acquisition Review Council (DSARC III) to meet and decide on production.

A Joint Program

When Dr. William Perry, the DoD Under Secretary of Defense for Research and Engineering, announced on September 30, 1977, that a competitive flyoff would be held, the Joint Cruise Missiles Project Office (JCMPO), which had been established earlier that year, was reorganized to manage all aspects of cruise-missile programs. Once a decision to go into production is announced, it is planned that ALCM and GLCM program management will be returned to the Air Force, and the Navy will assume responsibility for the SLCM program.

The structure of the project office

largely followed recommendations made by the Navy, which was designated the executive service for the JCMPO. A Navy officer was named to head the office.

Some Air Force leaders felt the pro-Navy decision "made the USAF appear incapable of managing its own program." *(See* AIR FORCE *Magazine, December '77, "Navy Dominates Joint Cruise Missile Program Development.")* At its 1978 convention, the Air Force Association adopted a policy statement calling for the Air Force, as principal user of ALCM and GLCM, to "be entrusted with design, development, and acquisition of these weapons." Further, the statement said: "Program management by USAF appears essential also to carry out evolutionary improvements of these weapons in response to feedback from the using Air Force commands and to assure rapid adjustments to future advances in Soviet defenses against both the cruise missile and its carrier aircraft."

Director of the Joint Project Office is Rear Adm. Walter M. Locke, formerly chief executive in the Navy's Tomahawk SLCM program. Col. Alan C. Chase, USAF, is Director for the ALCM portion of the joint office. Colonel Chase has served as Deputy Director of the Advanced Medium STOL Transport (AMST) program and Executive Officer to the Air Force Deputy Chief of Staff for Research and Development. He is a 1958 graduate of the US Military Academy and holds a master's degree in aeronautical engineering from Oklahoma State University. The Colonel's rated experience includes six years in B-52s and 198 RF-4 missions in Southeast Asia.

The JCMPO is responsible to the Chief of Naval Materiel, Adm. Alfred J. Whittle, and the Commander of Air Force Systems Command, Gen. Alton D. Slay. The unit receives fiscal and program guidance from a Defense executive committee chaired by Dr. Perry and consisting of eight senior Defense, Air Force, and Navy officials.

The concept of the executive committee, or EXCOM, and the makeup of its membership serve two purposes. The EXCOM provides continual Defense guidance to the JCMPO, rather than at only the predetermined intervals set for weapon systems generally. The EXCOM also provides joint Air Force and Navy supervision that avoids the appearance of service favoritism.

Admiral Locke and his senior staff meet about once a month with the EXCOM to review the program's progress and activities and to identify potential problem areas or items of special concern. Frequently, Defense and service specialists, and commanders of potential cruise-missile-using commands participate in the EXCOM sessions. Dr. Perry exercises final approval authority for the EXCOM, but can elect to refer recommendations to the Secretary of Defense.

A majority of the 319 personnel assigned to the JCMPO (143 USAF and 176 USN) work at the program's headquarters near the Pentagon. The remainder, most of the ALCM and GLCM engineers and the Joint Engine Project, are at Wright-Patterson AFB, Ohio.

There is an equal distribution of Air Force and Navy billets throughout the JCMPO. In most cases, division chiefs and their deputies are from different services.

The ALCM and GLCM Project Divisions, concerned with Air Force missiles exclusively, are manned entirely by Air Force uniformed and civilian employees. The Joint Engine Project Office is predominately Air Force, because of adaptation of the Air Force-sponsored engine for the Tomahawk and both ALCM prototypes. Organizationally, ALCM and GLCM were the responsibility of the Air Force's Aeronautical Systems Division (ASD) before the JCMPO was established, and they will be integrated into ASD when DSARC III is reached, or at the direction of the Secretary of Defense.

Besides its Washington headquarters, the JCMPO maintains close contact with Air Force and Navy organizations having missions related to cruise missiles. For example, ASD is directing the avionics enhancement modification and integration programs to update three B-52Gs for the flyoff. ASD also would direct ALCM production. Brig. Gen. Melvin Chubb, Jr., ASD Deputy for Strategic Systems, heads the cruise missile integration project.

In a related project, General Chubb also is managing the cruise missile carrier aircraft program, which includes a $15 million study to decide if a wide-body ALCM launcher is feasible, and, if so, which one of several existing aircraft designs would best serve that purpose. The aircraft being examined in the CMCA program include Lockheed's C-5 and L-1011, McDonnell Douglas's YC-15 AMST prototype and DC-10, Boeing's YC-14 AMST prototype and 747, and a Rockwell International derivative of the B-1 bomber.

If the CMCA study results in a Defense decision to develop a CMCA to supplement the B-52, current planning calls for more than 100 CMCA aircraft to be purchased beginning in the mid-1980s. SALT II restrictions on numbers of weapons carried by each central strategic launch vehicle could determine the size and configuration of a CMCA fleet.

Flight Tests

The ALCM flyoff, a major 1979 program, is under the overall supervision and control of the JCMPO. The Air Force Flight Test Center at Edwards AFB has organized a Joint Test Force (JTF) to manage and conduct detailed test and support planning, data reduction and analysis, and test operations. The JTF includes representatives of the Air Force Test and Evaluation Center (AFTEC), Strategic Air Command (SAC), Air Force Logistics Command (AFLC), other defense and Air Force activities, as well as contractor representatives from the missile manufacturers, McDonnell Douglas (the navigation and guidance contractor), Boeing Wichita (builder of the B-52G missile carrier aircraft), and Williams Research Corp., the engine manufacturer. In all, about 400 USAF and defense representatives and 500 contractor employees will be on the scene during the flyoff. Although primarily an Air Force program out of a joint office, the flyoff also will have the support of Navy personnel at the USN Pacific Missile Test Center and the China Lake tracking station.

ALCM prototypes will be tested

in a variety of missions, including long-range flight with overwater launch, en-route terrain following navigation using terrain-keyed inputs for updating the on-board navigation/guidance systems, and terminal accuracy.

A large fleet of support aircraft will be required to assure control of the missiles during their flights, relay telemetry inputs, and provide aerial recovery of the missiles at the end of each mission. Most mission profiles call for the missile to end its flight by zooming up to about 15,000 feet, deploying a parachute, and being recovered in the air. A few missions are scheduled to terminate with ground impact, but there will be no ordnance detonation by any missile during the flyoff.

On a typical ALCM test flight launched at Edwards, the following aircraft would be used in support:

- A B-52G configured to launch the missile from a pylon or the rotary racks in the bomb bay (two B-52Gs are being modified for each competitor's launches). Another B-52 will measure aerodynamic performance of the aircraft itself when missiles are carried and released from pylons on its wings. All B-52Gs will be flown by Air Force Flight Test Center personnel and SAC crew members in a combined development and initial operation test and evaluation program.
- F-4 Phantoms will provide safety chase and missile command and control for all parts of the test except survivability testing. Eight F-4s are modified to provide command and control capability if a mission has to be terminated. The F-4s can take over control of the missiles to prevent accidental collision with a stray aircraft, or to divert the missile around severe weather. In lengthy flights, three chase aircraft will be airborne, one for primary chase and one for back-up, while a third plane is being refueled.
- EC-135 ARIA (Advanced Range Instrumentation Aircraft) will receive and record telemetry signals from the missiles while in flight, and retransmit this data to ground stations. The ARIA also will be able to override the missiles' controls in survivability tests.
- KC-135s will be used to refuel the chase aircraft.
- A T-38 will provide photographic coverage of launches and high-speed recoveries.
- HH-53 helicopters will recover the missiles at the end of each flight. Three HH-53s with Mid-Air Recovery Systems (MARS) will be assigned.
- A UH-1 will provide photo documentation of midair recovery, and airlift security teams to guard classified missile components.
- An E-3A AWACS will be used as an airborne command post to control the aircraft and missiles in the test area, to provide vectors for guiding fighters to the missiles during survivability tests, and to communicate with ground-based units during these tests.

Prior to free flight test missions, approximately twenty-five "captive-carry" missions will be conducted with each ALCM version. In these missions, the missiles are "flown" while attached to pylons

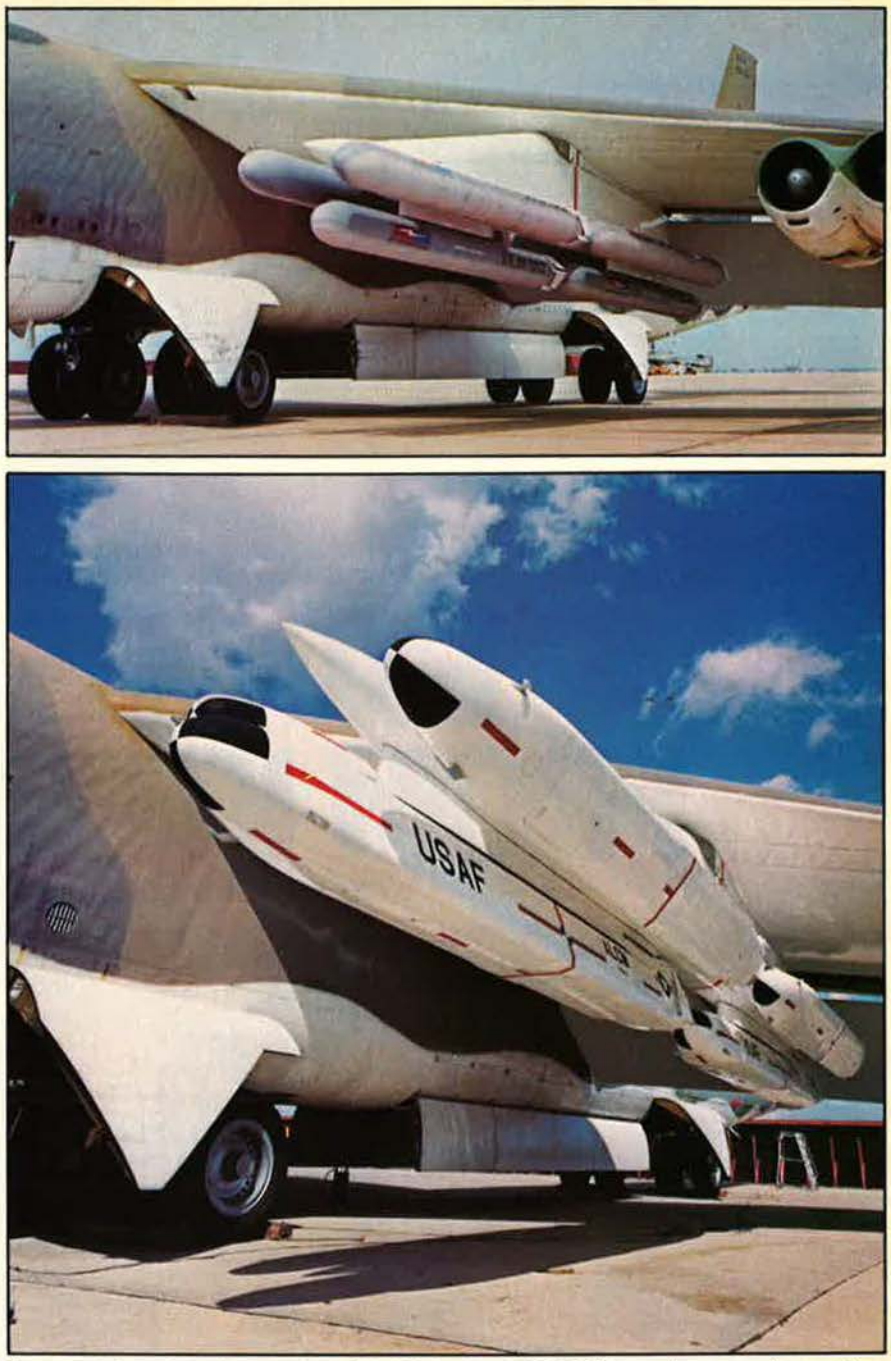
COMPARATIVE STATISTICS FOR CRUISE MISSILES

	AGM-109 Air-Launched Cruise Missile	AGM-86B Air-Launched Cruise Missile
Length	20 ft.	20 ft. 9 in.
Wing Span	8 ft. 7 in.	12 ft.
Range	Approx. 2,500 km. (1,350 nm)	Approx. 2,500 km. (1,350 nm)
Cruise Speed	Approx. 500 mph	Approx. 500 mph
Warhead	Nuclear	Nuclear
Prime Contractor	General Dynamics Corp.	Boeing Aerospace Co.
Cruise Engine	F107 turbofan engine in the 600-lb. thrust class. Williams Research Corp.	F107 turbofan engine in the 600-lb. thrust class. Williams Research Corp.
Guidance	Inertial navigation with terrain contour matching. McDonnell Douglas Astronautics	Inertial navigation with terrain contour matching. McDonnell Douglas Astronautics

	Navy Sea-Launched Cruise Missile	Ground-Launched Cruise Missile
Length	18 ft. 3 in. (20 ft. 3 in. with booster)	18 ft. 3 in. (20 ft. 3 in. with booster)
Wing Span	8 ft. 7 in.	8 ft. 7 in.
Range	Approx. 2,500 km. (1,350 nm) with nuclear warhead. Approx. 450 km. (243 nm) with conventional warhead	Approx. 2,500 km. (1,350 nm)
Cruise Speed	Approx. 500 mph	Approx. 500 mph
Warhead	Nuclear or conventional	Nuclear
Prime Contractor	General Dynamics Corp.	General Dynamics Corp.
Cruise Engine	F107 turbofan engine in the 600-lb. thrust class. Williams Research Corp.	F107 turbofan engine in the 600-lb. thrust class. Williams Research Corp.
Boost Motor	Solid-propellant motor in the 7,000-lb. thrust class. Atlantic Research Corp.	Solid-propellant motor in the 7,000-lb. thrust class. Atlantic Research Corp.
Guidance	Modified Harpoon for antiship; inertial navigation with terrain contour matching for land attack. McDonnell Douglas Corp.	Inertial navigation with terrain contour matching. McDonnell Douglas Corp.

under the wings of the B-52 launch aircraft, and guidance systems will be monitored by the B-52 and ARIA aircraft. Jettison and flight-performance missions are being conducted to test the separation of the missile from the launch aircraft under emergency and launch conditions, its deployment of control surfaces, its response to the first navigation commands, and the aerodynamic effects of launching an ALCM from under the wing of a B-52.

The Utah Test and Training Range (UTTR) in western Utah is the primary area for flight tests. But the flat terrain of the UTTR does not offer the varied geographical features required for all the tests. Some missions will be launched over the Pacific Ocean on a flight path that covers the USAF Space and Missile Test Evaluation Center, the Pacific Missile Test Center, the Tonopah Test Range, Edwards AFB, the Naval Weapons Center at China Lake, Calif., and the Nellis Range before terminating in the UTTR. Extensive ground tracking by the Air Force, Navy, and FAA will be required to keep the missiles within approved flight corridors. All aspects of the missile overflights, including environmental impact assessments, were coordinated with the Department of Interior before the flight routes were approved by FAA.



Shapes designed to simulate the AGM-109 (top) and AGM-86B have been used to test the flight characteristics of a new B-52 ALCM wing pylon.

Mission Planning

On at least one mission for each missile prototype, SAC crews and mission planners will lay out the cruise missile flight routes. This is a part of SAC's training to integrate the cruise missile into the Single Integrated Operational Plan (SIOP).

Each contractor has been given maximum latitude to prove the advantages of its entry in the competition. And, within the general performance requirements established by the Defense Department, each contractor has assembled its own test program. Not all missions will be identical for the two competitors. Both missiles will be tested to their full range during the flyoff. The first Boeing launch is from a pylon; the first General Dynamics launch will be from a rotary launcher. Nor are flights scheduled so that the competing missiles will fly identical missions or even at the same time of day. Program spokesmen say, however, that each missile will be judged against the same criteria.

Complementing the flight-test portion of the flyoff will be a series of extensive ground-based tests to determine each missile's radar cross section and its infrared (IR) spectrum. In addition, contractor organization manufacturing capability, cost estimates, logistics, and other factors are to be analyzed and compared. Test managers say that at the end of each contractor's flight and ground tests, both missile prototypes will have been tested equally.

The JCMPO, coordinating through a Source Selection Advisory Council, will make its recommendations to the Air Force Secretary following the test program. The Secretary has source-selection authority for the ALCM. A decision to go into full-scale production would be made at the Defense Department level. With a favorable decision, USAF could receive its first missiles by the early 1980s. ■

The Iranian revolution developed in stages until Americans no longer were able to work and had become a liability to helpful Iranian friends.

EXODUS FROM IRAN

BY BONNER DAY, SENIOR EDITOR

WHEN the Shah's rule began to crumble in Iran, Americans, including 700 in the US military forces, suddenly found themselves caught up in the middle of an armed revolution.

For the US government, the goal was to maintain friendship with Iran and its new rulers without abandoning the long-time Iranian friends who were associated with the old government. But for most Americans on the scene, the uppermost thought soon became survival. One American remarked: "Our utility to our government went to zero, and we became a liability to our Iranian friends."

The US Air Force reported no deaths during the hectic seven-month period between August 1978 and February 1979, when the Shah's rule finally toppled. In fact, no deaths were reported among any active-duty military personnel. The State Department reported three Americans killed during the revolution—two businessmen and a correspondent for the Los Angeles *Times*.

The revolution developed in

Americans leaving Iran by military aircraft. Military Airlift Command flew 121 missions during the most dangerous months.

stages. A religious holiday in August 1978 kicked off a series of demonstrations. Efforts of the Iranian government to control crowds in the streets sparked a number of battles. Then, on February 10, 1979, fighting erupted as Iranian Army troops attempted to break up an antigovernment demonstration of Air Force cadets at the air force base near Teheran. This battle, credited with forcing the resignation of the last government appointed by the Shah, is cited as the turning point of the revolution.

The Iranian revolution threatened, and still threatens, severe damage to US economic and strategic interests, but American officials in the riot-torn country found themselves reduced to helpless bystanders. Says one USAF officer: "As powerful as America is, our survival in those days depended upon the goodwill and friendship of the Iranian people."

The greatest threat to the American community came on February 14, when armed guerrillas attacked the US Embassy in Teheran. The building was ransacked, and Ambassador William H. Sullivan and 101 other Americans were taken prisoner. They were later released unharmed.

From August on, Americans risked their lives whenever they appeared in public. During this period, the reins of government were being wrested from the Shah by one of the nation's Moslem religious leaders, Ayatollah Ruhollah Khomeini.

There were 44,000 Americans in Iran when the troubles began. This included 700 servicemen, 250 Defense employees, and 8,000 Defense-related contractor personnel. More than half of the US military force, 450, were members of the US Air Force.

The violence—and the campaign to pressure Americans to leave—gradually increased after August. Revolutionists were writing on the walls of buildings housing Americans: "Yankee Go Home," "Death to the Foreigners," and "Death to American Imperialists." Autos of Americans were vandalized with painted slogans, or set on fire.

Anonymous phone calls became routine. One Air Force officer's wife picked up the phone and was told: "Today you die." Some Americans refused to answer a phone. Others answered in Farsi so strangers would not know they were Americans.

Violent Acts

Isolated incidents of violence, including the fatal shooting of a retired US Air Force officer, caused Americans to become increasingly cautious in public. Some made a practice of staying, as much as possible, on major streets where soldiers and police were patrolling. Visits to markets and other public places were held to a minimum. A few Americans continued to go to the markets for food, but many asked Iranian friends to do essential shopping for them.

The relationship between Americans and many of their Iranian employees began to change. Iranian drivers and guards hired by Americans became less friendly. Says one Air Force officer: "Suddenly I felt threatened by people we had always assumed were friends."

As gasoline became scarce, some gas station attendants would not sell to Americans. Taxi drivers began refusing American customers, or dropping them off blocks from their destinations.

Still, the incidents directed at Americans were few and isolated enough that many continued to feel safe even as the revolution grew more violent.

When the US Ambassador ordered US dependents out in January, many wives objected. Says Mrs. Hilbert H. Hayslett, Jr., the wife of an Air Force officer: "I didn't feel any danger. I never felt I was close to personal injury at all."

For her, the most harrowing experience was the flight in January by Air Force cargo plane to Athens. She described the noise of the C-141's engines and the lack of food during the long waits before and after the flight.

After February 10, the danger to Americans increased dramatically. As the street mobs took up arms, Americans found themselves in the middle of the fighting. "For several days, we could look out of our offices or homes and see Iranians shooting at each other," one officer remarked.

Receiving help in Athens. When the troubles began in August 1978, most of the 44,000 Americans began their exodus. After seven months, only 3,000 remained in Iran.

Many of the Americans remaining in Iran gathered at a few homes and offices for mutual support and protection.

One Air Force officer, returning to his apartment on February 12, ran into revolutionary forces storming the headquarters of the SAVAK, the Shah's internal security force. The shooting broke out shortly after he arrived at his apartment, which was located on the same block. He dropped to the floor when he heard bullets spattering against the apartment.

When revolutionists on the roof tried to break into his apartment, he crawled downstairs, locked himself in a bathroom, and sat in the bathtub for four hours to protect himself from stray bullets.

During this wait, a revolutionist knocked on the front door and asked if there were any Americans inside. When the fighting stopped and the revolutionists had left the roof of the apartment, the officer slipped out and never returned.

Another Air Force member, a sergeant, tells of guerrillas knocking at his door and asking for permission to climb to the roof of his apartment to shoot at government troops.

When one Air Force officer returned to his house, he found it being searched by several armed revolutionaries. He walked directly to his bedroom, packed a briefcase and a suitcase, and let himself out by a window.

Air Force Maj. Larry Davis was not so lucky. He was shot in the chest while opening the door to his home. The assailant shot at him at least three times, inflicting a scalp wound with a second bullet. Knocked to the ground, Davis pulled a gun and fired back, causing his attacker to flee. Davis, though wounded twice, walked across the street and asked a neighbor to drive him to the US Army Hospital in Teheran. Later he was evacuated to the US and is now recovering.

Armed Battles

When fighting broke out between Air Force cadets and Army troops at Doshen Tappeh Air Base, Americans working there were evacuated. A helicopter lifted eighty-three Americans in three trips, flying them to a US government office building away from the fighting. The Americans stayed there overnight, sleeping on the floors.

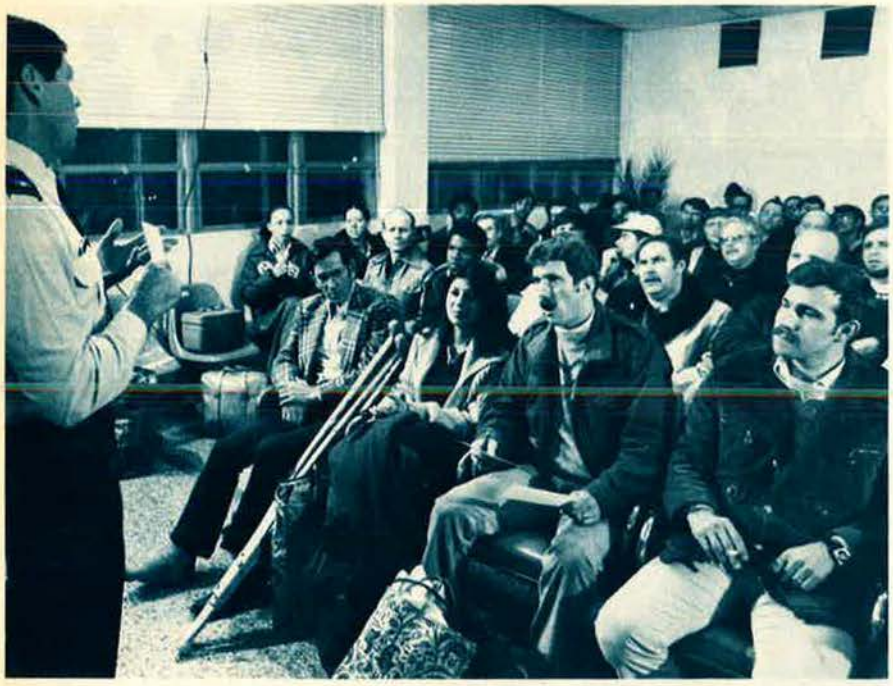
As the battle raged in mid-February, normal duties ground to a halt and US employees were told to concentrate on staying alive. US military men were instructed to wear civilian clothes and to stay off the streets. Those with duties considered nonessential were ordered to stay at home, and to keep in contact with their superiors by phone.

Air Force Col. William T. Crafton, returning home to get fresh clothes, was stopped and questioned by two armed men on motorcycles. After pretending he did not understand the Farsi the two were speaking, he was released. Some Americans were stopped and arrested as many as three times. When this happened, Americans would be driven to one of several revolutionary headquarters set up in Teheran and other major Iranian cities. Officers at the US Embassy, when they learned of arrests, would ask for the immediate release of Americans being held. They were eventually released.

One American, who lived between a police station and an Army post, found himself in the middle of a shooting battle when both places were attacked. He lay on the floor in his house for twenty-four hours to avoid being hit by stray bullets. Because his phone was out of order, his whereabouts were unknown to the US Embassy.

When the shooting died down, he started for the Embassy, but ran into a second shoot-out as revolutionary forces assaulted an office of the SAVAK. He was forced to go back home for another day. Meanwhile, Embassy officials were frantically trying to find him. Several days after being reported missing, he finally arrived unharmed at the Embassy.

The ambiguous position of the US government left Americans in Iran in a quandary. They could not take up arms for either side, or even in self-defense. Military personnel were cautioned not to carry weapons at all. And in the beginning, the US Administration was reluctant to order its citizens out of the country, for fear that would



Travelers are briefed in Athens. Americans, fearing for their lives, were forced to leave most of their personal belongings in the last month of the revolution.

upset the already unstable situation. Americans outside of Teheran felt even more helpless. They also were harassed by revolutionary forces, but could not expect assistance from the Embassy.

Americans "Evacuated"

The "draw-down" of Americans began last fall, when anyone finishing a normal tour was returned to the US without being replaced. The term "evacuation" was avoided. Two commercial flights a day were chartered, in addition to the two Pan Am regularly flew from Iran, to handle the additional passengers. The Pan Am flights, leaving from both Teheran and Isfahan, flew 28,400 passengers out of the country from August through February. In support of the American community in Iran, the Air Force Military Airlift Command flew thirty-four C-5 and eighty-seven C-141 missions and delivered 5,732 passengers to Athens and Frankfurt during the period of troubles.

From August to April this year, the number of Americans in Iran was cut from 44,000 to 3,000. The great majority of those remaining in Iran are married to Iranians or have dual American-Iranian citizenship. The current force of US government employees includes forty working for the State Department, one Defense Department civilian, twenty-three military men assigned to the military assistance group, and thirteen Marine guards.

A trip out of Iran during the confusion in February was hectic. The night before departing, Americans were assembled at the Embassy or the nearby Teheran Hilton. Early the next morning, passengers would line up at the hotel to submit to searches by armed Iranian guards and to be issued tickets by Embassy officials. Some were searched several times. One Air Force officer tells of waiting in line for three hours before finally being allowed to get on a bus.

The wait aboard the bus, while it and others in the convoy were being loaded, took another two hours. The convoy, ten or eleven buses escorted by trucks filled with armed Iranian soldiers, took about thirty minutes to drive to the airport.

At the airport, four more hours were spent searching passengers again. Passengers were taken off the bus in groups of six for the searches. Some were searched several times. In some cases, money, rings, and other valuables were confiscated. At 3:30 p.m., more than nine hours after the grueling process began, the plane finally took off.

On the day he left, one Air Force colonel had his passport checked five times and submitted to four body searches.

Because of the bitter fighting between various Iranian armed groups, US officials say it is remarkable that so few Americans were injured. US officials credit the warm feelings the Iranian public holds generally for America and its citizens.

One officer reported that he received twelve separate apologies from Iranians for any discomfort the revolution might have caused him.

"I'll never forget the last words I heard from an Iranian," says Air Force SMSgt. Charlie Rogers. "A guard told me, with no sign of sarcasm, 'Come back and see us.' " ■

An Air Force C-141 unloading at Athens. During a seven-month period, the Military Airlift Command airlifted 5,732 passengers.

The oil situation has tended to obscure both the degree to which this country is dependent on foreign sources of strategic non-energy minerals, and Soviet global strategy aimed at denying the West access to those vital raw materials.

THE GEOPOLITICS OF NON-ENERGY MINERALS

BY DAVID J. KROFT

As the United States enters its third century, there is much discussion of the adequacy of its mineral resources. US dependence on foreign oil is well known to most industry and defense planners. However, the extent to which this nation relies on imports of non-energy minerals is seldom realized. If the United States is to remain economically and militarily strong, it must plan for possible near-term shortages in non-energy minerals.

This article briefly considers the non-energy mineral resource base of the United States vis-à-vis that of other nations. Only those minerals of particular strategic importance to this nation, and more specifically to the Air Force, will be considered. Because it is likely that ore deposits will be discovered in areas presently thought to be unmineralized and that changes will occur in the political orientation or stability of nations, any international geopolitical analysis of non-energy minerals supply and demand must be continually reappraised.

Open pit copper mine in British Columbia.

Terminology of Mineral Economics

Two terms—"resource" and "reserve"—and the criteria used to define a strategic mineral are fundamental to a discussion of the strategic non-energy mineral position of the United States.

A mineral *resource* is any concentration of naturally occurring solid, liquid, or gaseous materials in or on the earth's crust in such form that economic extraction is currently or potentially feasible.

In contrast, a mineral *reserve* is that portion of the identified resource from which a usable mineral commodity can be economically and legally extracted at the time of estimation.

The economic classification of a particular mineral deposit can change over time. With advances in extractive and processing technology, rising metal prices reflecting increased demand, or changes in environmental priorities, a resource might become a reserve. Conversely, due to rising labor costs, enactment of regulations restricting the use of certain metals, or a decrease in demand for one metal, a reserve could revert to a resource.

Although mineral reserves are economically and legally exploitable at the time of determination, three to ten years can elapse between the discovery of an orebody and initial production. Consequently, a nation having large reserves of a particular mineral cannot immediately convert its mineral endowment to marketable metals or chemicals; hence the strategic significance of reserves is far greater than that of resources exclusive of reserves.

Any mineral neither found nor produced in the United States in sufficient quantities to sustain the nation during a period in which the security and/or economy of the country is threatened by a foreign power can be broadly classified as strategic. To determine the strategic importance of a mineral, five factors must be considered:

- The criticality of the particular application in which the mineral is used,
- The size of accessible US and world reserves-resources of the mineral,
- US government and industry stockpiles of the mineral,
- The geographic distribution of foreign sources of supply, and
- The availability of alternative or substitute materials.

World Reserves of Strategic Minerals

The reserve base of the United States, Central Economy Countries (which include those nations, such as the Communist countries, in which the government attempts to control all aspects of the economy through long-term comprehensive planning), and the world as a whole for thirty selected major minerals is shown in Table 1. It is evident that the US reserve base for most minerals is relatively small when considered as a percentage of world reserves. For only three of the minerals-metals listed (barite, copper, and molybdenum) does the United States

Table 1: RESERVES OF SELECTED STRATEGIC MINERALS—1979

(Data in thousand short tons unless otherwise noted)

COMMODITY	UNITS	UNITED STATES	UNITED STATES AS PERCENT OF WORLD	CENTRAL ECONOMY COUNTRIES	CENTRAL ECONOMY COUNTRIES AS PERCENT OF WORLD	WORLD	NATION (S) OR NATION BLOCK CONTAINING LARGEST RESERVES	RESERVES	RESERVES AS PERCENT OF WORLD
antimony	short tons metal	120,000	3%	2,505,000	53%	4,740,000	Central Economy Countries	2,505,000	53%
asbestos		4,400	5	30,900	32	95,900	Canada	40,800	43
barite		25,000	24	21,000	20	103,000	United States	25,000	24
bauxite		44,100	—	1,212,000	4	29,754,000	Guinea	9,036,400	30
cadmium	short tons metal	121,200	17	100,300	14	738,300	Canada	154,300	21
chromium		—	—	23,000	1	3,700,000	Republic of South Africa	2,500,000	68
cobalt	short tons metal	—	—	350,000	22	1,600,000	Zaire	500,000	31
columbium (niobium)	thousand pounds	—	—	NA	—	22,000,000	Brazil	18,000,000	82
copper		107,000	19	66,000	12	549,000	United States, Chile	107,000	19
industrial diamonds	million carats	—	—	25	4	680	Zaire	500	74
fluorspar		16,000	5	31,000	10	300,000	Republic of South Africa	78,000	26
gold	million troy ounces	110	9	260	22	1,200	Republic of South Africa	580	48
gypsum		350,000	18	NA	—	2,000,000	Canada	410,000	21
ilmenite		54,000	9	15,000	2	622,000	Canada	183,000	29
iron ore	million short tons recoverable iron	4,000	4	34,700	34	103,000	USSR	31,000	30
lead		28,700	21	29,800	21	138,900	Central Economy Countries	29,800	21
manganese		—	—	3,000,000	50	6,000,000	Central Economy Countries	3,000,000	50
mercury	76 pound flasks	350,000	8	1,500,000	35	4,300,000	Spain, Central Economy Countries	1,500,000	35
molybdenum	thousand pounds	7,500,000	44	2,000,000	12	17,100,000	United States	7,500,000	44
nickel	short tons metal	200,000	—	8,200,000	14	60,000,000	New Caledonia	15,000,000	25
phosphate		2,424,000	8	991,800	3	29,754,000	Morocco	19,836,000	67
platinum group metals	thousand troy ounces	1,000	—	200,000	25	790,000	Republic of South Africa	580,000	73
potash	K_2O equivalent	220,400	2	2,534,600	17	14,546,400	Canada	11,020,000	76
rutile		3,000	2	3,000	2	134,000	Brazil	100,000	75
silver	million troy ounces	1,510	25	2,000	33	6,100	Central Economy Countries	2,000	33
tantalum	thousand pounds	—	—	NA	—	134,000	Zaire	82,000	61
tin	tons	44,100	—	2,336,200	21	11,020,000	Indonesia	2,644,800	24
tungsten	thousand pounds	275,000	6	2,800,000	64	4,400,000	Central Economy Countries	2,800,000	64
vanadium	thousand pounds	230,000	1	16,000,000	74	21,600,000	USSR	16,000,000	74
zinc		24,200	15	18,700	11	165,300	Canada	30,900	19

Source: US Bureau of Mines, 1979

Table 2: UNITED STATES NET IMPORT RELIANCE IN 1978 AS A PERCENT OF APPARENT CONSUMPTION[1]

Commodity	Percent Reliance	Country or Countries Providing 25 Percent or More of United States Imports During Period 1974-1977
antimony	48%	Republic of South Africa, Mexico
asbestos	84	Canada
barite	40	Peru
bauxite-alumina	93	Jamaica, Australia
cadmium	66	———
chromium	92	Republic of South Africa
cobalt	97	Zaire
columbium (niobium)	100	Brazil
copper	19	Canada
corundum	100	Republic of South Africa
industrial diamonds	100	Republic of South Africa
fluorspar	82	Mexico
gold	54	Canada
gypsum	34	Canada
ilmenite	39	Canada, Australia
iron ore	29	Canada, Venezuela
lead	11	Canada
manganese	98	Brazil, Gabon
mercury	57	———
mica (sheet)	100	India
nickel	77	Canada
platinum group metals	91	Republic of South Africa, USSR
potash	61	Canada
silver	41	Canada
strontium	100	Mexico
tantalum	97	Thailand
tin	81	Malaysia
tungsten	50	———
vanadium	27	Republic of South Africa, Chile
zinc	62	Canada

[1]Net Import Reliance = Imports – Exports + Adjustments for Government and Industry Stock Changes.
Source: US Bureau of Mines, 1979

have the world's largest reserves. This is in contrast, for example, to the Republic of South Africa, which has the world's largest reserves of chromium, fluorspar, gold, and platinum group metals (platinum, palladium, iridium, osmium, rhodium, and ruthenium). While United States reserves of only eight of the listed minerals (barite, cadmium, copper, gypsum, lead, molybdenum, silver, and zinc) exceed ten percent of the world reserve base, Central Economy Countries as a group have ten percent or more of the world reserve base in twenty-one minerals.

Table 2 illustrates US reliance on imports of many minerals to satisfy its industrial-military requirements. The increasing dependence of the United States on imported minerals is due to a number of factors:

- Although the United States mineral resource base is extensive, many orebodies have been, or are being, depleted. Most near-surface, easily exploited high-grade deposits already have been discovered, and many have been mined. Consequently, as deeper, often lower-grade deposits are sought, exploration by mining companies is becoming increasingly difficult and costly.
- It is possible that United States reserves-resources of certain minerals are small because of inadequate exploration, but more likely that some elements were never concentrated within this nation's borders by geologic processes.
- While large resources of various minerals have been identified in the United States, developing a number of them will be restricted because of environmental, technological, or economic reasons. For example, more than

sixty percent of the public domain has been withdrawn from the provisions of the Mining Law of 1872 and the 1920 Mineral Leasing Act. Despite the fact that mineralization might be known or suspected on withdrawn lands, mining companies cannot explore in these prohibited areas.

- Should economically exploitable mineral deposits be found on lands still open to exploration, developing these orebodies could be postponed or precluded by government restrictions. From a purely economic standpoint, it may be less expensive over the long run for a company to obtain its mineral supplies from abroad, rather than to accept the numerous delays inherent in the licensing-permit process and the added costs of meeting newly enacted environmental standards.

Minerals-Metals Used in Aircraft Construction

Any advanced aircraft contains a wide variety of metals derived from minerals. The airframes of most advanced aircraft are constructed primarily of steels and alloys of aluminum and titanium. The airframe of the F-15 Eagle, for example, consists of fifty percent aluminum alloys; thirty-four percent titanium alloys; eight percent steels; six percent gold, copper, rubber, nylon, etc.; and two percent composite materials.

Although information on the metallurgical composition of engines is both varied and difficult to obtain, the primary constituents of most are also steels and aluminum and titanium alloys. The F101-GE-100 turbofan engine used on the B-1 bomber is constructed of sixty-eight percent steels, twenty-five percent titanium alloys, five percent miscellaneous metals and nonmetallics, and two percent aluminum alloys.

The basic metals used in aircraft are aluminum, titanium, and iron. To produce alloys of these and other metals used in military and commercial aircraft, many additive elements are required. For example, most alloys used in aircraft structural components contain varying amounts of chromium, copper, iron, manganese, titanium, and zinc. Because of the ever-increasing temperatures and centrifugal stresses in turbine engines with increasingly higher thrust-to-weight ratios, new alloys must be developed that can maintain their strength at more than 1,750°F (944.9°C). Toward this end, nickel-based superalloys containing metals such as chromium, hafnium, indium, columbium (niobium), rhenium, tantalum, tungsten, yttrium, and zirconium are being produced.

Aside from their use in alloys, aluminum, chromium, cobalt, nickel, and yttrium are used in coatings that, when applied to engine components, protect against corrosion, oxidation, and sulfidation.

While only trace amounts of most of these elements are used in alloys, total annual consumption by an airframe or engine manufacturer can be significant. For example, General Electric's Aircraft Engine Group recently forecast its 1979 cobalt requirements to be 450,000 pounds, or nearly 2.4 percent of the apparent total US demand for this metal in 1978—ninety-seven percent of which was imported, primarily from Zaire.

Future Trends in Aerospace Materials

A large percentage of this nation's requirements for bauxite (the primary ore used in making aluminum), chromium, cobalt, columbium (niobium), manganese, nickel, rutile (one of the primary ores used in making titanium metal), and vanadium must be imported. Few technically or economically acceptable substitutes exist for most of the minerals used in alloys needed by the aerospace industry. Consequently, advances in materials engineering and aircraft engine design must be investigated to reduce United States demand for these strategic metals.

To reduce the structural weight of aircraft, composite materials (a polymeric or metal matrix or binder reinforced with organic or inorganic fibers or filaments such as boron, graphite, or Kevlar 49) are being used increasingly in secondary structures. Overall structural and individual component weight thus can be decreased by as much as fifteen and thirty percent respectively. In the F-15 Eagle, substituting boron filament reinforced epoxy for titanium on the horizontal and vertical stabilizer saves twenty-two percent in weight.

Research is under way to develop lighter and higher-temperature-resistant aluminum alloys amenable to powder metallurgy alloying and manufacturing techniques. Many of the alloys under consideration contain combinations of aluminum, magnesium, and lithium, with minimal reliance on imports of the latter two.

As a substitute for titanium in some lower-temperature applications, a high-toughness steel has been developed which contains 72.8 percent iron, fourteen percent cobalt, ten percent nickel, two percent chromium, one percent molybdenum, and 0.16 percent carbon. Aside from its potential use in aircraft components, the steel is believed to be suitable for armor plate.

To reduce consumption of strategic metals used in engine components, research is proceeding on the reliability of ceramic turbine blades. Initial tests indicate that ceramic engine components can be used successfully in certain applications.

Geopolitical Aspects of Mineral Supply

Of major concern to the United States is the political orientation and/or geographic location of many of the countries that provide this nation and its allies with strategic minerals.

The United States gets its non-energy mineral imports principally from four geographic areas: southern Africa, the West and Southwest Pacific, Latin America, and North America. With the possible exception of Canada, Australia, and New Zealand, all of the countries in southern Africa and Latin America either are, or have the potential of being, politically unstable. Neither the United States nor its allies can be assured of the long-term availability of minerals from these nations—particularly in light of Soviet global strategy.

Soviet Global Strategy

Within the last decade, Soviet global strategy has become increasingly oriented toward attempting to restrict the access of Western nations to vital raw materials. The Soviet Union has attempted to support Marxist liberation movements, especially those advocating the overthrow of pro-Western governments of mineral-rich nations.

There are essentially three reasons why the Soviet Union is pursuing this particular goal:

- By restricting or denying the West access to mineral resources, the Soviet Union hopes to bring about an eco-

Dr. David J. Kroft is a minerals economist with the San Francisco office of Dames & Moore, specializing in mineral commodity analysis and the geopolitical aspects of mineral supply and demand. His undergraduate work was in political science and geology and he holds a Ph.D. in mineral economics from Stanford University. Dr. Kroft has been selected for promotion to captain in the Air Force Reserve.

nomic crisis in Western nations that ultimately will lead to the collapse of the capitalistic system.

- Many minerals economists believe that the Soviet Union has not developed enough mineral production capacity to support its own industrial and defense needs. Consequently, the Soviet Union seeks to secure for itself "captive" sources of minerals that otherwise would have been used to satisfy Western mineral demand.
- The Soviet Union needs hard currency to buy Western technology and goods. One way the USSR can obtain this revenue and, at the same time, satisfy its strategic objectives is to resell to the West minerals obtained at low cost from countries either unfriendly toward, or boycotted by, Western nations. A classic example is the purported Soviet purchase of chromite from Rhodesia (which contains the world's largest reserves of high-chromium ore) for resale at a significantly higher price to the West.

Stockpiling Activities

In response to the realization that continued immediate availability of numerous imported strategic minerals-metals is uncertain, many companies and nations have begun to stockpile critical raw materials. The goal of the United States government is to maintain a strategic stockpile sufficient to satisfy anticipated shortages in supply for the first three years of a war. However, the United States government has failed to acquire a three-year supply of the following minerals, many of which are used in the construction of airframe and engine components: chromite, cobalt, copper, fluorspar, lead, manganese, nickel, platinum, titanium sponge, vanadium, and zinc. On the other hand, the domestic stockpile contains more than a three-year supply of mercury, quartz crystals, sapphires and rubies, silver, talc, and tin.

Despite the fact that European countries import most of their strategic minerals, only France and to a lesser extent Sweden have established firm stockpiling policies. However, within the past few years, most European nations have begun to reexamine their stockpile objectives, or lack of them, in view of recently declining investment in the Third World and the uncertainty of future political stability in southern African nations.

Neither the makeup nor the quantity of minerals stockpiled by France is known precisely. The French government has stated that it is particularly interested in purchasing cobalt and zirconium. According to industry experts, more than half of France's non-energy minerals are imported, a large percentage from the Republic of South Africa. Similarly, in 1977, the West Germans imported forty-eight raw materials from nations in southern Africa, including asbestos, chrome, cobalt, manganese, and platinum—all minerals in which the United States is also deficient. Although Great Britain has a minimal raw materials stockpile, that nation gets approximately fifty percent of its chromium and platinum, thirty-five percent of its manganese, and fifteen percent of its vanadium imports from the Republic of South Africa. Japan, which relies heavily on imports for virtually all of its mineral requirements, does not maintain a strategic stockpile of critical minerals.

Geopolitical Constraints to US Mineral Imports

The four geographic areas from which the United States imports most of its non-energy minerals vary in political stability and vulnerability to Soviet influence. Their strategic importance to the United States and their potential impact on US policy are summarized below.

- *Southern Africa*: From a non-energy mineral resource standpoint, southern Africa is one of the richest areas in the world and, therefore, among the most strategically significant to the United States and its allies. In 1978, more than half of the world's gold, industrial and gem diamonds, and cobalt and nearly one-third of the world's antimony, chromite, vanadium, vermiculite, and platinum group metals were produced by southern African nations. During the period 1974–77, the United States relied on these nations for more than twenty-five percent of its imports of antimony ores, concentrates, and oxides, chromium, cobalt, corundum, industrial diamonds, ferromanganese, platinum group metals, and vanadium.

Table 3 shows the mineral reserves of the Republic of South Africa as a percentage of African, Western, and world reserves. More than forty percent of the Western world's reserves of chromite, fluorspar, gold, manganese, platinum group metals, titanium, and vanadium is located in that country. Of these seven minerals, five (chromite, manganese, platinum group metals, titanium, and vanadium) are considered strategic.

The intention of the Soviet Union with regard to this region is clear: to obtain a major foothold in any of the nations of southern Africa. Because of the inherent economic and political instability of most southern African nations, and given the relative power vacuum in the region, it may be comparatively easy for the Soviet Union to achieve this goal.

Although the United States has traditionally maintained a low military profile in Africa, it may become necessary for this nation to expand its military presence

Table 3: MINERAL RESERVES OF THE REPUBLIC OF SOUTH AFRICA

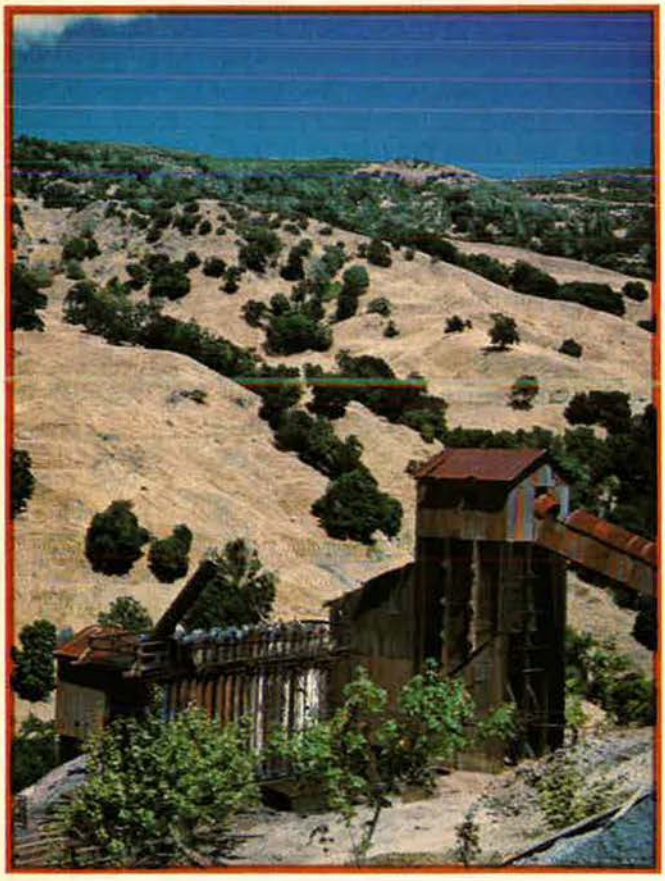
Commodity	Percent of African Reserves	Percent of Western World Reserves	Percent of World Reserves
antimony	99%	10%	4%
asbestos	77	14	10
chromite	85	84	83
copper	10	2	2
industrial diamonds	8	8	7
fluorspar	98	50	46
gold	94	61	49
iron ore	66	6	4
lead	54	5	4
nickel	86	12	10
manganese	94	84	48
phosphate rock	10	8	8
platinum group metals	99	99	86
tin	10	2	1
titanium	93	40	5
vanadium	99	96	64
zinc	63	9	9

Source: van Rensburg and Pretorius, 1977

in southern Africa. Should the Soviet Union not succeed in "socializing" mineral-rich African nations, other more overt tactics could be employed to restrict the flow of mineral exports from this region to the United States and its allies. Many ore carriers and tankers are too large to use the Suez Canal and must circumnavigate much of the African continent. Elements of the Soviet Navy in African waters could prevent shipments of minerals from reaching their destinations. Although this is probably unlikely, such a condition would necessitate an increase in Western naval and air force presence in and adjacent to the Indian and southern African oceans.

• *West and Southwest Pacific:* The reliance of the United States and its allies on Australian mineral exports is significant. Approximately sixty-seven percent of the alumina and forty-three percent of the ilmenite (an ore used primarily in producing titanium dioxide pigment) imported by the United States is from Australia. More than seventy and forty-five percent respectively of United States imports of tin and tantalum come from South Asian nations, principally Malaysia and Thailand.

It appears that the major Soviet objective in the Pacific is to continue to expand its influence vis-à-vis the United States. However, the economic and political stability as well as the pro-Western orientation of Australia and New Zealand serve to mitigate Soviet efforts. Nevertheless, the Soviet Union is gradually increasing its naval forces and air reconnaissance capability in the region in an attempt to challenge traditional United States control of the South Pacific. As in the case of southern Africa, an obvious Soviet goal would be to cut vital sea and air lines of communication that link the United States and its allies with the mineral supplies of western Pacific nations.



Abandoned mercury mine in California. The US imports more than half its mercury and now has a three-year supply on hand.

• *Latin America:* More than eighty percent of the bauxite, seventy-three percent of the columbium (niobium), and twenty-five percent of the iron ore and vanadium imported by the United States is from Latin American nations. The United States also is dependent on Mexico for ninety percent of its strontium and fifty-five percent of its fluorspar requirements.

With few exceptions, Latin American nations are economically and politically unstable. Consequently, they have long been targets for Soviet interference. In Latin America, the objectives of the Soviet Union are essentially threefold: to spread communism throughout the area, to establish military or other power bases hostile to the United States, and to restrict US access to vital raw materials exported from this area.

• *North America:* The United States obtains more than twenty-five percent of its asbestos, copper, gold, gypsum, ilmenite, iron ore, lead, nickel, potash, silver, and zinc imports from Canada. It is probable that the US can rely on Canadian sources of minerals over the foreseeable future.

Summary and Conclusions

The United States, for a number of geological, political, technological, and economic reasons, must continue to rely, at least over the near-term, on mineral imports. However, as is the case of any other internationally traded commodity, there is no guarantee that the United States can continue to depend on existing or potential foreign sources. Because of the changing political, social, and economic aspirations of nations, foreign mineral reserves now available to the United States may in the future be restricted either for use solely by the nation in which the mineral reserves are found, or by that nation's allies.

Given the uncertainty of future mineral imports from various countries, the United States government should do everything in its power to encourage this nation's mining industry to explore for and develop in an environmentally acceptable manner additional domestic mineral reserves. It is also imperative that the US government promote research directed toward developing new materials, such as composites, that can be substituted for some of the minerals-metals in which this nation is deficient.

It could be argued that the United States should conserve its lower-grade, or as yet undiscovered, mineral deposits until a time when imports may be unavailable. However, given the many years often required to discover and evaluate areas of mineralization and the three- to ten-year lead time necessary to bring an orebody into production, any unanticipated disruption in mineral imports to the United States or its allies could have a serious adverse impact on the economy of the Western world. Although the strategic mineral stockpile of the United States is large, it might become necessary to share a part of it with our allies, if their access to foreign sources should be restricted.

Unless effective measures are taken by the United States, not only to increase its strategic mineral self-sufficiency but also to develop new substitute materials, the security of this nation as well as its ability to maintain global peace could be seriously compromised. ■

Increases in the cost of living are making on-base housing more attractive to Air Force members. But, unless funds are restored to maintain or replace these quarters, service officials say they will have trouble . . .

Housing the Air Force Family

BY ED GATES
CONTRIBUTING EDITOR

MUCH of USAF's multibillion dollar housing inventory—more than 140,000 sets of family quarters, 280,000 bachelor airmen and officer spaces, and 4,500 leased houses and apartments—is in reasonably good shape, according to authorities at Air Force Headquarters.

But for how long? Funds to improve thousands of family homes have suddenly been shut off, at least temporarily. The construction of new family quarters has been phased out, and there are no replacement plans on the drawing board. Money for modernizing bachelor quarters continues to flow in, but at a slower pace than needed to get the job done in the next few years.

Air Force family quarters vary in age from two to eighty years, and many of them lack the conveniences and features found in modern civilian housing. Still, a great many units are truly first-class and, were they on the civilian market, might well sell for $60,000, $70,000, and up. Even figuring in the older, unimproved housing units, such as the 13,000 still-to-be-updated Wherry units, which weren't much to begin with when they surfaced thirty to thirty-five years ago, the average USAF family home today could easily be worth $40,000 to $45,000. That adds up to around $6 billion, not counting bachelor quarters.

To maintain and preserve this valuable real estate, the Air Force launched a family housing upgrading project in 1973. Financed by annual appropriations, Air Force so far has pumped about $120 million into the effort. Some 21,000 on-base homes have received a face-lift in the form of extra baths and bedrooms, more storage space, kitchen and bathroom modernization, installation of dishwashers and air-conditioning, and construction of patios and recreational areas.

USAF's game plan calls for similarly improving another 44,000 sets of family quarters in the next few years (along with refurbishing unsatisfactory bachelor quarters, as reported below). But this program is in deep trouble; the Defense Department has deleted all funds for family housing improvements from the FY '80 budget. USAF had requested $52 million, a level of spending that, if maintained for five years, would come close to completing the entire quarters refurbishing effort.

Cutting off the FY '80 funds, which shocked officials concerned with improving living conditions in the services, leaves authorities in a quandary about how to proceed. Can they plan for a restoration of funds in FY '81? What happens at bases where portions of housing projects are currently being upgraded? Occupants of the unimproved units are likely to be extremely distressed over yet another year's delay in modernizing their dwellings.

Joe F. Meis, the Principal Deputy Assistant Secretary of the Air Force (Manpower, Reserve Forces and Installations), is among the USAF officials unhappy with the funds wipeout. He called the action a "major disappointment" and declared he would press for a restoration of house upgrading money in the FY '80 budget.

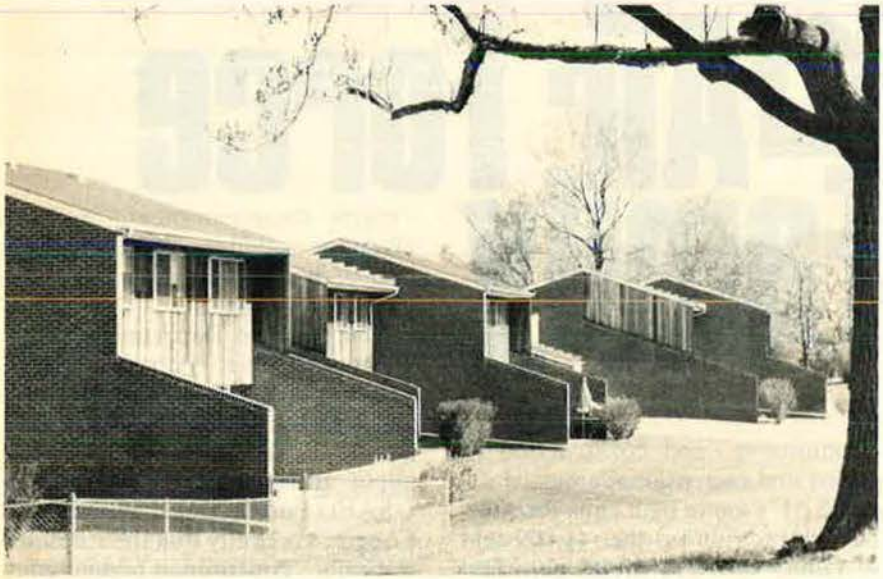
The Defense Department's family housing chief, Perry J. Fliakes, defended the deletion of funds by claiming the family housing deficit among all the services has shrunk to about 10,000 units (about half in USAF). Furthermore, Fliakes told Congress recently that the Administration's "constrained budget guidance . . . applies also to the family housing programs."

Despite the setback, appropriations for routine housing maintenance, such as electrical and plumbing repairs, are holding up well. For the present year alone, according to Col. C. H. Fried, Air Force Chief of Housing and Services, USAF is getting nearly $442 million for housing maintenance and operations, an increase of $60 million over 1978. People in most government quarters receive "good service" when they call for maintenance, Colonel Fried said.

He and his associates also issued favorable reports on the U-Fixit shops found at most bases, where housing occupants can draw light bulbs, paint, and other materials for making minor improvements.

Housing the Junior Graders

To USAF's on-base quarters inventory must be added the 1,000 Stateside civilian homes the service leases for recruiters, AFROTC staffers, and certain other personnel on duty away from bases. In Europe, 3,000 families live in leased apartments in Germany, Spain, and



New quarters construction in the Air Force has been phased out in the past few years, the Defense Department holding that existing quarters plus "community support" just about satisfy the housing requirement. These officer quarters at Bolling AFB, D. C., were built in the early 1970s.

England. Currently under construction are an additional 1,000 leased units at RAF Lakenheath in England and Hahn, Spangdahlem, and Kalkar Air Bases in Germany. All these and more are urgently needed because on-base housing abroad remains extremely tight, while off base most accommodations are inadequate and expensive.

Mr. Meis deplored the unsatisfactory places many Air Force families must endure in Turkey and other European sites. Limited availability, lofty rents, and the dollar devaluation have added up to "a disaster for younger USAF people abroad," Mr. Meis declared.

Although the service's family housing inventory sounds enormous, it accommodates only about one-third of its house-hunters. Many of the other two-thirds would jump at the chance for base quarters, even if they weren't first-rate. That's because of the economics of residing in government quarters, to say nothing of their convenience.

Instead of forking over perhaps $300 to $400 a month for rent, plus another $100 or so for utilities, base housing denizens surrender only their basic allowance for quarters (BAQ), a sum ranging from $150 a month for junior enlisteds to $392 for full colonels.

Officially, USAF puts its family quarters "deficit" at 5,186 units, far below the 75,000- to 100,000-unit shortage of ten to twelve years ago. Strangely, the official deficit figure does not include junior enlisted families, the group that needs housing assistance the most. The reason, authorities say, is that the junior enlisteds are not legally eligible for on-base quarters.

The lower graders, like young newlyweds in civilian life, do manage somehow, and Air Force is helping. Under a recent policy change, for instance, junior EM families can compete for the service's 7,500 so-called "inadequate" quarters, where lower rents are charged. A typical E-4 family occupying an officially designated inadequate unit pays only about $129 per month for rent and utilities and saves $43 in the process since an E-4's BAQ is $172. It's a decidedly better deal than living in town.

Air Force officials for years have talked about tearing down all the inadequate quarters, on the grounds that all members deserve something better. But the realities of today's astronomical building costs and rental charges vs. the modest means of newcomers to military service have resulted in their continued life.

In a few instances, where standard family quarters can't be filled with officially eligible families, junior enlisteds have been allowed to move in. But this is not likely to occur at most bases, because the eligibles' demands for on-base quarters stand to remain high.

Air Force's long-range goal, nevertheless, is to "extend full housing entitlements to all junior enlisted families." The service, unfortunately, cannot do much about it now because, officials say, USAF still has an overall quarters deficit. Any extension "would seriously reduce the value of the housing entitlement to the career force," and Congress has rejected any new house-building for junior enlisteds. That "long-term" goal could turn into an eternity.

Since some 280,000 Air Force families must live off base, the service has set up Housing Referral Offices (HROs) at each site. Manned by civilians, they compile rental and sales leads, steer house-hunters to dwellings most nearly meeting their needs and means, and probe discrimination and landlord-tenant complaints.

Housing discrimination gripes are on the decline, Colonel Fried reports. Confirmed complaints fell to twenty-eight (out of ninety-nine such allegations) last year, com-

pared to sixty-two in 1977. A confirmed complaint automatically places a guilty landlord on the Defense Department's blacklist; he cannot rent to service people for at least six months.

It is not known how many USAF families buy rather than rent, though the HROs provide some clues. In 1978, for example, of the throngs of USAF couples who asked HROs for off-base housing aid, 96,000 wound up renting and 10,000 bought.

The Demise of RHIP

The services for years doled out quarters to senior members first, an arrangement not appreciated by the less senior. The rationale, to which USAF fully subscribed, held that long-service and long in-grade NCOs and officers deserved priority quarters assignment because they had toiled with dedication for many years. A sort of "just reward." Under this RHIP (Rank Has Its Privileges) system, senior people reporting to a base promptly bumped subordinates on house waiting lists.

Protests over such tactics and orders from the Defense Department led to a major change; Air Force established separate categories of house waiting lists (E-4 through E-6, E-7 through E-9, O-1 through O-3, and O-4 through O-5). Competition within each group shifted from date-of-rank to a date-of-application basis. Bumping disappeared. Newcomers to a base, regardless of their seniority, go to the bottom of their respective lists. Furthermore, family quarters at each base are now distributed on a pro-rata share based on the number of eligible members within each housing category; thus, individuals compete only with those in their own categories.

There were some early squawks, but, according to Colonel Fried, they have long since subsided. "It's a much fairer arrangement," he said. The change doesn't cover colonels and generals who, as the service's top executives, still rate prompt assignment to the best quarters.

Outlook for Bachelor Quarters

Energy conservation also shows up prominently in USAF's house maintenance and betterment programs. The service has already spent some $30 million in recent years for weatherstripping, storm windows, furnace improvements, insulation, and related measures for two-thirds of its family quarters. The program improves homes and saves considerable maintenance money in the process. Officials also feel that energy conservation weakens the case for installing utility meters in family quarters and charging occupants for any excessive use of gas and electricity. Air Force opposes the metering scheme, holding that it would be viewed as an attack on a traditional fringe benefit—free utilities *(see box)*.

What about bachelor housing? Or, as it's now officially termed, "unaccompanied personnel housing"? The same FY '80 budget cited earlier contains more than $60 million specifically for upgrading old dormitory spaces and building new, modern ones. All things considered, this is a fairly healthy infusion of construction dollars and comes on the heels of similar upgrading activity the past few years.

In 1977, the Air Force identified more than 88,000 airmen living spaces to be upgraded in five years. This means larger rooms, more privacy, wall-to-wall carpeting, private or semiprivate bathrooms, attractive furniture, etc. The estimated price tag: three-quarters of a billion dollars.

THE SEXIST CONNOTATION

The term "Bachelor Housing," long a fixture in the military lexicon and understood by one and all, has become a no-no. The replacement, the Defense Department has decided, is "Unaccompanied Personnel Housing." Why? "Because it eliminates the sexist connotation," an informed source said. USAF's bachelor housing inventory numbers 280,000 units, including about 9,000 single officer quarters. No more of the latter are planned except for a few transient units.

METER TESTING AT LITTLE ROCK

Two years ago, Congress was on the verge of ordering the services to install utility meters in all family housing and charge occupants for excess usage of electricity and gas. But when the Air Force protested, the lawmakers ordered a test of the scheme. One of the test sites is Little Rock AFB, Ark., where 1,535 homes are metered. Recent data indicate that about half of the participants there are using less than the established "normal" amount of energy. For those with excess usage, the average monthly "bill" is $13.76, according to USAF housing officials. That's hardly worth the expense and trouble of going 100 percent meters Defense-wide, Air Force officials believe, noting that their service alone has 140,000 family quarters. They also view metering and billing as an attack on an established fringe benefit—free utilities. Air Force plans to monitor the test project closely and send "appropriate recommendations" to DoD and Congress early next year.

The fiscal realities—rising construction and labor costs, inflation, and higher-priority military projects—intervened; that timetable has been stretched. Authorities now hope to complete the huge project by 1985 or 1986. But that, too, could slip, the funding crunch being what it is.

For the 1978–79 fiscal years, USAF has about $70 million lined up to upgrade 11,356 dorm spaces. The FY '80 budget request of $62 million covers 8,495 airmen spaces and ninety-six new transient officer quarters.

Air Force leaders have been making a particularly strong pitch for dormitory improvement funds, so perhaps Congress won't tamper with the FY '80 request now before it. In several recent congressional appearances, Maj. Gen. William D. Gilbert, USAF's Director of Engineering and Services, has stressed the importance potential recruits attach to privacy in living quarters. Offering them reasonable accommodations could well mean the difference between USAF's enlisting and reenlisting ample manpower or falling short, General Gilbert and others have noted.

The Off-base Option

Numerous young bachelors, meanwhile, continue to downgrade military service and threaten to depart, because they are not permitted to live off base and collect a BAQ at the same time. The single BAQ ranges from $86 monthly for an E-1 to $232 for a bachelor captain. Critics also note that married members live off base and collect their BAQ, so why the discrimination?

The Pentagon's response is that the law requires that both married and single quarters, having been built at taxpayers' expense, be kept filled, if not voluntarily then by ordering members to occupy them. (The main exception is when the units do not meet Pentagon adequacy standards.)

Since married quarters are almost always oversubscribed by volunteers, directed assignments to them are unnecessary. Many bachelor units, however, even though judged adequate, could go begging if single members had the option of living on or off base. And Uncle Sam would have to shell out more BAQ money, something he continues to frown upon.

But Air Force and Army have advanced a partial solution: a legislative proposal extending the "option-residency" feature to junior officers and E-7s through E-9s. (Bachelor O-4s and above have long enjoyed the on/off-base living option.)

The services' hope, of course, is that with more bachelor quarters improvement on base, single members will want to remain on the reservation. In summary, Air Force says it wants "to provide privacy and increased space for members assigned to quarters on base, and to afford more persons the option of living on or off base.

"We shall continue to seek the necessary approvals and funding to accomplish these goals," a recent Hq. USAF position paper states. But actually shaking loose the funds necessary to get the job done, when at the same time proponents of scores of other vital military programs engage in equally compelling rhetoric, is another matter. So far, housing hasn't done too well.

While Air Force remains temporarily stymied over the bachelor live-on or live-off issue, it recently plowed new ground in a related controversial area: the assignment of men and women to the same dormitories.

Years ago, quarters for single women were sealed off like Fort Knox. Even Houdini would have been hard pressed to penetrate the security draped around female quarters to keep the men out.

But as military womenpower increased, rules were eased. At first men and women assigned to the same dorms had to be "both physically and visually separated." This meant all women in one wing, all men in another, with no connecting entrances.

But more recently, the Air Force ruled that both sexes can live "across the hall or down the hall from each other" in any building with semiprivate and private baths, not central latrines. Most of the new and improved single quarters are designed to accommodate this arrangement. So the policy change, besides treating adults as adults, provides more assignment flexibility, better utilization of dorm spaces, and consequently modest dollar savings.

Overall, authorities believe that members—marrieds and singles—are fairly well housed in the States, though, as Mr. Meis noted, some lower-ranking people "pay a stiff price [rent] for it." Overseas, substandard conditions are too prevalent, although the services are tackling the problem by going after more new leased housing.

Getting funds restored to continue family quarters upgrading is the most critical housing challenge facing USAF authorities. Maintaining dormitory improvement at the current level is not far behind.

And what about eventually replacing deteriorating quarters? As far back as the early 1970s, officials were talking about the need to begin planning for housing replacement. But that was before building costs started going out of sight; replacement talk has ceased. The present USAF housing inventory may have to suffice for a great many years. ■

ABOVE: The Air Force family housing inventory contains more than 140,000 units, including these typical enlisted quarters at Bolling AFB, D. C. The service has made major improvements to several thousand sets of quarters and hopes to upgrade many more. The big problem: getting the government to furnish the necessary funds. LEFT: New family quarters for general officers, like this set at Bolling AFB, contrast sharply with the larger and more traditional red brick homes found at many older USAF bases. Most of the generals quartered at Bolling work at the Pentagon.

The recent visit of USAF F-15s to Saudi Arabia raised a tempest in a teapot over the relative virtues of air and sea deployment. It should, instead, have stimulated DoD enthusiasm for . . .

Modernizing the Means of Mobility

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

AS IS often the case around budget time, there appears to have been a little interservice sniping over various Mideast deployments, real and postulated. The Air Force, according to one caviling report, used an impressive armada of tankers and transports to get twelve F-15s to Saudi Arabia. Meanwhile, still according to this report, the base rights difficulties encountered in this deployment made a strong case for carriers as the neat and uncomplicated way to deal with future contingencies in the Middle East.

There was, of course, a riposte to all this, one calling attention to the length of time it took the carrier *Constellation* to reach the Persian Gulf from Subic Bay and the number of ships and men involved in her entourage. Further, said the land-based air disciples, the F-15 movement could have gone off more quickly, and more austerely, had this been wartime when some safety and compassionate provisions would have been disregarded.

Well, so much for this little interservice propaganda blitz. Compared to the donnybrooks of years past, it was a gentlemen's debate. Besides, it tends to obscure some of the real issues that both the *Constellation* and the F-15 deployments should have brought into focus.

The first of these is the obvious fact that the region we call the Mideast is, of all the places in this troubled world, one of the most likely scenes for some kind of conflict involving our forces, our NATO preoccupations notwithstanding. Having said that, it next becomes clear that it is one of the places, of all the places in the world, where we are least prepared to fight, and never mind which service—Navy, Air Force, or whatever.

The *Constellation's* having to steam from the Philippines, and even then at the end of its normal West Pacific deployment, brought out what would seem to be a clear case for additional carriers, for there can surely be no question as to the desirability, if not the absolute requirement, for a US naval presence in the Indian Ocean. Too much of our nation's future is invested in those waters to allow Soviet dominance by default. And since carrier task forces are the main strength of our surface Navy, we should have a carrier or two deployed in the oceans south of Arabia. The problem is simply where to get the carriers. There appears to be no source. They are all committed—overcommitted—and it does not seem reasonable, or even, in the case of NATO's Sixth Fleet, possible, to pull back on those commitments. The Navy clearly needs another attack carrier or two.

Getting back to the Air Force and its F-15 passage to Saudi Arabia, the message we should get from that exercise is the need for a modernized tanker force. The new advanced tanker cargo aircraft adapted from the DC-10 could have reduced dramatically both the tanker and transport requirements for this deployment. What is more, these new tankers would have allowed the F-15 squadron to proceed nonstop, thus avoiding any base right negotiations. The KC-135 tanker fleet, some 615 airplanes, is still basic to our tactical air mobility, but these birds are getting on in years, and anyone who has sweated out a KC-135 takeoff on a hot day in the tropics, especially those imprisoned in that windowless tube of a passenger compartment, has doubtless wished for bigger engines. It takes a lot of these old tankers to support big modern fighters when they set off for distant places.

Thus, it remains one of the minor mysteries of our defense policy why there has not been more emphasis on rebuilding the tanker fleet. Vietnam, if it proved nothing else, certified the tanker as an essential adjunct to land-based tactical aviation. The current program of the new tanker-cargo aircraft calls for twenty. There is, in addition, some speculation about a modernization and general face-lifting effort for the aging KC-135s, one that would provide new engines, more fuel capacity, and, hence, greater efficiency. At this point, it appears to be only speculation.

In the years to come, there will doubtless be more deployments to the Mideast and other parts of the world where we must bring our capability with us. One way to do this is, of course, with carriers, and there are times when this is the best way. There will be other times—there have been other times—when a tanker-supported Air Force deployment is the only way to get there soon enough.

As our relationships in the world grow more uncertain, the mobility of our Air Force must obviously depend more and more on in-flight refueling. Fighters, bombers, and even transports will have to look to the tankers when landing rights are denied, a contingency that almost certainly will affect future Mideast deployments.

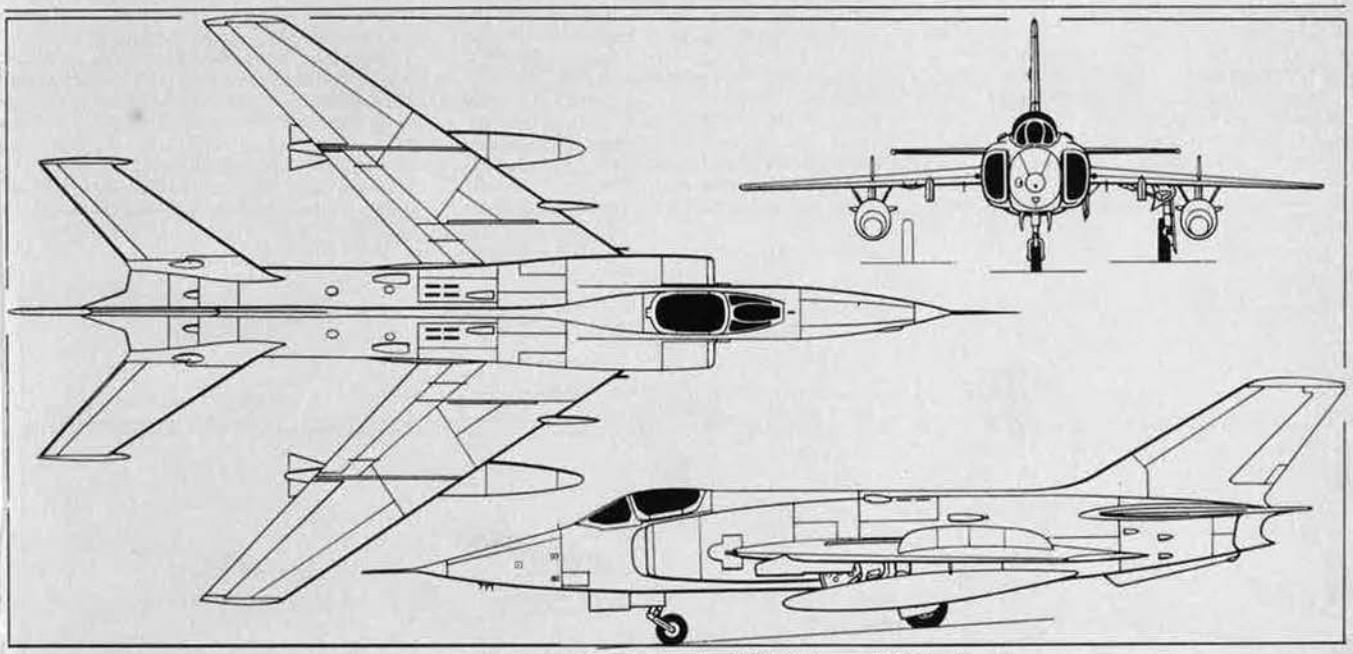
And so it is fair at least to wonder at the muted enthusiasm within the Defense Department for the tanker business.

True, there is money for twenty new advanced tankers in the budget, and there are 600 or so of the old tankers still ready for duty, but the years ahead seem likely to put an awful strain on this capability. Twenty new ones, and 600 old ones, just do not seem enough. ■

JANE'S

ALL THE WORLD'S AIRCRAFT SUPPLEMENT

JUNE 1979



Shenyang F-9 twin-engined fighter-bomber (NATO 'Fantan-A') *(Pilot Press)*

SHENYANG

CHINESE STATE AIRCRAFT FACTORY; Works: Shenyang, Liaoning Province, People's Republic of China

The Chinese State Aircraft Factory had its origin in the Mukden (now Shenyang) plant of the Manshu Aeroplane Manufacturing Company, established in Manchukuo (now Manchuria) by Japan in 1938. Re-established and re-equipped with Soviet assistance after 1949, Shenyang is now one of the main design, development, and production centres of the present-day Chinese aerospace industry. Before the political break with the USSR the Shenyang factory produced several Soviet-designed aircraft under licence, including the MiG-17 fighter (Shenyang F-4) and MiG-15UTI fighter/trainer (Shenyang F-2). Since the early 1960s it has produced large numbers of the F-6 (MiG-19) and a small quantity of the F-8 (MiG-21). Indications are that output of the F-6 is now diminishing, with increasing emphasis being placed on new aircraft developed by the Chinese industry and making use of its increasing technological capability. One of these, already in production and service, is the F-9 fighter-bomber.

SHENYANG F-9
NATO reporting name: Fantan-A

The F-9, a twin-engined fighter-bomber embodying technology derived from the Shenyang F-6/MiG-19, is in production in China and has the NATO reporting name 'Fantan-A'. The accompanying photographs, which became available in early 1979, enable some earlier reports to be confirmed and additional features of the aircraft to be observed.

As was thought, the airframe is based substantially upon that of the F-6/MiG-19, with overall dimensions increased by about 10% to give a longer fuselage, higher aspect ratio wings, and taller vertical tail surfaces. The wings retain the four external attachment points and large boundary layer fences of the F-6, and on the outboard pylon under each wing the aircraft in the photographs carry an auxiliary fuel tank apparently of the same size as the 800 litre (176 Imp gallon) drop-tanks carried in this position by the F-6. The principal change of configuration occurs in the forward fuselage, which is longer than that of the F-6 and now terminates in a 'solid' conical nose radome, the form of which suggests that it houses only a very small ranging radar. The introduction of this radome has necessitated the provision of lateral air intakes for the twin engines, abreast of the single-seat cockpit, and the shape of these increases the area-rule 'waisting' of the central portion of the fuselage.

The centre and rear fuselage sections appear to retain the various louvres and external airscoops of the F-6, supporting the belief that the latter's power plant of two side-by-side Chinese-built Tumansky R-9B turbojet engines (each rated at 25.5 kN; 5,730 lb st dry and 31.9 kN; 7,165 lb st with afterburning) remains basically unchanged. The taller main fin has a smaller dorsal fin than the F-6, and the strake fairing below the tail is shorter. Horizontal tail surfaces, including anti-flutter weights at their tips, appear to be the same as those of the F-6.

As on the F-6, the landing gear nosewheel retracts forward and the main units retract inward into the wings. The F-9 retains the two wing-mounted cannon of the F-6, these now occupying

First officially-released ground-to-air photograph of an F-9 taking off

F-9 fighter unit of the Chinese Air Force at its base

the revised wing-root position outboard of the engine intake trunks. The third (nose-mounted) gun carried by most versions of the F-6/MiG-19 appears to be omitted.

The majority of 'Fantan-As' are in service with strike squadrons of the Chinese Air Force of the People's Liberation Army, but the F-9 is also known to serve in an air defence role with the Naval Air Force.

DIMENSIONS, EXTERNAL (approx):

Wing span	10.20 m (33 ft 5 in)
Length overall	15.25 m (50 ft 0 in)

WEIGHT (approx):

Max T-O weight	10,000 kg (22,050 lb)

PERFORMANCE (approx):

Max level speed at altitude	close to Mach 2 (1,145 knots; 2,125 km/h; 1,320 mph)
Combat radius	up to 430 nm (800 km; 500 miles)

LOCKHEED

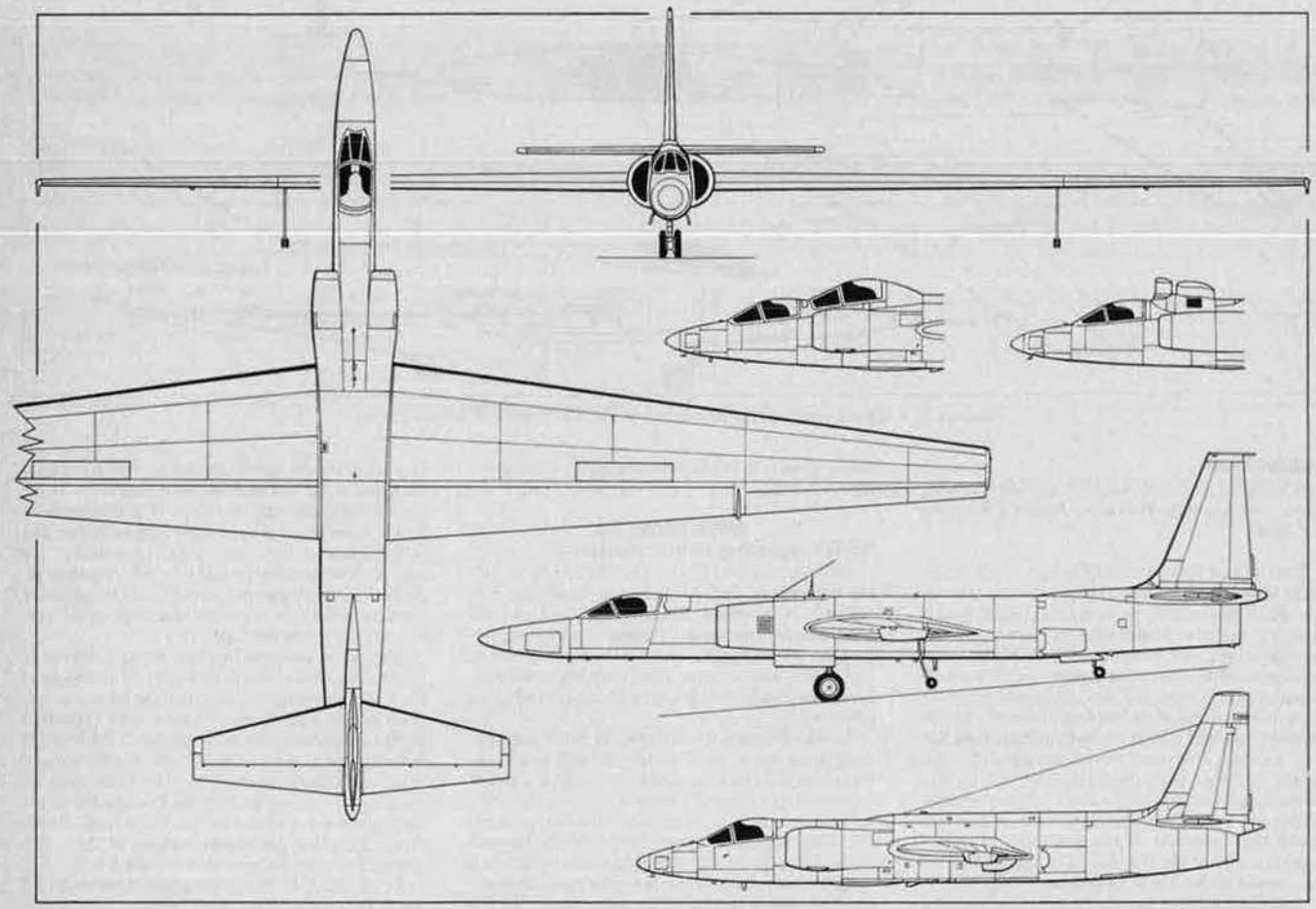
LOCKHEED-CALIFORNIA COMPANY (a Division of Lockheed Corporation); Head Office: Burbank, California 91520, USA

LOCKHEED U-2 and TR-1

Development of the U-2 began in the Spring of 1954 to meet a joint CIA/USAF requirement for a high-altitude strategic reconnaissance and special-purpose research aircraft. It took place in the Lockheed 'Skunk Works' at Burbank, California, where, after acceptance of the design in late 1954, two prototypes were hand-built in great secrecy by a small team of engineers. The aircraft's true purpose was cloaked under the USAF U-for-Utility designation U-2, and the first flight, by Lockheed test pilot Tony LeVier, took place on or about 1 August 1955 at Watertown Strip in the Nevada desert.

The configuration of the U-2 is basically that of a powered sailplane, which explains its unusual 'bicycle' landing gear, combined with underwing balancer units which provide stability during take-off and are then jettisoned. Range can, if necessary, be extended by shutting off the engine and gliding. Because of its configuration the U-2 requires unusually precise handling during take-off and landing—particularly the latter, since there is an extremely small margin between approach speed and stalling speed. After touchdown, the aircraft comes to rest on one of the down-turned wingtips.

Initial quantities of 48 single-seat and five two-seat U-2s were ordered in FY 1956, but after about 30 of these had been completed the increasing weight of special equipment which the aircraft was required to carry had degraded performance to such an extent that a more powerful engine became necessary, and this was installed from 1959 onwards. At the same time a substantial increase in



Three-view drawing of the Lockheed U-2R strategic reconnaissance aircraft, with additional side view of the U-2C elint version (bottom) and scrap views of the two-seat U-2CT (top left) and U-2D (top right) *(Michael A. Badrocke)*

fuel capacity made possible a considerably greater range. In FY 1968 the U-2 was put back into production, to replace some of the two dozen or more aircraft lost over hostile territory or in accidents, and the production line is now to be reopened again to manufacture a new, tactical reconnaissance version, the TR-1.

In service, the U-2 was flown at first by CIA pilots, ostensibly in USAF units known as the 1st, 2nd, and 3rd Weather Reconnaissance Squadrons (Provisional). These were based initially at Lakenheath in England, Adana in Turkey, and Edwards AFB, California, with detachments respectively in Germany, Pakistan, and Okinawa. From here, and from bases in Cyprus, the south-west Pacific, Alaska, and elsewhere, they were employed for photographic and electronic intelligence (elint) overflights of Eastern Europe, the USSR, the Middle East, China, Cuba, and other sensitive areas. These operations, which began in January 1956, were 'blown' when a U-2B flown by Lt Francis Gary Powers was brought down near Sverdlovsk in the Soviet Union on 1 May 1960, during an overflight from Peshawar, Pakistan, to Bodö, Norway.

Deliveries to already-established USAF units began in early 1957, these including the 4028th and 4080th Strategic Reconnaissance Squadrons of Strategic Air Command, and Air Research and Development Command. In addition to their strategic reconnaissance role, they carried out much valuable high-altitude research work, including the monitoring of radioactivity levels in the atmosphere. Two-seat U-2Ds of the 6512th Test Squadron, USAF Systems Command, were also used for atmospheric sampling, for development of equipment for the Midas and Samos satellites, and to track and assist recovery of Discoverer spacecraft. At least six U-2s were transferred from the USAF to the Chinese Nationalist Air Force in the 1960s, most or all of which were subsequently lost.

From 1964, US Air Force U-2s began to operate from Bien Hoa in Vietnam, and later from detached bases at Osan, South Korea, and U-Tapao, Thailand. Overflights of mainland China, which had been made from bases in Taiwan, were halted after a Sino-American agreement in 1974, and the U-2s concerned were recalled to the USA. It is often (and wrongly) stated that the Lockheed SR-71 was a 'U-2 replacement', but such is not the case. In 1976 the 349th (formerly the 4080th) Strategic Reconnaissance Squadron was transferred to Beale AFB, California, and redesignated the 99th SRS. It shares this base with the 1st SRS, which flies the SR-71, the two units forming the 9th Strategic Reconnaissance Wing and illustrating that the two types are complementary. In recent years SAC U-2s have, in addition to their usual duties, flown photo-reconnaissance missions on behalf of the US Ministry of Agriculture, Society of Engineers, and other agencies, and have been employed to monitor hurricanes, earthquakes, and other natural disasters.

The other major operator of the U-2 has been the National Aeronautics and Space Administration and its predecessor, NACA. The first aircraft to appear in NASA markings was NASA 55741, which was shown to the press in June 1960, a month after the Powers incident. It has been suggested that this untypical registration may have been an attempt to disguise a USAF serial number, 55-5741, presumably indicating a prototype aircraft. At least three other U-2s have been operated by NASA (NASA 320, 708, and 709), the last two of these being of the U-2C version. Work undertaken for NASA has been extensive and varied, and has included flights over ecological test areas, in support of various Earth resources programmes; investigations into clear air turbulence (HI-CAT programme); a NASA/USAF high-altitude atmospheric sampling programme (HASP); and observations in astronomy, atmospheric physics, and geophysics.

In view of the continuing classified nature of much of its work, it is not possible to confirm officially many details concerning the U-2; but the list of variants and general description which follow are believed to be substantially correct. It should also be noted that there have been numerous conversions between one model and another during the aircraft's operational career, and that there may be differences between individual aircraft of the same model.

U-2A. Single-seat initial production version, powered by a 49.8 kN (11,200 lb st) Pratt & Whitney J57-P-37A turbojet engine with special wide-chord compressor blades for flight at very high altitudes. Approximately 30 built, of which most later converted to U-2B, others to WU-2A and U-2D. Deliveries to 1st, 2nd, and 3rd Weather Reconnaissance Squadrons (Provisional) began in January 1956, and to 4028th and 4080th Strategic Reconnaissance Squadrons in early 1957.

WU-2A. Designation of small number of U-2As converted for atmospheric research. Bulged fairing on underside of fuselage, below air intakes. Used for weather reconnaissance flights over Europe, Turkey, Japan, Australia, the USA, and Argentina. Took part in HI-CAT and HASP programmes, and in radioactivity sampling on behalf of SAC.

U-2B. Single-seat improved version of U-2A with strengthened airframe, more powerful J75 engine, and fully 'wet' wing. Total of 48 U-2A/Bs ordered (USAF serial numbers 56-6675 to 56-6722); from 1959 the last 18 (approx) of these, and most existing U-2As, were completed or re-engined to U-2B standard. Two supplied to Chinese Nationalist Air Force in July 1960, and at least four others later.

U-2C. Single-seat electronic intelligence (elint) version, converted from U-2B in early/middle 1960s and having similar performance. Bulged air intakes, and long dorsal spine fairing containing various additional avionics and other equipment. Two (NASA 708 and 709) delivered to NASA in April 1971 and used, *inter alia*, for Earth resources monitoring on behalf of Ames Research Center.

WU-2C. Original designation of U-2R (which see).

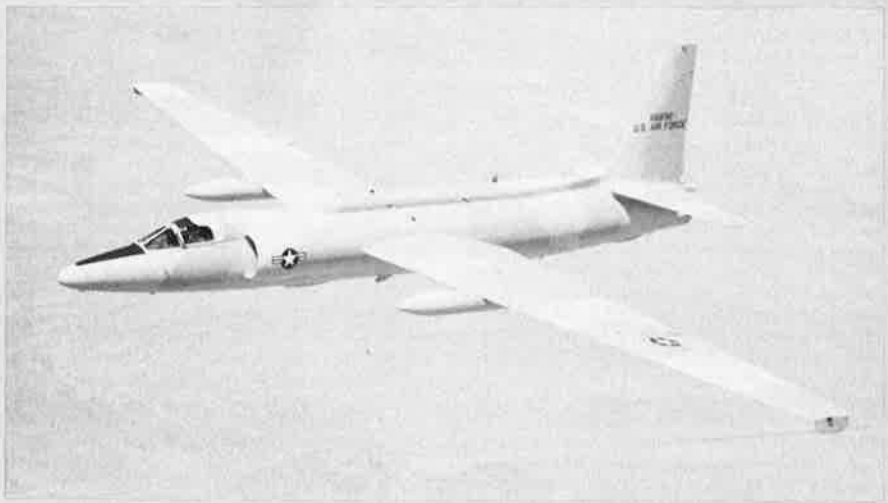
U-2CT. Two-seat dual-control conversion trainer, with elevated rear cockpit for instructor. Dorsal spine fairing and bulged intakes, as U-2C. Two examples known, one converted from U-2C and one from U-2D. On training flights, underwing balancer wheels are not jettisoned, to facilitate landings.

U-2D. Tandem two-seat development of U-2B for training and special duties, first displayed publicly at Wright-Patterson AFB in mid-1961. Five production aircraft (serials 56-6951 to 56-6955) built as U-2D; others converted from earlier models. Twin fairings above fuselage, one between cockpits and one above second cockpit, house antennae for infra-red, radioactivity, or other sensors; these fairings vary in shape between individual aircraft.

U-2EPX. Proposed ocean surveillance version for US Navy (EPX = electronics patrol experimental). Two aircraft, converted to carry AN/APS-116 radar similar to that in Lockheed S-3A Viking, test-flown by Lockheed in 1973 to evaluate use of U-2 as an airborne relay aircraft for surveillance data. Not adopted by USN.

U-2R. Additional batch of 12 single-seat aircraft, ordered for strategic reconnaissance in FY 1968, by which time approx half of original U-2s had been lost through various causes. Serial numbers 68-10329 to 68-10340. Originally designated WU-2C. Bulged intakes, as on U-2C, but longer nose and fuselage, without dorsal spine fairing; increased wing span and internal fuel capacity; rear fuselage slightly bulged on top, just forward of fin; main-wheel unit further aft, tailwheel unit further forward, than on earlier models. Non-US bases have included Mildenhall, England. The U-2R was selected recently as the preferred airborne relay vehicle for the Lockheed PLSS (Precision Location Strike System), intended to locate and identify enemy radar emitters, and to direct strike aircraft against them.

TR-1. Tactical reconnaissance version, described officially by the Department of Defense as "to be equipped with a variety of electronic sensors to provide continuously available, day or night, all-weather surveillance of the battle area in direct support of the US and Allied ground and air forces during peace, crises, and war situations". Tooling for the U-2 has been kept in store at the USAF-owned Plant 42 at Palmdale, California, and the FY 1979 defence budget included $10.2 million to reopen the production line in FY 1980. It is understood that the TR-1 will be based on the U-2R, still with the J75-P-13 engine, but with the significant addition of an 'advanced synthetic aperture' radar system (ASARS) in the form of a UPD-X side-looking airborne radar (SLAR) and modern electronic countermeasures (ECM). Seen as a replacement for the now-abandoned Compass Cope RPV (see 1977–78 *Jane's*), the TR-1 is intended primarily for use in Europe, where its SLAR will provide the capability to 'see' approximately 30 nm (55 km; 35 miles) into hostile territory without the need to overfly an actual or potential battle area. An initial $550 million contract has been placed with Lockheed for 25 TR-1s.



Lockheed U-2C electronic intelligence aircraft

The following description applies primarily to the single-seat U-2B, C, and R versions, except where indicated otherwise:

TYPE: High-altitude reconnaissance and research aircraft.

WINGS: Cantilever mid-wing monoplane, with wingtips turned down 90° for use as skids during landing. All-metal structure. Trailing-edge flaps occupy approx 60% of each half-span, with ailerons outboard. Small tubular fairing between each flap and aileron: on U-2C/CT/R these are larger and project beyond trailing-edge. Small plate-type spoiler forward of outer portion of each flap. Some aircraft fitted with trim tab on each aileron.

FUSELAGE: All-metal semi-monocoque structure of circular cross-section, with thin-gauge skin. Fineness ratio approx 10 : 1. Forward-opening door-type airbrake on each side of fuselage aft of

The new Lockheed TR-1 reconnaissance aircraft will resemble closely the U-2R (right)

wings, used mainly as a landing aid. Large airscoop fairing on fuselage beneath rear of wing root: generally on starboard side, but sometimes on port side and sometimes on both. Since about 1974 some aircraft have had a modified tailpipe, to reduce the infra-red signature from the engine.

TAIL UNIT: Cantilever all-metal structure. Trim tab on rudder and in each elevator. Ventral fin under fuselage of U-2A and WU-2A, immediately aft of wing.

LANDING GEAR: Retractable bicycle type, with twin main wheels and twin small tailwheels, each unit retracting forward into fuselage. Balancer units under outer wings, each with twin small wheels, are jettisoned on take-off (except on U-2CT). Tailwheels and underwing wheels have solid tyres: castoring tailwheel unit aids manoeuvring on ground. Brakes on main wheels. Braking parachute in container under rudder.

POWER PLANT (except U-2A): One 75.6 kN (17,000 lb st) Pratt & Whitney J75-P-13 turbojet engine. Normal internal fuel capacity 2,970 litres (785 US gallons) in U-2A, approx 4,315 litres (1,140 US gallons) in U-2B, approx 4,448 litres (1,175 US gallons) in U-2C. Provision for two 397.5 litre (105 US gallon) non-jettisonable auxiliary slipper tanks on wing leading-edges: these were designed originally to extend range of U-2A, but may be seen on other models.

ACCOMMODATION: Pilot only in U-2A/B/C/R, on ejection seat (except in early U-2As before 1957). Rearward-sliding transparent canopy, protected internally against ultra-violet radiation. Accommodation is not pressurised. Tandem ejection seats and dual controls in U-2CT and U-2D, the rear cockpit in the U-2CT being "stepped" above the upper line of the fuselage. Rearview periscope on most aircraft (positions vary).

AVIONICS AND EQUIPMENT: Typical standard avionics in U-2B include Magnavox ARC-34 UHF com, Tacan, ILS, Lear A-10 autopilot, Bendix ARN-6 ADF, MA-1 compass, and (for night flying) astro-compass. Equipment includes one vertical and two lateral cameras for training flights, or up to five 70 mm cameras (U-2) or side-looking airborne radar (TR-1) for operational missions. Panoramic camera(s) originally of Land Polaroid type, but more usually Model 73B or Perkin-Elmer Model 501 in U-2B, with ventral periscopic sight. The U-2B shot down over Sverdlovsk on 1 May 1960 reportedly carried also an electromagnetic receiver for monitoring and recording radio and radar transmissions from the ground, made by Huggins Laboratories, Hewlett-Packard, and Raytheon.

DIMENSIONS, EXTERNAL:

Wing span: except U-2R	24.38 m (80 ft 0 in)
U-2R	31.39 m (103 ft 0 in)
Wing area, net: except U-2R	52.49 m² (565 sq ft)
Wing aspect ratio	approx 10.2
Length overall: except U-2R	15.11 m (49 ft 7 in)
U-2R	19.20 m (63 ft 0 in)
Height overall: except U-2R	3.96 m (13 ft 0 in)
U-2R	4.88 m (16 ft 0 in)
Wheel track (c/l of wing balancer units): except U-2R	approx 15.24 m (50 ft 0 in)
Wheelbase: except U-2R	approx 6.10 m (20 ft 0 in)

WEIGHTS:

Weight empty, without equipment:	
U-2C	6,259 kg (13,800 lb)
Fuel and equipment payload:	
U-2B	approx 1,360 kg (3,000 lb)
U-2R	approx 5,443 kg (12,000 lb)
T-O weight without slipper tanks:	
U-2A	7,189 kg (15,850 lb)
Max T-O weight with slipper tanks:	
U-2A	7,833 kg (17,270 lb)
U-2B/C	9,003 kg (19,850 lb)
U-2R	13,154 kg (29,000 lb)

PERFORMANCE (estimated for TR-1):

Max level speed:	
U-2A at approx 18,290 m (60,000 ft)	429 knots (795 km/h; 494 mph)
U-2B/C at 19,810 m (65,000 ft)	458 knots (850 km/h; 528 mph)
TR-1 at 18,290 m (60,000 ft)	373 knots (692 km/h; 430 mph)
U-2C at low altitude	174 knots (320 km/h; 200 mph)
Max cruising speed: U-2A at approx 18,290 m (60,000 ft)	399 knots (741 km/h; 460 mph)
Max rate of climb at S/L:	
U-2C	more than 3,000 m (9,845 ft)/min
Time to 21,330 m (70,000 ft), with fuel for 6 h 30 min mission: U-2C	18 min
Operational ceiling: U-2A	21,330 m (70,000 ft)
U-2B/C	25,900 m (85,000 ft)
TR-1	27,430 m (90,000 ft)
T-O run: U-2C	240 m (787 ft)

Range without slipper tanks, 378.5 litres (100 US gallons) reserves:
U-2A 1,910 nm (3,540 km; 2,200 miles)

Range with slipper tanks:
U-2A, 378.5 litres (100 US gallons) reserves 2,260 nm (4,185 km; 2,600 miles)
U-2B/C approx 3,475 nm (6,435 km; 4,000 miles)
Max range: TR-1 more than 2,605 nm (4,830 km; 3,000 miles)
Max endurance: U-2C, U-2R, TR-1 12 h

DASSAULT-BREGUET

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

DASSAULT-BREGUET ATLANTIC ANG

The Atlantic ANG (Atlantic Nouvelle Génération) is a twin-turboprop maritime patrol aircraft derived directly from the earlier Atlantic that was produced in 1964–74 for operation by the armed services of France (40, of which 3 were sold subsequently to Pakistan), Germany (20, including 5 special-purpose ECM aircraft), Italy (18), and the Netherlands (9). Design definition of the new version was initiated by a French government instruction to proceed in March 1977, with the aim of providing a replacement for the first generation Atlantic and the Neptune during the period from 1985 to 1990. This led to launch of the development phase of the ANG programme in December 1978. Initial requirement is for 42 aircraft for the French Navy.

Two prototypes are being produced by modification of first generation Atlantic airframes. These are scheduled to fly in mid-1981 and at the beginning of 1982 respectively. Series production is expected to begin in late 1981, to permit delivery of the first production Atlantic ANG in early 1985. The work is likely to be shared by the same European SECBAT (Société d'Etudes et de Construction du Bregue ATlantic) consortium that was responsible for the earlier programme, with possible modification of the work-split to reflect varying national interests in the ANG aircraft. The Tyne engines will be produced by SNECMA of France, Rolls-Royce of the UK, FN of Belgium, and MAN of Germany; and propellers by Ratier of France and British Aerospace.

Structural changes by comparison with the first generation Atlantic will include use of a refined bonding technique, improved anti-corrosion protection, better sealing between skin panels, and design improvements offering longer fatigue life and more economical maintenance. These are intended to ensure increased serviceability, with 75% of squadron aircraft permanently available for operations; readiness to take off within 20 minutes of an order to go; and an aircraft life of more than 20 years, or at least 12,000 flying hours.

The basic mission performance requirements envisaged for the ANG are quite similar to those of the Atlantic now in service: a high cruising speed to the operational area, quick descent from cruising altitude to patrol height, lengthy patrol endurance at low altitude, and a high degree of manoeuvrability at sea level. It will be able to carry a wide variety of weapons and equipment for finding and attacking both submarines and surface targets in all weathers. Like the original Atlantic, the ANG will be able to perform mine-laying, logistic support, and passenger and freight transport missions. It could be adapted for advanced AEW and flight refuelling duties, and is suitable for civilian tasks such as air/sea rescue and patrol of offshore fishing and oil interests.

TYPE: Twin-turboprop maritime patrol aircraft.

WINGS: Cantilever mid-wing monoplane, with streamlined avionics pods on tips. Wing section NACA 64 series. Dihedral on outer panels only. All-metal three-spar fail-safe structure, with bonded light alloy honeycomb skin panels on tor-

Artist's impression of Dassault-Breguet Atlantic ANG, with four underwing missiles and with radar extended

sion box and on main landing gear doors. Conventional all-metal ailerons actuated by SAMM twin-cylinder jacks. All-metal slotted flaps, with bonded light alloy honeycomb filling, over 75% of span. Three hinged spoilers on upper surface of each outer wing, forward of flaps. Metal airbrake above and below each wing. No trim tabs. Kléber-Colombes pneumatic de-icing boots on leading-edges.

FUSELAGE: All-metal 'double-bubble' fail-safe structure, with bonded honeycomb sandwich skin on pressurised central section of upper lobe, weapons bay doors, and nosewheel door.

TAIL UNIT: Cantilever all-metal structure, with bonded honeycomb sandwich skin panels on torsion boxes. Fixed-incidence tailplane, with dihedral. Control surfaces operated through SAMM twin-cylinder jacks. No trim tabs. Kléber-Colombes pneumatic de-icing boots on leading-edges.

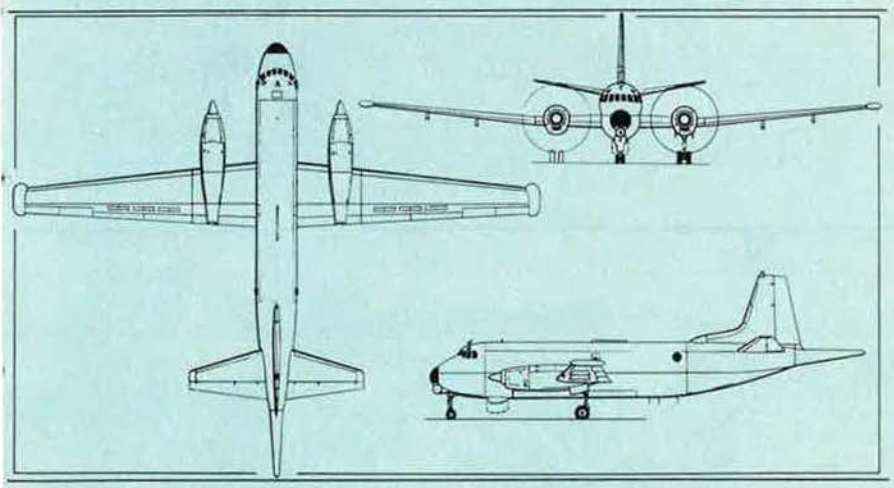
LANDING GEAR: Retractable tricycle type, supplied by Messier-Hispano-Bugatti, with twin wheels on each unit. Hydraulic retraction, nosewheels rearward, main units forward into engine nacelles. Kléber-Colombes tyres, size 39 x 13–20 on main wheels, 26 x 7.75–13 on nosewheels. New Messier-Hispano-Bugatti disc brakes with higher braking energy, and Modistop anti-skid units.

POWER PLANT: Two 4,552 kW (6,105 ehp) Tyne RTy.20 Mk 21 turboprop engines, each driving a four-blade constant-speed propeller type PD 249/476/3. Six pressure-refuelled integral fuel tanks with total capacity of 23,000 litres (5,059 Imp gallons). Updated gauging system.

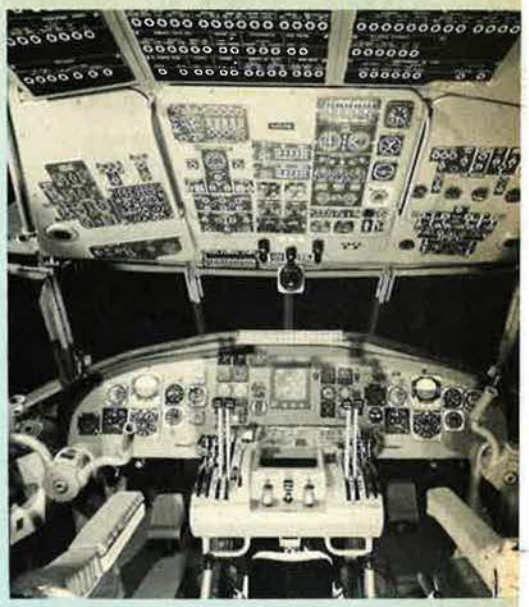
ACCOMMODATION: Normal flight crew of 12, comprising observer in nose; pilot, co-pilot, and flight engineer on flight deck; a radio-navigator, ESM-ECM-MAD operator, radar-IFF operator, tactical co-ordinator, and two acoustic sensor operators at stations on the starboard side of the tactical compartment; and two observers in beam positions at the rear. Rest compartment, with eight seats, in centre-fuselage, forward of crew room with tables and seats, galley, toilet, and wardrobe.

SYSTEMS: Uprated and modernised air-conditioning system. Simplified hydraulic system with modern technology components. Three basic electrical systems: variable-frequency three-phase 115/208V AC system, with two 60/80kVA generators and modernised control and protection equipment; fixed-frequency three-phase 115/208V 400Hz AC system, with four 15kVA Auxivar generators, two on each engine; 28V DC system, with four 6kW transformer-rectifiers supplied from the variable-frequency AC system, and one 40Ah battery. One 60kVA emergency AC generator, driven at constant speed by APU. Oxygen and de-icing systems basically unchanged from original Atlantic. Uprated APU (manufacturer not yet selected), driving a 60kVA alternator.

ARMAMENT AND OPERATIONAL EQUIPMENT: Main weapons bay in unpressurised lower fuselage can accommodate all NATO standard bombs, depth charges, eight homing torpedoes, or two air-to-surface missiles (typical load comprises three torpedoes and one AM.39 Exocet missile). Four underwing attachments for stores, including rockets, missiles, or containers. Up to 78 sonobuoys in compartment aft of weapons bay, where whole of upper and lower fuselage provides storage for sonobuoys and marker flares. Forward-looking infra-red sensor under nose. Thomson-CSF Iguane retractable radar immediately forward of weapons bay, with LMT IFF interrogator and SECRE decoder. Cameras in port side of nose and in bottom of rear fuselage. Crouzet-manufactured MAD in tail sting. Thomson-CSF Arar 13 radar detector for ESM. Other equipment includes FH com, Tacan and DME



Dassault-Breguet Atlantic ANG twin-turboprop maritime patrol aircraft *(Pilot Press)*



Atlantic ANG cockpit mockup

by LMT, VHF/AM com by Socrat, TRT radio-altimeter, Collins FM and V/UHF radio-compass, dual SAGEM Uliss 53 inertial navigation systems, Crouzet geographical display, and air data computer. UHF and VHF/FM suppliers not yet designated. Thomson-CSF Sadang system for processing active and passive acoustic detection data.

DIMENSIONS, EXTERNAL:

Wing span, incl wingtip pods	37.36 m (122 ft 6¾ in)
Wing aspect ratio	11
Length overall	31.75 m (104 ft 2 in)
Height overall	11.30 m (37 ft 1 in)
Fuselage:	
Max width	2.90 m (9 ft 6 in)
Max depth	4.00 m (13 ft 1½ in)
Tailplane span	12.31 m (40 ft 4½ in)
Wheel track	9.00 m (29 ft 6¼ in)
Wheelbase	9.44 m (30 ft 11½ in)
Propeller diameter	4.88 m (16 ft 0 in)
Main weapons bay:	
Length	9.00 m (29 ft 6¼ in)
Width	2.10 m (6 ft 10¾ in)

AREA:

Wings, gross	120 m² (1,290 sq ft)

WEIGHTS AND LOADINGS:

Weight empty, equipped	25,000 kg (55,115 lb)
Military load: ASW mission	2,200 kg (4,850 lb)
AS mission	3,000 kg (6,610 lb)
Max fuel	18,500 kg (40,785 lb)
Mission T-O weight: ASW	43,900 kg (96,780 lb)
AS	45,400 kg (100,090 lb)
Max T-O weight	46,200 kg (101,850 lb)
Max wing loading	385 kg/m² (78.96 lb/sq ft)
Max power loading	5.07 kg/kW (8.34 lb/ehp)

PERFORMANCE (estimated):

Max level speed at optimum height	355 knots (657 km/h; 408 mph)
Max level speed at S/L	320 knots (592 km/h; 368 mph)
Max cruising speed at 7,600 m (25,000 ft)	Mach 0.50
Typical patrol speed	170 knots (315 km/h; 196 mph)
Service ceiling	9,100 m (30,000 ft)
T-O run at max T-O weight	1,750 m (5,750 ft)
170-knot turning radius at AUW of 40,000 kg (88,185 lb) at:	
30° bank	1,500 m (4,925 ft)
45° bank	600 m (1,970 ft)
60° bank	500 m (1,640 ft)
Range with max fuel	4,400 nm (8,150 km; 5,065 miles)
Max endurance	18 h
Typical endurance at low altitude:	
600 nm (1,110 km; 690 miles) from base	8 h
1,000 nm (1,850 km; 1,150 miles) from base	5 h

WSK-PZL-SWIDNIK

WYTWORNIA SPRZETU KOMUNIKACYJNEGO Im. ZYGMUNTA PULAWSKIEGO-PZL-SWIDNIK (Zygmunt Pulawski Transport Equipment Manufacturing Centre, Swidnik); Head Office and Works: 21-045 Swidnik k/Lublina, Poland

PZL-SWIDNIK (MIL) Mi-2
NATO reporting name: Hoplite

Production and development of the Soviet-designed Mi-2 general-purpose light helicopter were assigned exclusively to the Polish aircraft industry in the mid-1960s, the first Polish-built example making its initial flight on 4 November 1965. Since then PZL-Swidnik has built more than 2,800 Mi-2s in a variety of civil and military versions, including more than 2,000 for the USSR. The Mi-2 is in service with the air forces of Czechoslovakia, Poland, Romania, and the USSR, and with operators in European and various developing countries.

The agricultural version, which is described in the 1978–79 *Jane's*, now has the Polish name **Bazant** (Pheasant). In this configuration it carries a hopper on each side of the fuselage (combined capacity 1,000 litres; 220 Imp gallons) and either a spraybar to the rear of the cabin on each side or a distributor for dry chemicals under each hopper. The Bazant is in service in Bulgaria, Czechoslovakia, Denmark, Egypt, Finland, Iran, Iraq, Libya, Poland, Sudan, Sweden, and the USSR.

Contrary to the report in the 1978–79 *Jane's*, Spitfire Helicopters has only limited US marketing rights for the Mi-2, and the name Taurus 2 is not approved by PZL-Swidnik. The modified version with Allison 250 turboshaft engines is the subject of separate development by PZL-Swidnik and the Allison Division of General Motors. It is known as the **Kania** or **Kitty Hawk**, and is described separately.

PZL-SWIDNIK KANIA/KITTY HAWK

In collaboration with the Detroit Diesel Allison Division of General Motors Corporation in the USA, PZL-Swidnik is developing a modified version of the Mi-2 light helicopter, known as the Kania or Kitty Hawk, powered by two Allison 250C-20B turboshaft engines. In addition to a standard passenger version, the Kania is intended for cargo, agricultural, ambulance, and other roles, similar to those performed by the Mi-2.

TYPE: Twin-turboshaft general-purpose light helicopter.

ROTOR SYSTEM: Three-blade fully articulated main rotor and two-blade seesaw tail rotor. Three hydraulic boosters for longitudinal, lateral, and collective pitch control of main rotor. Rotor brake fitted. Electrical anti-icing of rotor blades optional.

ROTOR DRIVE: Transmission drive via main rotor, intermediate, and tail rotor gearboxes, each with oil sight gauge and magnetic plug. Oil temperature gauge, oil cooling system, pressure indicator, and tachometer for main gearbox. Anti-friction bearings on tail rotor shaft.

FUSELAGE AND TAIL UNIT: Conventional semi-monocoque fuselage, with circular-section monocoque tailboom. Horizontal stabiliser at end of tailboom. Hoist and cargo sling attachment points standard.

LANDING GEAR: Non-retractable tricycle type, plus tailskid. Twin-wheel castoring nose unit, single wheel on each main unit. Pneumatic brakes on main wheels.

POWER PLANT: Two Allison 250C-20B turboshaft engines, mounted side by side above cabin; each rated at 313 kW (420 shp) for T-O and 30 min power, 298 kW (400 shp) max continuous, and 276 kW (370 shp) for max cruise. Standard usable fuel capacity of 600 litres (131 Imp gallons), with provision for additional 480 litres usable (105.5 Imp gallons) in optional auxiliary tanks.

ACCOMMODATION: Pilot (port side), and co-pilot or passenger, on adjustable and removable front seats, each fitted with safety belt. Dual controls optional. Accommodation for up to eight more persons, on two three-person bench seats and a single or double seat at rear of cabin, all with safety belts. Seats removable for carriage of cargo, stretchers, agricultural or other equipment. Access to cabin via jettisonable door on each side at front (port one of sliding type), and larger passenger/cargo door at rear on port side. Pilot's windscreen wiper standard. Cabin heating or air-conditioning, and electrical anti-icing of pilot's windscreen, optional.

SYSTEMS: Electrical system includes two 28V 150A DC starter/generators, two 115V 250A 400Hz static inverters, two 26V/115V 55VA 400Hz transformers, and a 25Ah nickel-cadmium battery. 16kVA AC generator for anti-icing system optional. External power receptacle. Dual fire detection and extinguishing systems for engines, single systems for transmission.

AVIONICS AND EQUIPMENT: King KX-175BE com/nav, KR-85 digital ADF, KT-76 transponder, and VFR instrumentation, all standard. Optional avionics include King KWX-50 digital weather radar, KRA-10 radar altimeter, and KN-65A-03 DME. Dual instrument lighting systems, pilot's cabin extension light, cabin dome light, three hold dome lights, three position lights, adjustable landing light, and anti-collision light are all standard, as are cargo and stretcher tiedown rings. Optional equipment includes dual controls, co-pilot's windscreen wiper, and auxiliary fuel tanks. Cabin carpet, standard or executive passenger seats, heating and air-conditioning systems, and sand filters are also optional.

OPERATIONAL EQUIPMENT: According to mission, the Kania can be equipped with a 1,000 kg (2,205 lb) capacity stabilised cargo sling; 120 kg (265 lb) capacity hoist; stretchers and casualty care equipment; agricultural spraying or dusting gear.

DIMENSIONS, EXTERNAL:

Diameter of main rotor	14.56 m (47 ft 9¼ in)
Diameter of tail rotor	2.70 m (8 ft 10¼ in)
Length overall, rotors turning	17.41 m (57 ft 1½ in)
Length of fuselage	11.95 m (39 ft 2½ in)
Fuselage: Max width	1.60 m (5 ft 3 in)
Height to top of rotor hub	3.75 m (12 ft 3½ in)
Stabiliser span	1.84 m (6 ft 0½ in)
Wheel track	3.25 m (10 ft 8 in)
Wheelbase	2.71 m (8 ft 10¾ in)
Tail rotor ground clearance	1.80 m (5 ft 10¾ in)

DIMENSIONS, INTERNAL:

Cabin: Length, incl flight deck	4.07 m (13 ft 4¼ in)
Max width	1.50 m (4 ft 11 in)
Height at front	1.30 m (4 ft 3¼ in)
Mean height at rear	1.51 m (4 ft 11½ in)
Max height at rear	1.62 m (5 ft 3¾ in)
Floor area	5.68 m² (61.1 sq ft)
Volume	7.766 m³ (274.25 cu ft)

AREAS:

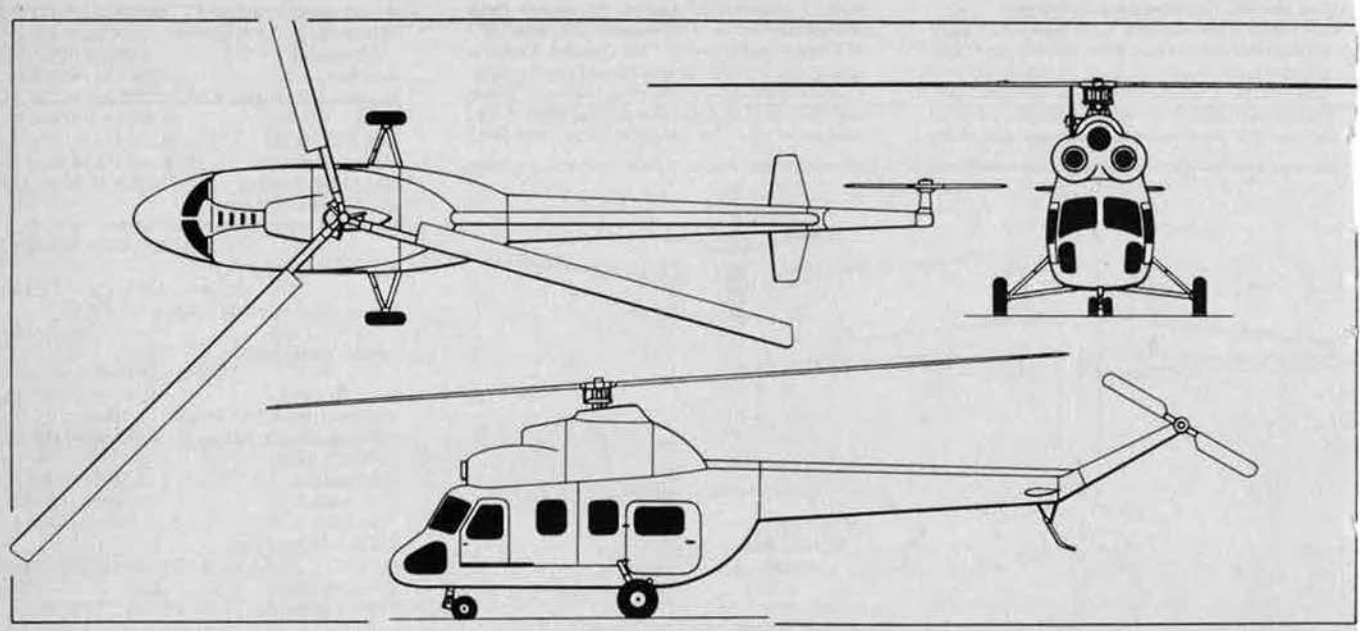
Main rotor disc	166.50 m² (1,792.2 sq ft)
Tail rotor disc	5.725 m² (61.6 sq ft)

WEIGHTS:

Weight empty, standard	2,140 kg (4,717 lb)
Normal T-O weight	3,350 kg (7,385 lb)
Max T-O weight	3,550 kg (7,826 lb)

PERFORMANCE (estimated, for 'clean' aircraft a S/L, ISA, zero wind. A: at 3,150 kg; 6,944 lb gross weight; B: at normal T-O weight; C: at max T-O weight):

Max cruising speed:	
A, B, C	113 knots (210 km/h; 130 mph)
Econ cruising speed:	
A, B	105 knots (195 km/h; 121 mph)
C	104.5 knots (194 km/h; 120.5 mph)
Rate of climb:	
A	504 m (1,653 ft)/m
B	450 m (1,476 ft)/m
C	402 m (1,319 ft)/m
Rate of climb, one engine out:	
A	96 m (315 ft)/m
B	66 m (216 ft)/m
C	42 m (138 ft)/m
Service ceiling (30.5 m; 100 ft/min climb rate):	
A, B	above 4,000 m (13,125 ft)
C	4,000 m (13,125 ft)
Hovering ceiling IGE at T-O power:	



PZL-Swidnik Kania/Kitty Hawk, developed from the Mi-2 *(Pilot Press)*

A	2,560 m (8,400 ft)
B	1,940 m (6,365 ft)
C	1,320 m (4,330 ft)

Hovering ceiling OGE at T-O power:

A	1,860 m (6,100 ft)
B	1,240 m (4,070 ft)
C	480 m (1,575 ft)

Max range at econ cruising speed, standard fuel, no reserves:

A	282 nm (522 km; 324 miles)
B	275 nm (510 km; 317 miles)
C	268 nm (497 km; 309 miles)

Max endurance, conditions as above:

A	3 h 41 min
B	3 h 27 min
C	3 h 15 min

AIDC/CAF

AERO INDUSTRY DEVELOPMENT CENTER–CHINESE AIR FORCE; Address: PO Box 8676-1, Taichung, Taiwan 400

By the beginning of this year, the Aero Industry Development Center had delivered more than 130 of the 187 Northrop F-5E Tiger II tactical fighters and 21 two-seat F-5Fs which it is building under licence for the Chinese Nationalist Air Force. CAF name for the F-5E is Chung Cheng. The AIDC had also completed more than 30 of the 50 T-CH-1 turboprop training/light ground attack aircraft currently on order, and was about to fly the prototype of its second indigenous design, the XC-2 twin-turboprop transport.

AIDC XC-2

The basic design of the XC-2 twin-turboprop transport, which was started in January 1973, incorporates features of common interest to military and civil operators, including quick-change capability and the ability to operate from short fields and unprepared surfaces. The XC-2 can carry up to 38 passengers or 3,855 kg (8,500 lb) of freight.

The first prototype (serial number 68-5001) was rolled out on 31 October 1978, and was scheduled to make its first flight in early 1979.

TYPE: Twin-turboprop transport aircraft.

WINGS: Cantilever high-wing monoplane. Wing section NACA 65_3218. Incidence 4°. No dihedral or sweepback at quarter-chord. Light alloy three-spar fail-safe structure, in three sections: constant-chord centre-section and tapered outer panels. All-metal manually-operated ailerons and hydraulically-actuated Fowler-type trailing-edge flaps. Servo tab in each aileron.

FUSELAGE: Conventional all-metal semi-monocoque fail-safe structure, of basically rectangular section, upswept at rear to provide clearance for rear loading. Cabin pressurisation optional.

TAIL UNIT: Cantilever aluminium alloy three-spar structure, with sweptback fin and rudder and non-swept horizontal surfaces. Dorsal fin. Horizontal surfaces mounted midway up fin. Trim and balance tab in rudder and each elevator.

LANDING GEAR: Retractable tricycle type, with hydraulically-steerable twin-wheel nose unit. Single-wheel main units retract into fairings on sides of fuselage.

POWER PLANT: Two 1,082 kW (1,451 ehp) Lycoming T53-L-701A turboprop engines, each driving a Hamilton Standard 53C51-27 three-blade variable-pitch metal propeller with spinner. Fuel in rubber tanks in wings, with combined standard capacity of 3,028 litres (666 Imp gallons).

ACCOMMODATION: Crew of three (pilot, co-pilot, and flight engineer) on flight deck. Standard seating in main cabin for 38 passengers, four-abreast at 79 cm (31 in) pitch. Interior layout has quick-change capability to passenger/cargo or all-cargo configuration. Access to main cabin via forward and rear doors on port side; single door on starboard side; and a two-section loading ramp/door in underside of rear fuselage, aft of main cabin, which is openable in flight for airdrop operations. Provision for toilet, galley, and baggage compartment in passenger version.

SYSTEMS: Anti-icing and cabin heating systems standard. Hydraulic system, pressure 207 bars (3,000 lb/sq in), for flaps, landing gear, and nosewheel steering. 28V DC primary electrical system, with 300A starter/generator on each engine. Two nickel-cadmium batteries for engine starting and emergency power.

AVIONICS AND EQUIPMENT: Communications equipment includes UHF and VHF radios. Navigation equipment includes ADF, Tacan, and transponder. Optional equipment includes VOR/ILS and HF.

AIDC XC-2 prototype twin-turboprop transport, under development in Taiwan

DIMENSIONS, EXTERNAL:

Wing span	24.90 m (81 ft 8.4 in)
Wing chord (centre-section, constant)	3.05 m (10 ft 0 in)
Wing aspect ratio	9.5
Length overall	20.10 m (65 ft 11.3 in)
Height overall	7.72 m (25 ft 3.8 in)
Tailplane span	9.12 m (29 ft 10.9 in)
Wheel track	3.86 m (12 ft 7.8 in)
Wheelbase	7.10 m (23 ft 3.5 in)
Propeller diameter	3.05 m (10 ft 0 in)
Propeller ground clearance	0.90 m (2 ft 11.5 in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck:	
Length	8.095 m (26 ft 6.7 in)
Width	2.57 m (8 ft 5 in)
Height	2.23 m (7 ft 3.7 in)
Floor area	20.85 m² (224.4 sq ft)
Volume	45.45 m³ (1,605.0 cu ft)

AREAS:

Wings, gross	65.40 m² (704.00 sq ft)
Ailerons (total)	4.24 m² (45.63 sq ft)
Trailing-edge flaps (total)	11.69 m² (125.80 sq ft)
Fin (incl dorsal fin)	9.35 m² (100.64 sq ft)
Rudder (incl tabs)	4.75 m² (51.12 sq ft)
Tailplane	10.41 m² (112.05 sq ft)
Elevators (incl tabs)	8.97 m² (96.55 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	7,031 kg (15,500 lb)
Max payload	3,855 kg (8,500 lb)
Max T-O weight	12,474 kg (27,500 lb)
Max landing weight	12,247 kg (27,000 lb)
Max zero-fuel weight	11,254 kg (24,810 lb)
Max wing loading	190.7 kg/m² (39.06 lb/sq ft)
Max power loading	5.77 kg/kW (9.48 lb/ehp)

PERFORMANCE (estimated, at max T-O weight):

Never-exceed speed	250 knots (463 km/h; 287 mph)
Max level speed at S/L	212 knots (392 km/h; 244 mph)
Max cruising speed at 3,050 m (10,000 ft)	200 knots (370 km/h; 230 mph)
Econ cruising speed at 3,050 m (10,000 ft)	180 knots (333 km/h; 207 mph)
Stalling speed, flaps down	78 knots (145 km/h; 90 mph)
Max rate of climb at S/L	457 m (1,500 ft)/min
Service ceiling	8,015 m (26,300 ft)
Service ceiling, one engine out	2,740 m (9,000 ft)
T-O run	625 m (2,050 ft)
T-O to 15 m (50 ft)	778 m (2,550 ft)
Landing from 15 m (50 ft)	826 m (2,710 ft)
Landing run	582 m (1,910 ft)

Range with max payload, reserves for 87 nm (161 km; 100 mile) alternate and 45 min hold 259 nm (480 km; 298 miles)

Range with max fuel, 45 min reserves 897 nm (1,661 km; 1,032 miles)

LOCKHEED

LOCKHEED-CALIFORNIA COMPANY (a Division of Lockheed Corporation); Head Office: Burbank, California 91520, USA

LOCKHEED L-1011 ADVANCED TRISTAR

The original TriStar prototype (N1011), which was flown for the first time on 16 November 1970, continues in use by Lockheed in 1979 under the name Advanced TriStar. It is in use to test and develop new ideas and systems that, subject to satisfactory performance, are under consideration for inclusion in new versions of this aircraft. It has the most advanced equipment of any example yet built, thus enabling the company to evaluate in depth the potential of such ideas or techniques before making a decision to include them in any new versions of the commercial TriStar.

In early 1979, N1011 was powered by three of the latest 222.4 kN (50,000 lb st) Rolls-Royce RB.211-524 turbofan engines. Additional installed equipment then included automatic brakes, automatic take-off thrust control, flight management system, extended wingtips, active aileron control, Autoland, direct lift control, all-moving tailplane, area navigation system, and moving-map display. It was

N1011, the original TriStar prototype, now flight testing equipment for the 1980s as the Advanced TriStar

The 1979 Beechcraft Baron 58TC (two Continental TSIO-520-WB engines)

intended to install during 1979 a new digital autopilot.

Automatic brakes operating in conjunction with anti-skid units ensure that braking is optimum at all times, in relation to load, speed, and weather conditions. Automatic take-off thrust control allows the pilot to use reduced take-off power settings, and to operate from shorter field lengths than would be normal for such settings. With the throttles set to provide the requisite take-off power, having regard to field length, altitude, and aircraft gross weight, should an engine failure occur during take-off the remaining two engines are advanced automatically to rated take-off thrust or a pre-set emergency power rating limit, thus minimising any time lag that might be experienced due to crew response.

At a time when fuel savings are valuable, however small they may be, the introduction of extended wingtips is most important. Each wing of the Advanced TriStar has been extended at the tip by 1.37 m (4 ft 6 in), resulting in a significant reduction of induced drag, and producing fuel savings in the order of 3%. However, this added span generates an increased wing lift increment which would be unacceptable under certain manoeuvre or gust loads. This has required the introduction of an active control system to provide automatic aileron deflection to offset such loads, thus allowing the inclusion of such wingtip extensions without the need for wing structural redesign.

It is expected that many of these new ideas and systems will be incorporated in the design of new advanced technology TriStars which are likely to enter service during the 1980s.

BEECHCRAFT

BEECH AIRCRAFT CORPORATION: Head Office: Wichita, Kansas 67201, USA

BEECHCRAFT BARON 58P AND 58TC

The pressurised Baron 58P and the turbocharged Baron 58TC introduced for 1979 more powerful 242 kW (325 hp) Continental TSIO-520-WB flat-six engines, resulting in weight and performance changes which are detailed below. In addition, the pressurisation differential of the Baron 58P has been increased from 0.26 bars (3.7 lb/sq in) to 0.27 bars (3.9 lb/sq in), providing this aircraft with a 3,050 m (10,000 ft) cabin environment to a height of 6,705 m (22,000 ft).

WEIGHTS AND LOADINGS (A: Baron 58P; B: Baron 58TC):

Weight empty, equipped:
- A: 1,814 kg (3,999 lb)
- B: 1,715 kg (3,780 lb)

Max T-O and landing weight:
- A, B: 2,812 kg (6,200 lb)

Max ramp weight:
- A, B: 2,830 kg (6,240 lb)

Max zero-fuel weight:
- A, B: 2,585 kg (5,700 lb)

Max wing loading:
- A: 152.0 kg/m² (31.14 lb/sq ft)
- B: 160.96 kg/m² (32.96 lb/sq ft)

Max power loading:
- A, B: 5.81 kg/kW (9.54 lb/hp)

PERFORMANCE (A: Baron 58P; B: Baron 58TC, at 2,812 kg; 6,200 lb AUW, except cruising speeds at average cruise weight):

Max level speed:
- A, B: 261 knots (484 km/h; 301 mph)

Max cruising speed at approx 77% power:
- at 3,050 m (10,000 ft):
  - A, B: 212 knots (393 km/h; 244 mph)
- at 4,570 m (15,000 ft):
  - A, B: 222 knots (412 km/h; 256 mph)
- at 6,100 m (20,000 ft):
  - A, B: 232 knots (430 km/h; 267 mph)
- at 7,620 m (25,000 ft):
  - A, B: 241 knots (447 km/h; 277 mph)

Cruising speed at approx 71% power:
- at 3,050 m (10,000 ft):
  - A, B: 203 knots (377 km/h; 234 mph)
- at 4,570 m (15,000 ft):
  - A, B: 214 knots (396 km/h; 246 mph)
- at 6,100 m (20,000 ft):
  - A, B: 223 knots (414 km/h; 257 mph)
- at 7,620 m (25,000 ft):
  - A, B: 231 knots (428 km/h; 266 mph)

Cruising speed at approx 62% power:
- at 3,050 m (10,000 ft):
  - A, B: 190 knots (352 km/h; 219 mph)
- at 4,570 m (15,000 ft):
  - A, B: 201 knots (372 km/h; 231 mph)
- at 6,100 m (20,000 ft):
  - A, B: 210 knots (389 km/h; 242 mph)
- at 7,620 m (25,000 ft):
  - A, B: 218 knots (404 km/h; 251 mph)

Econ cruising speed at approx 53% power:
- at 3,050 m (10,000 ft):
  - A, B: 175 knots (325 km/h; 202 mph)
- at 4,570 m (15,000 ft):
  - A, B: 186 knots (344 km/h; 214 mph)
- at 6,100 m (20,000 ft):
  - A, B: 194 knots (359 km/h; 223 mph)
- at 7,620 m (25,000 ft):
  - A, B: 202 knots (375 km/h; 233 mph)

Stalling speed, flaps up, power off:
- A: 83 knots (155 km/h; 96 mph)
- B: 84 knots (156 km/h; 97 mph)

Stalling speed, flaps down, power off:
- A: 79 knots (147 km/h; 91 mph)
- B: 78 knots (145 km/h; 90 mph)

Max rate of climb at S/L:
- A: 451 m (1,481 ft)/min
- B: 432 m (1,418 ft)/min

Rate of climb at S/L, one engine out:
- A, B: 82 m (270 ft)/min

Service ceiling:
- A, B: above 7,620 m (25,000 ft)

Service ceiling, one engine out:
- A: 4,110 m (13,490 ft)
- B: 4,250 m (13,940 ft)

T-O run:
- A, B: 474 m (1,555 ft)

T-O to 15 m (50 ft):
- A, B: 806 m (2,643 ft)

Landing from 15 m (50 ft):
- A: 761 m (2,498 ft)
- B: 740 m (2,427 ft)

Landing run:
- A: 448 m (1,471 ft)
- B: 420 m (1,378 ft)

Range with 719 litres (190 US gallons) fuel, and allowances for engine start, taxi, T-O, climb and 45 min reserves at econ cruise speed at approx 77% power:
- at 3,050 m (10,000 ft):
  - A, B: 884 nm (1,638 km; 1,018 miles)
- at 4,570 m (15,000 ft):
  - A, B: 916 nm (1,696 km; 1,054 miles)
- at 6,100 m (20,000 ft):
  - A, B: 958 nm (1,775 km; 1,103 miles)
- at 7,620 m (25,000 ft):
  - A, B: 1,008 nm (1,866 km; 1,160 miles)

at approx 71% power:
- at 3,050 m (10,000 ft):
  - A, B: 956 nm (1,770 km; 1,100 miles)
- at 4,570 m (15,000 ft):
  - A, B: 983 nm (1,821 km; 1,132 miles)
- at 6,100 m (20,000 ft):
  - A, B: 1,021 nm (1,891 km; 1,175 miles)
- at 7,620 m (25,000 ft):
  - A, B: 1,071 nm (1,984 km; 1,233 miles)

at approx 62% power:
- at 3,050 m (10,000 ft):
  - A, B: 1,076 nm (1,994 km; 1,239 miles)
- at 4,570 m (15,000 ft):
  - A, B: 1,096 nm (2,031 km; 1,262 miles)
- at 6,100 m (20,000 ft):
  - A, B: 1,120 nm (2,074 km; 1,289 miles)
- at 7,620 m (25,000 ft):
  - A, B: 1,153 nm (2,135 km; 1,327 miles)

at approx 53% power:
- at 3,050 m (10,000 ft):
  - A, B: 1,179 nm (2,183 km; 1,357 miles)
- at 4,570 m (15,000 ft):
  - A, B: 1,198 nm (2,219 km; 1,379 miles)
- at 6,100 m (20,000 ft):
  - A, B: 1,217 nm (2,254 km; 1,401 miles)
- at 7,620 m (25,000 ft):
  - A, B: 1,229 nm (2,277 km; 1,415 miles)

Industrial Associates of the Air Force Association

"Partners in Aerospace Power"

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Thirty-five years ago, the greatest amphibious assault in history was launched against Nazi-occupied Europe. The author, who participated in D-Day air operations, describes preparations for the invasion and air support for the 176,000 assault troops who stormed the Normandy beaches on . . .

D-DAY: JUNE 6, 1944

BY GEN. LAURENCE S. KUTER, USAF (RET.)

In mid-May 1944, the US Chiefs of Staff decided to meet with their British counterparts in London shortly after D-Day, which then was planned for June 5. The Chiefs sent their operations and planning deputies ahead to observe D-Day preparations, make arrangements for the meetings, and have first-hand reports on the progress of the invasion when the Chiefs arrived. The Army was represented by Maj. Gen. T. J. Handy and Col. George A. Lincoln; the Navy by Rear Adm. C. M. Cooke, Jr., and Capt. D. R. Osborn; the Army Air Forces by Maj. Gen. Laurence S. Kuter, Assistant Chief of Air Staff for Plans, and Col. Fred M. Dean. The group left by DC-4 from a remote corner of National Airport in Washington on May 28 under elaborate secrecy cover.

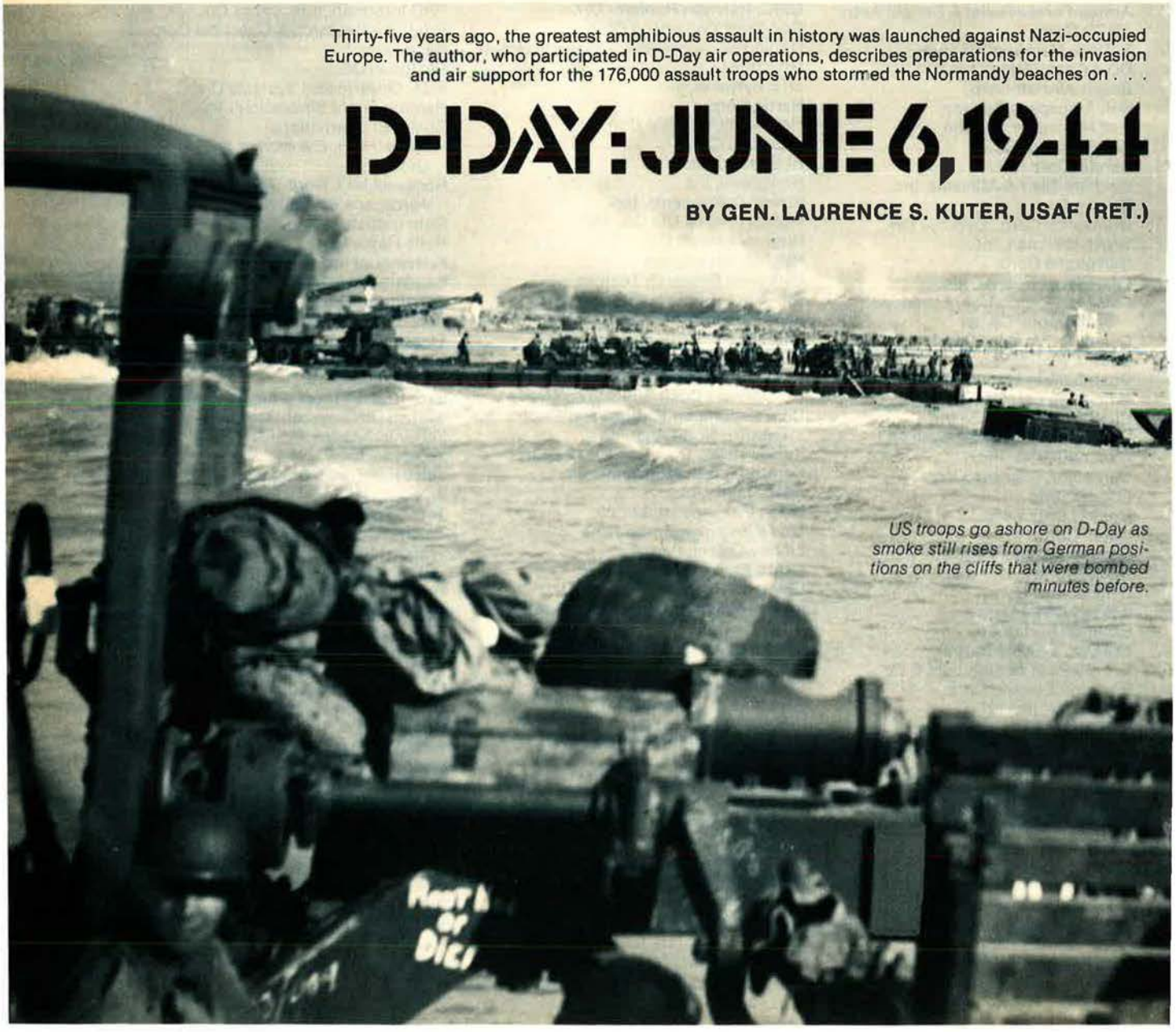
The following excerpt is from notes written by General Kuter after his return to Washington on June 23, 1944. The excerpt covers only the period from May 29 to June 7 (D+1). The latter part of General Kuter's notes covers the Combined Chiefs of Staff meetings after D+1 and his subsequent visit to the Mediterranean Theater.

—THE EDITORS

TWENTY-FOUR hours and eleven minutes after leaving Washington, we arrived at Bovingden, our southernmost heavy bombardment station in England. At Bovingden, we were met by all of the official transportation reserved by the European Theater of Operations for their high-level visiting firemen. My baggage was loaded into one seven-passenger Packard limousine, vintage about 1938, which followed me as I joined Brig. Gen. Ted Curtis, Lt. Gen. Carl A. "Tooey" Spaatz's Chief of Staff at US Strategic Air Forces in Europe, who had come to meet me in his car, and drove with him to Park House in London to have dinner with General Spaatz and his official family.

Dinner was very pleasant, filled with references to the time wives had last been seen in Washington. Warm clear days had permitted many heavy bombers to initiate the campaign against the synthetic oil establishments deep in Germany. At about 11:30, I was driven in to Claridges, where a suite had been reserved for us.

Our first day was largely consumed by making an appointment with, finding, and talking to the Chief of the



US troops go ashore on D-Day as smoke still rises from German positions on the cliffs that were bombed minutes before.

Imperial General Staff, Field Marshal Sir Alan Brooke. He presides for the British Chiefs of Staff as Admiral Leahy presides for ours. We explained that our Chiefs planned on arriving at about D+3, and described the limited agenda that was proposed for discussion. "Brookey" seemed to be remarkably genial and amenable to the American suggestions. He spoke of the coming invasion with general confidence, but some concern over the airborne aspect.

I spent that afternoon and evening again with Tooey Spaatz, Maj. Gen. Fred Anderson, and Ted Curtis, telling them and no one else of the impending arrival of General Arnold and of the subjects he wished to discuss with them.

The next morning, we had a long and interesting discussion with General Eisenhower and his Chief of Staff, Lt. Gen. W. Bedell Smith. They also expressed a somewhat reserved confidence in the plan for the invasion but concern over the airborne portion. There had been rather widely divergent views on the employment of the airborne force. Real concern was expressed over the possible losses that might result. All factors considered, however, General Eisenhower had decided that the ends he expected to gain were well worth the losses (up to thirty-three percent) he feared he might have to take, and so had ordered the operation.

In General Spaatz's headquarters, there also was concern over the employment of his command. General Spaatz had believed that he should go all-out to destroy German sources of both aviation and motor fuel. The RAF school of thought maintained that the strategic effort should be used to disrupt French rail communications and thereby prohibit the rapid movement of German reserves and achieve a more immediate effect on the battle, although many Frenchmen would undoubtedly be killed in the attack on rail transportation. The RAF school of thought prevailed, and orders had been so issued. One will never know which was the better course of action, as the war will undoubtedly be won.

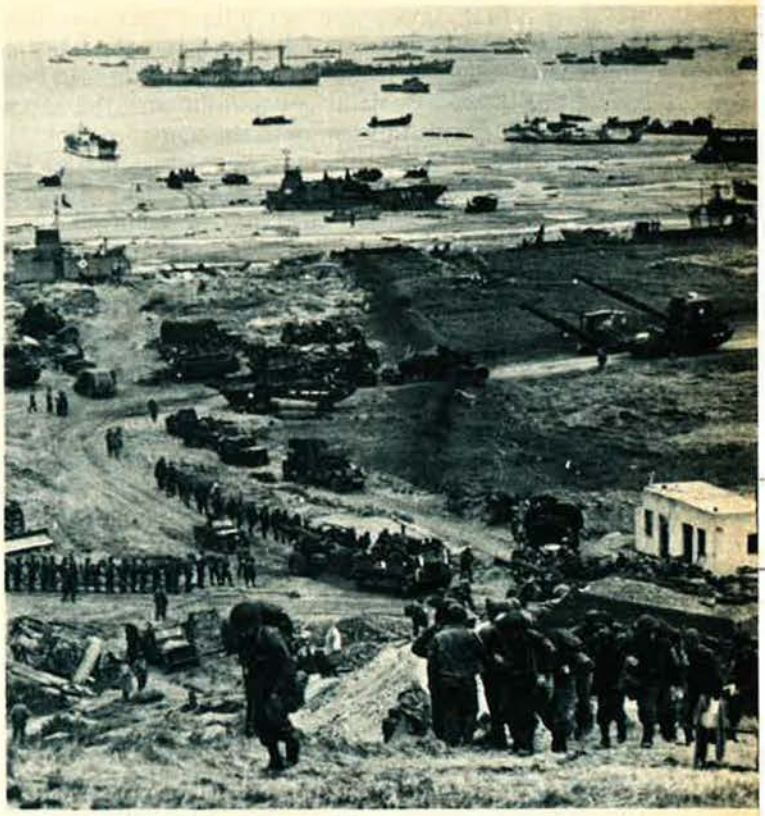
I think it is worthy of note that in the great tenseness prior to the invasion, with the widely varying types of forces involved, some of which (notably the airborne force) were brand new in their application, and the great differing national temperaments involved, there were no more serious differences of professional and national opinion than did exist at that time.

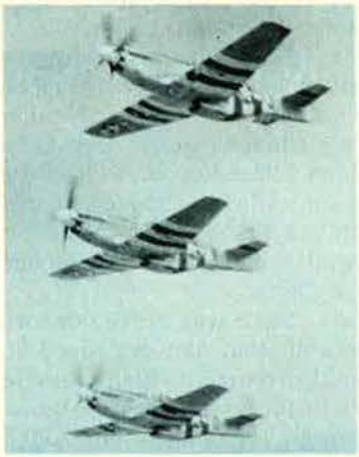
During the next couple of days, General Handy and Admiral Cooke visited ground and naval units in their concentration areas along the south coast of England, while I visited air bases. We also worked in calls on the Marshal of the Royal Air Force, Sir Charles Portal, and the First Sea Lord, Admiral Cunningham. While visiting the units, each one of us arranged to participate in the D-Day operation, each in his own medium.

I naturally arranged to fly with my old unit, the 1st Bombardment Division, whose targets fortunately were in the center of the beachhead for the Zero-Hour attack.

Preparations for D-Day

In visiting the air units prior to D-Day, my initial impression was of a lack of Air Force interest in the D-Day operation of the surface forces. In contrast to the high





Above, a Normandy beach on D+2, with a few of the 4,000 ships, needed to move the invasion force across the Channel, lying offshore. Left, these Mustangs, wearing invasion stripes, encountered no Luftwaffe opposition on D-Day. Below, Ninth Air Force B-26s had done a thorough job of isolating the battlefield by bombing bridges, roads, and rail lines.

state of tension in the ground and naval units, the air units seemed almost indifferent. To one who did not know these units, that atmosphere would have been alarming. The facts in the case are very simple, however. This air crowd had been fighting its battle day in and day out for a couple of years. Its role in connection with the actual invasion was only a little more of the same, except this time against very much softer, less-heavily defended objectives. There was, of course, no indifference. Interest in the success or failure of our units on the ground was very deep and very real.

In visiting Jimmy Doolittle's (Eighth Air Force) headquarters, I learned from Maj. Gen. Pat Partridge of an action that impressed me as very sound preparatory thinking and operating. Anticipating that this great force of heavy bombers might have to bomb the beaches of Normandy through an overcast when our own troops were very close to the beach line, two bombing missions involving large forces were executed against the beaches near Calais where, through broken clouds, bombing was done on instrument.

Observers in fighters at low altitudes watched the points of impact of the bombs. It was determined at just what point on the beach one might aim his bombs to be sure of not hitting boats approaching the beaches. Then, to be sure that these instruments for blind bombing would not show densely packed landing craft as a false beach, the entire formation returned over the Portsmouth area, which was teeming with ships, to get some practice in differentiating between a ship line and a shore line. This foresightedness was not in vain.

A couple of days before D-Day, our party reformed and, as a group, went to advance headquarters to call on General Montgomery and on Admiral Ramsey. Neither was present. Montgomery's Chief of Staff, Maj. Gen. Freddie de Guingand, whom I had known well in the Western Desert Campaign, and Admiral Ramsey's Chief of Staff discussed the situation with us. In Montgomery's headquarters, there was again great general confidence but doubt as to the airborne effort.

In Ramsey's headquarters, there was grave concern lest the same naval antiaircraft that had destroyed so many of our troop-carrier transports in Sicily should shoot down great numbers of the vast swarm of transports that would be returning over units of our Allied fleet after dropping their gliders and paratroopers. His concern was truly justified. In total darkness, particularly when attacks from German bombers were to be expected, the problem of avoiding firing on our own low-flying aircraft was very great. As a result of this deep concern, no doubt, I know no instance of any gun aboard a naval vessel firing at a transport on the night of D–1.

Our party went to Stanmore to visit Air Chief Marshal Leigh-Mallory at his headquarters of the Allied Expeditionary Air Forces. While there, his American Deputy Commander, Maj. Gen. Hoyt S. Vandenberg, was our principal guide. In Leigh-Mallory, we found a bubbling, effervescent confidence in the air effort as a whole, but a very grim, all-pervading doubt as to the efficacy of the airborne effort. General Vandenberg's views were gloomy, though not so gloomy as Leigh-Mallory's.

About two days before D-Day, the sailors and soldiers in our party went to the port to get aboard their little boats, but my group had plenty of time to visit more air units. After visiting Hq., Ninth Air Force, I went with Lt. Gen. Lewis Brereton to visit his IX Bomber Command and hear his final "address to the troops."

At that headquarters, Brig. Gen. Sammie Anderson, bursting with confidence and pride in his splendid medium and light bombardment wings, had assembled his wing and group commanders. Brereton passed on to the commanders Eisenhower's words of satisfaction in their training, pride in their accomplishments, and confidence in their achievement in the invasion. Brereton added a few very well chosen thoughts of his own, with exactly the right amount of the dramatic and exactly the right amount of American swearing. It was very pleasant to listen to the tribute he paid to the planning, training, and logistics support which we, in the States, had given to make, as he said, their great effort possible.

Sammie Anderson handed me five photographs as soon as we met and kept pressing until I went over them in detail. They showed five bridges across the Seine. His medium bombers had destroyed those bridges with far higher accuracy than any of us had ever believed medium bombers could achieve. His climax picture was of a large steel railroad bridge, the central spans of which were lying in the water. There were no bomb craters visible in this picture. Every one of his bombs had hit the bridge or gone into the water alongside. That is, without doubt, the finest example of precision bombing I have ever seen.

Sammie's medium and light bombers normally operated above the 9,000-foot altitude to avoid excessive losses to German light flak. For the zero-hour operation however, they were prepared to go in as low as 2,500 feet if a low ceiling forced them down. They would have taken very heavy losses at that altitude, but they would have done their business also.

To avoid disclosing the area of the intended invasion none of the bombers had been permitted to fly close enough to the invasion beaches to see or to know them. Consequently, detailed relief maps had been built. They portrayed the country exactly as it was expected to be seen from 9,000 to 12,000 feet at early daylight on D-Day. Each crew was thoroughly briefed on its specific target on these detailed relief maps. Here again was excellent preparatory thinking carried out to the last detail.

Among the fighter-bombers of the Ninth Air Force, there was no cold indifference. These boys were keyed up. They had spent months and months escorting bombers and doing other fighter chores, and rarely finding German airplanes. When the invasion began, they were sure they would find plenty of German planes and, furthermore, they could get down into the battle area and on the roads and railroads and bomb and strafe enemies that they could see. They were itching for it.

The Bombardment-Fighter Team

On the afternoon of June 4, I went up to my old headquarters at Brampton Grange to visit Brig. Gen. Bob Williams at the headquarters of the 1st Bombardment Division. I found there the full flowering of a very large, very strong, very able heavy bombardment force which I had had a hand in developing during the lean, bitter, and painful days of late 1942.

I arrived at Brampton Grange at about dinner time on June 4. I then learned that D-Day would not be June 5 as planned, because of bad weather. After a very pleasant

dinner with this group of old friends, I went to Molesworth to visit the 303d Heavy Bombardment Group, which had been in my command a year and a half earlier. I believe that there are no military units in our history that have lost their complete fighting complement as many times as these original heavy bombardment groups in this 1st Bombardment Division. The 303d Group was commanded by an old friend of mine, Col. Hal Bowman. The unit showed not the faintest adverse effect of the enormous attrition it had experienced during the past year and a half.

We found all of the officers assembled in the club for a show by some entertainers from a London night club. Over the platform was a large sign reading "Welcome, Lieutenant Carnes." We learned that about a month earlier the group had been on a difficult mission deep in Germany. Four Messerschmitt 410s had formed in the rear of the group in echelon, preparatory to launching a heavy rocket barrage. The Me-410s dropped back out of the range of our guns, assuring that everything was perfect before they fired into the group. A P-51 approached from the rear of the Messerschmitts. It formed at the tail of the echelon and very promptly, neatly, and cleanly shot down those German airplanes one by one from rear to front before any of them fired a round at the group.

Hal Bowman had not been leading his group on that mission. He did come into their interrogation, however, and shortly found it would be necessary to find the pilot of that P-51 before order could be restored in his organization. "CD-6" was painted in large characters on the tail of the P-51, and Lieutenant Carnes was the pilot of Charlie-Dog 6.

That evening the 303d Group belonged to Lieutenant Carnes and they told him so by presenting a bottle of Napoleon brandy to him—source very carefully concealed.

That story is a far cry from the touchy relations existing between the fighters and the bombers a year and a half ago when the fighters maintained that if they closed in on the bombers, the bombers' careless firing and indif-

AAF B-17s (above) and B-24s, along with RAF bombers, had prepared the way for the invasion by continuous attacks on war-production plants and oil refineries. On D-Day, more than 1,800 heavies bombed the beachheads five minutes before Zero Hour. Left, two US airborne divisions were dropped behind the beaches to facilitate later linkup of forces on Omaha and Utah beachheads.

ferent identification of aircraft resulted in our fighters being shot down by our own guns. The bombers maintained that our fighters stayed so far away they provided no protection from the Germans at all. Fighters and bombers are much better acquainted now than they were then.

On June 5, which proved to be D–1, I drove north through Peterborough and Nottingham to visit our troop carriers. I wanted to find how far down the echelon of command the higher command's doubt about effectiveness of the airborne plan had permeated. I knew that Brig. Gen. P. L. Williams was one who doubted its effectiveness. If the commander doubts the ability of his unit to carry out its mission, the situation naturally is very serious.

When I reached the headquarters, P. L. Williams was absent, but I found the Chief of Staff and Deputy Chief of Staff and the Operations Officer, Col. Jack Sprague. Far from doubt, I found the highest order of confidence and esprit conceivable. This unit had worked itself up to a fighting pitch at precisely the right psychological moment.

The staff of the IX Troop Carrier Command did have one very great worry—that D-Day might be postponed another twenty-four hours. Throughout the barracks mild fights were breaking out. One man would playfully push another and would suddenly be clipped on the jaw. His squad would immediately hunt up the fellow who clipped their member on the jaw and squad, platoon, company, and battalion fights were in the making.

The fighting spirit that was breaking out in both the airborne and troop carrier units was being kept in hand by a major effort on the part of all commanders, down through the corporals. The IX Troop Carrier Command staff did seriously doubt their ability to hold this fighting spirit in check for an additional twenty-four hours. That was their one and only worry. This unit had obviously been keyed to an intense high in fighting spirit at precisely the right moment. This item in morale leadership was one of the very many unrecorded contributions to the success of the invasion on D-Day.

Zero Hour

Upon returning to Brampton Grange, I found that instructions for the Zero Hour, D-Day mission had been received by teletype from the Eighth Air Force. By about 10:00 o'clock, all details of the field order were completed. This order had been prepared in outline by the few officers in the top staff echelon of the bombardment division who knew the details of the D-Day operation several days previously. When the order was issued to the division's four wings, it was eleven feet long on teletypewriter paper.

At about 11:00 p.m., when Bob Williams and I were assured that all had been done that could be done, we went to bed to be awakened at 3:00 a.m. After a hurried breakfast, Williams, Bart Beaman, and I drove to Chelveston, where Williams's special B-17 was parked.

We took off just after the last airplane of the B-17 group stationed at Chelveston. While the squadrons, groups, wings, and air divisions were maneuvering into their separate assemblies, we flew singly to the south coast of England and out over the Channel to get an advance look at the weather, and to be sure to be there when the first units crossed their prescribed lines of departure for the attack.

Gen. Laurence S. Kuter was graduated from West Point in 1927. During World War II, he commanded an Eighth Air Force bomb wing, served as Deputy Commander of the Northwest African Tactical Air Force, and was Deputy Commander of the AAF in the Pacific. Between operational tours, he was General Arnold's Assistant Chief for Plans. After the war, General Kuter commanded MATS (now MAC), Air University, PACAF, and NORAD. He retired in 1962 to become Executive Vice President of Pan American Airways. He and Mrs. Kuter now live in Naples, Fla.

We found broken clouds extending down to about 1,000 feet beginning at the English coast. Further across the Channel, clouds became thicker and the tops higher. It appeared that at mid-Channel the overcast would be solid with a smooth top at about 12,000 feet, extending down to an irregular ceiling at about 1,000 feet.

This weather condition was the one that had been most feared. German bombers or fighter-bombers might fly singly through smooth clouds over our densely packed ships in the Channel, protected by the weather from our vast superiority in fighters. It would have been possible for single German aircraft to dip down at almost any point, drop its bombs on a ship (they were so close together it would have been hard to miss), pull back up into the cloud, and proceed home for more bombs to get more ships.

If Göring and all of the meteorologists of the Luftwaffe had prescribed ideal weather for the German Air Force to operate against our invading fleet, they could not have set up more favorable conditions than what actually existed from the center of the Channel to the invasion beaches on D-Day, June 6, 1944.

However, at that time the 1,864 heavy bombers had a bit of a problem of their own. They were scheduled to cross a line only about thirty miles long on the south coast of England during a precise twenty-minute interval, so timed that the last bomb would be released on the invasion beachhead precisely five minutes before Zero Hour for the first wave of troops to land.

The leading elements of each of the three heavy bombardment divisions approached the line of departure no more than ten seconds earlier or ten seconds later than prescribed.

We joined the last group in the bombardment division, in the center of the line. That enormous swarm of heavy bombers proceeded steadily across a solid unmarked overcast to an invisible point in space. Bombs were released into the solid clouds below as the bombers turned right and proceeded in their enormous column along the prescribed route of withdrawal, back through prescribed lanes to points where divisions, wings, and groups broke off, each to return to his own airdrome to reload for the second mission.

During all this time, no German fighter was seen. This seemed especially ominous to us, as we believed the smooth cloud layer below us was swarming with fighters carrying bombs and dipping down to get the ships in the Channel.

The only hostile action we saw was a moderate amount of heavy-caliber antiaircraft fire that burst sporadically, poorly aimed, among the heavy bombers, doing no dam-

age. We did, however, see six large antiaircraft rockets come up through the clouds near us. At the end of their spiraling trajectory they burst in a very large explosion. Although this rocket fire was heavier than had ever been observed before, it was wholly ineffective.

A Miracle of Science and Training

In returning across the Channel, we could see through holes in the clouds that there were ships in every visible spot of water. Each was leaving the crooked wake of a ship doing an antisubmarine zigzag or irregular maneuver to avoid bombers. Each glimpse of the Channel presented a picture of vast numbers of ships diving about through the water, much like cockroaches in a closet when the door is suddenly opened.

We returned uneventfully to Chelveston. There was very little conversation. Each of us was thinking of the field day the Luftwaffe might be having, darting out of that cloud cover against our shipping. We felt the toll might be heavy indeed, but trusted that it was not prohibitive.

I left Bob Williams at Brampton Grange and drove back to Hq., Allied Expeditionary Air Forces. At about noon, I met General Vandenberg. My concern undoubtedly showed in my expression. It was quite some time before I could believe his statement that no Luftwaffe aircraft—fighter, fighter-bomber, or bomber—had as yet appeared on the scene. Throughout June 6, the remnants of the Luftwaffe missed the greatest opportunity any air force could ever have to do an enemy maximum damage with minimum exposure. The total failure of the Luftwaffe was a wholly unexpected contribution of the greatest magnitude to the success of that cross-Channel invasion.

To Van, I described the heavy bomber effort as a miracle of science and training. Those 1,864 heavy bombers were manned by more than 20,000 officers and men. As a general statement, every one of those 20,000 Americans had been in the cornfields, behind the ribbon counters, or in the schoolrooms only a year and a half ago. As a general statement, any one of those 20,000 men might have pushed the wrong button or bumped into an emergency release and dumped a load of high explosives into the densely packed Channel below them.

Those 20,000 men proceeded above a solid overcast to a shoreline that could be seen only through instruments that were themselves inventors' dreams but two years ago and which not one of the men had ever seen until nine months ago, continued on to assigned targets which none had ever seen, dropped all of their bombs successfully, and returned to their bases. There is no record of even one man releasing one bomb that so much as scratched one boat. That such great numbers of recent farm boys, school boys, and ribbon clerks could aim bombs precisely at a wholly invisible target is truly a scientific miracle. This combination of things is something that happens in war but surely never happens in peace.

The Airpower Payoff

I spent most of the rest of D-Day with Van, watching the great control board at Allied Expeditionary Air Forces. On the board, the P-38 fighters I had seen sweeping the Channel high above the bombers were shown by their markers still patrolling the Channel for the Luftwaffe that had not yet appeared. A record on a blackboard showed that all of the heavies had bombed at the proper time and place and returned to their bases with a loss of two airplanes. I had seen one B-24 go down burning in about mid-Channel. The cause of this accident was unknown, but it surely was not due to enemy action.

On D+1, we learned of the first of spasmodic, unsuccessful Luftwaffe efforts to operate against the invasion. A torpedo bomber unit appeared on the night of D-Day. This particular unit had been training for some time in night torpedo work—obviously to meet the cross-Channel threat. Approximately thirty of their aircraft showed up on the radar screen. Several went down over German-defended points, apparently from German antiaircraft artillery. More went down when our night fighters met them. A small number reached some of our ships, launched torpedoes, and scattered. One torpedo hit one of our command ships with apparently no serious damage as the ship reported it had been hit but was proceeding with its mission, which it continued for the next three days. It became evident on D-Day, for the first time, that the Luftwaffe was a soundly defeated air force. The cumulative effect of several years' bombing by the RAF and a few months' full-strength precision heavy bombardment by the B-17s and B-24s of the AAF, together with the work of our fighters, brought forth their full fruits on the day of the invasion.

The destruction of aircraft factories had deprived these units of reserves. The shortage of combat-type aircraft had denied the crews the training needed to meet the invasion. Destruction of synthetic aviation gasoline refineries had created a shortage of gasoline to further restrict the training and operations of the aircraft that were left.

In addition, the fighters and the fighter-bombers had moved from their permanent bases in Germany to temporary bases in France. Frequently on arriving they found their forward airdrome had just been attacked by our bombardment or fighter-bomber forces, the airdrome was postholed, and they had to scatter and land at unscheduled fields. Inadequate motor transportation and gasoline (all due to bombing attacks on factories as well as recent strafing and bombing on the roads) made delivering fuel to the scattered airdromes most difficult.

Having landed at their scattered airdromes, they found that the bombing of communications centers prohibited calling each other and finding where to reassemble. Regardless of morale, esprit, or fighting heart, this was a defeated air force. It could obviously, however, regain its strength if its sources were left too long undisturbed.

It is most significant that the afternoon of D-Day saw an order issued from United States Strategic Air Forces to the Fifteenth Air Force in Italy stating in substance: "From this day on you need spend no further effort in the battle area. We will handle it here. You go back and keep working on the sources of military strength, particularly air strength, deep in Germany."

Fears of the air strategists that the invasion would terminate the employment of heavy bombers deep at the sources of German strength in favor of barrage bombing in the battle area were allayed before the sun set on the first day of the invasion. The high command had been much better educated on the employment of airpower than the Air Force enthusiasts had appreciated. ■

US AIR FORCE ANNIVERSARY ISSUE

The September "Anniversary" issue of AIR FORCE Magazine will be distributed to those attending AFA's 1979 Aerospace Development Briefings and Displays. In addition to this bonus readership, all advertisements in this issue will be prominently displayed in our "Industry Salutes the Air Force" exhibit at the entrance to Exhibit Hall. Closing for reservations is July 27. Why not join us? It is a good advertising buy!

AIR FORCE

A lighter-than-air pioneer and pilot of the record-setting Explorer II *balloon ascent, he went on to become a leading World War II strategic planner, Deputy Commander for Operations of Eighth Air Force, and head of the USSBS military advisory group. As first Commandant of the Air War College, he strongly influenced the development of postwar airpower doctrine.*

Maj. Gen. Orvil A. Anderson

BY LT. COL. JOHN H. SCRIVNER, USAF (RET.)

IN THE early days of airpower, it was possible for one man to make a variety of major contributions to military aviation. It was, for instance, possible to be a space explorer, an aerial warfare theorist, a strategic planner, a combat leader, an evaluator of airpower, and a teacher of doctrine for the future. Maj. Gen. Orvil Anderson was such a man.

Anderson won balloon navigator wings during World War I, and after the war stayed on in the Air Service to become a balloon pilot. He began his career as a record-setter with duty as copilot on the C-2 Army blimp, which made the first transcontinental, lighter-than-air (LTA) flight in 1922. The Army continued its interest in LTA, and Anderson had the opportunity to fly most of the blimps and dirigibles the services tested. His final report, following tests of the TC-13 and TC-14 airships, concluded that, for the Army, the airship "... seemed to have no military worth." The conclusion of these tests freed Anderson for participation in one of the Army Air Corps's most exciting projects—exploration of the stratosphere.

Operations at very high altitude had been under study for some time. Earlier attempts had been made to explore the upper atmosphere with rudimentary equipment, but not until late 1933 did American balloonists set a world altitude record of 61,237 feet. Almost before the record was in the books, the Russians exceeded it by 2,000 feet. To recapture the record, and to explore the upper atmosphere with sophisticated instruments, an agreement was reached between the Army Air Corps and the National Geographic Society in the spring of 1934. The resulting balloon expeditions were among man's greatest achievements.

Orvil Anderson, then a captain, was assigned as backup crewman to Maj. William E. Kepner and Capt. Albert W. Stevens for the balloon ascent into the stratosphere. *(See General Kepner's "Reminiscenses of an LTA Pilot," September '78 issue.)* He helped select the launch site, a depression in the ground near Rapid City, S. D., dubbed the Stratobowl, and was in charge of the camp and ground crew. At the last moment, Ander-

Crew of the ill-fated Explorer I *flight of 1934. From left: Capt. Albert W. Stevens, Maj. William E. Kepner, Lt. Orvil A. Anderson.*

son was added to the crew, and the three climbed into the round gondola of *Explorer I* at dawn on July 28, 1934.

The ascent was uneventful until the balloon reached 57,000 feet. At that altitude, Anderson and Kepner discovered several large rips in the balloon's fabric. The tears made it impossible to reach the planned height. Anderson began to valve the helium, stabilizing the balloon at 60,613 feet, and starting a rapid descent. On the way down, most of the balloon's fabric tore away to leave the gondola dangling from the parachute-like remainder.

As the gondola picked up speed in its fall, Kepner ordered the crew to bail out. All three aeronauts got out as the balloon exploded, plunging the gondola into a cornfield and smashing its precious instruments. Anderson and the others landed safely.

Almost immediately work began on a second balloon and gondola, *Explorer II*. Anderson was named pilot after Kepner withdrew because of other commitments. After numerous delays, the weather cleared enough for the launch on November 11, 1935. The gondola barely cleared the rim of the Stratobowl, but the rest of the ascent was without incident. *Explorer II*, with Anderson and Stevens sealed inside, rose to a record-breaking 72,395 feet, where Stevens took man's first picture of the curvature of the earth. After completing several experiments, Anderson brought the huge balloon smoothly to the ground with a balloon altitude record that stood for twenty-two years. Anderson and Stevens were instant heroes. For the rest of his life, "Andy" was introduced as the pilot of the famous *Explorer II*, and he never tired of the accolade.

In 1935, Captains Stevens and Anderson, here being congratulated by President Roosevelt, set an altitude record in Explorer II. *From left: Assistant Army Secretary H. H. Woodring, Stevens, the President, Army Chief of Staff Gen. Malin Craig, Brig. Gen. Oscar Westover, and Anderson.*

Strategic Airpower—Theory and Application

The theory that airpower could bring an industrial nation to its knees was rejected by most of the military in the 1930s. Until technology caught up with theory, they were essentially correct. The B-17 coupled with the Norden bombsight made it feasible, at least in the minds of Air Corps thinkers, to implement the strategic bombardment concepts of Billy Mitchell and Giulio Douhet, which were being taught at the Air Corps Tactical School at Maxwell Field, Ala. Anderson spent a year at the school in 1936–37 and came away from Maxwell a strategic bombardment theorist and devotee.

After the Tactical School, Anderson was assigned briefly to the Air Corps Board, where he wrote the first field manual for air-ground operations on which many World War II tactics were based. His next duty was at the Pentagon in the office of Air War Plans. Here, working with Col. Harold L. George, Lt. Cols. Kenneth Walker and Haywood Hansell, and Majs. Hoyt Vandenberg and Laurence Kuter, Anderson helped refine the theories of strategic bombardment.

As war approached, the group began work on the famous AWPD-1, and later AWPD-42, war plans that reflected the airpower theories of the 1930s and guided the American war effort in the air. In 1943, Anderson was assigned to the European Theater, where he would assist in proving the validity of those theories.

A joint Anglo-American Combined Operational Planning Committee (COPC) was formed in London to select strategic targets and to coordinate the American and British bombing campaigns. As chairman of the Combined Operational Planning Committee, Anderson had the opportunity to implement some of the planning he had so recently helped to develop.

In 1944, Anderson was assigned as Eighth Air Force Deputy Commanding General for Operations. He continued to wear his COPC hat, creating the unusual situation of planning and coordinating missions and then directing their execution. During this period, he selected the targets, planned, and directed the missions for Operation Big Week of February 1944. These concentrated bombing strikes were the beginning of the 1,000-plane raids over Germany. They marked the turning point of the air war over Europe and proved valid much of the Tactical School's daylight strategic bombardment doctrine. To be sure that the massive bombing of Europe had been as effective as claimed, however, the end results had to be assessed. Anderson was at the heart of that action, too.

The Strategic Bombing Surveys

To analyze the European bombing, President Franklin D. Roosevelt appointed a blue-ribbon committee the United States Strategic Bombing Survey (USSBS) most of whose members were civilians unfamiliar with military operations. To assist them, a military advisory group headed by Anderson was assembled. Headquartered in London, General Anderson and his staff advised the committee on the technical details of strategic bombing operations.

The USSBS committee sent small information-gathering teams throughout the European Theater. One team, searching Flensburg, Germany, discovered Albert Speer, Hitler's Reichsminister of Armament and Production. A call to London brought the USSBS committee for a four-day interrogation. It was a priceless opportunity since Speer, more than any other German, had the data necessary to assess accu-

Lt. Col. John H. Scrivner, Jr., wrote his doctoral dissertation on Maj. Gen. Orvil A. Anderson. He was a member of the Air Force Academy history faculty from 1963 to 1968 and served subsequently as Associate Editor of Air University Review *and as Chief of History, Hq., Military Assistance Command Vietnam (MACV). Since his retirement in 1975, Colonel Scrivner has been Division Director, Social Sciences and Education at Pikes Peak Community College, Colorado Springs, Colo.*

rately the capability of airpower to disrupt the economy of a nation at war.

At the end of the sessions, Speer presented Anderson with a note of surrender along with his personal pistol. (Speer's book, *Inside the Third Reich,* identifies the recipient as Maj. Gen. S. E. Anderson, who was not present at the interrogation. The note and pistol are in the Air Force Museum, a gift of Mrs. O. A. Anderson.)

The USSBS committee concluded that " . . . Allied air power was decisive in the war in western Europe." The immediate question, however, was the value of the Survey's findings to the target planners fighting the Japanese war. Anderson flew to Washington for conferences with the planners and helped establish target priorities for the Japanese homeland.

The surrender of Japan brought a reconstituted USSBS team to Tokyo. Again, Anderson was appointed chief of the military advisory group, no doubt relishing what seemed to be an open-and-shut case on the defeat of a nation by airpower. The only question was whose aerial forces had contributed most to the victory. On that point, controversy arose with the US Navy.

The "Anderson-Navy War," as it has been called, boiled down to a dispute between Anderson and his Navy counterpart, Rear Adm. Ralph Ofstie, a dedicated carrier airman. Each was determined that the other's service should not claim the major share of credit for the defeat of Japan and thereby gain the larger share of future defense budgets. In the end, both Anderson and Ofstie published their own reports, both somewhat biased. Overall, however, the USSBS reports on Japan supported airpower theories even more strongly than did the European.

Founder of the Air War College

In 1946, General Anderson was named Commandant of the newly created Air War College at Maxwell Field. His work with doctrine, plans, operations, and assessment, and his inspirational leadership, equipped him superbly to head an institution dedicated to developing Air Force leaders. From its beginning, the College functioned well, providing a forum for experienced officers to exchange ideas and time to reflect on the most effective ways to employ airpower.

Anderson was in constant demand as a public speaker. He seldom used notes and, as his students learned, was difficult to stop once started. His consistent themes were that airpower was the weapon of the future, that the US must remain strong, and that the best defense was a powerful offense. On occasion, he would pursue the latter idea into its ultimate, a preventive "slap" at the enemy. He would always caution that such a "slap" should occur only after all diplomatic means had failed and war was inevitable. This was not an uncommon concept in the late 1940s, but was easily misunderstood, especially once the Korean War erupted in 1950.

During a lull in Air War College activities in the early months of the Korean conflict, Anderson took some time out for surgery. He was resting in his quarters, but agreed to talk to a local newspaper reporter about a pending Drew Pearson article critical of the College. Anderson insisted that the interview be off the record and presumably had the reporter's agreement. The General apparently reviewed his ideas on the use of airpower and allegedly said that, if given the order, he could wipe out Russia's atomic capability in a week. The reporter seized upon that statement and printed the interview.

The Pentagon's reaction to the headlines, whether correctly quoted or not, was swift. At a time when President Harry Truman had silenced Gen. Douglas MacArthur and his own Secretary of the Navy, Francis Matthews, for much the same kind of statements, it was to be expected that official Washington's patience was thin. Anderson was ordered transferred, but declined the move and retired as a major general in December 1950—a regrettable end to a distinguished career. He died in 1965 at the age of seventy.

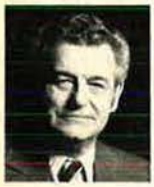
Flyer, explorer, planner, leader, analyst, scholar, writer, and teacher, Orvil Anderson was in every sense an airpower pioneer. His influence upon the thinking of future Air Force leaders was incalculable. Anderson Hall, the home of the Air War College, stands as a monument to his achievements. ■

During World War II, Anderson (center) served as Eighth Air Force Deputy for Operations. Here he discusses a Berlin mission with Brig. Gen. Charles Banfill (left) and Eighth Air Force Commander Lt. Gen. Jimmy Doolittle.

AFA's Committees, Councils and Policy Advisors for 1979

AFA's Committees and Councils, comprised of volunteers, carry out Association business and advise the National President. AFA Policy Advisors are selected by the National President for their experience and professional knowledge in areas of concern to AFA. They counsel the President on developments in their fields.

Executive Committee


Hasler


Douglas


Price


Gross


Harris


Donnelly


McBride

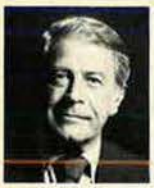

Rapp


Shosid


Straubel

The Executive Committee acts in behalf of the Board of Directors between Board meetings. It is chaired by National President **Gerald V. Hasler,** President and Chief Executive Officer of an architectural design and remodeling corporation in Albany, N. Y. The Committee includes AFA Board Chairman **George M. Douglas,** General Manager of Marketing, Mountain Bell Telephone Co., Denver, Colo.; AFA National Secretary **Jack C. Price,** Air Force civilian executive, Ogden Air Logistics Center, Hill AFB, Utah; National Treasurer **Jack B. Gross,** businessman and civic leader, Hershey, Pa.; **Martin H. Harris,** permanent AFA National Director and senior member of Martin Marietta Corp.'s professional staff, Winter Park, Fla.; **Jon R. Donnelly,** AFA National Director and State Editor, *Richmond News-Leader,* Richmond, Va.; **William V. McBride,** AFA National Director and recently retired Air Force Vice Chief of Staff, San Antonio, Tex.; **William C. Rapp,** AFA National Director and District Manager of Toll Services, New York Telephone, Buffalo, N. Y.; and **Joe Shosid,** Fort Worth, Tex., permanent AFA National Director and Assistant to Jim Wright (D-Tex.), Majority Leader of the US House of Representatives. **James H Straubel,** AFA Executive Director, is an ex-officio, nonvoting member of the Committee.

Finance Committee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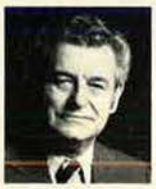
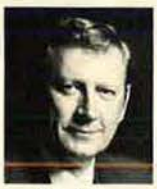

Hasler

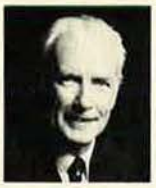

Douglas


Church


Ewing


Field


Jones


Nettleton


Newhouse


Ostrow


Scott


Webb

Chaired by AFA Treasurer **Jack B. Gross,** business ar civic leader from Hershey, Pa., this Committee reviews AFA's fiscal policy and makes appropriate recommendations to AFA National President **Gerald V Hasler,** who joins AFA Board Chairman **George M Douglas** as an ex-officio, nonvoting member of the Committee. Members are: **Charles H. Church, Jr.,** Overland Park, Kan., former President of AFA's Harry S. Truman Chapter and President of the United Missouri Bank of Hickman Mills, Kansas City, Mo.; **Dwight M. Ewing,** Merced, Calif., National Vice President for the Far West Region, realtor and property manager; **Alexander C. Field, Jr.,** Chicago, Ill., National Vice President for the Great Lakes Region and Vice President for Public Affairs, WGN TV; **Francis L. Jones,** Wichita Falls, Tex., National Vice President for the Southwest Region and property manager; **J. Gilbert Nettleton, Jr.,** Washington, D. C., AFA National Director and Vice President/Marketing, Fairchild Industries; **James O. Newhouse,** Germantown, Md., AFA National Director and Corporate Manager of Domestic Marketing, Fairchild Industries; **Martin M. Ostrow,** Beverly Hills, Calif., permanent AFA National Director, attorney; **C. W. Scott,** O'Fallon, Ill., Illinois State AFA President and an executive with Douglas Aircraft Co., McDonnell Douglas Corp.; and **William N. Webb,** Midwest City, Okla., Oklahoma State AFA President and an Air Force civilian executive at Tinker AFB.

Constitution Committee


Harris


Brosky


Chandler

Chaired by **Martin H. Harris,** permanent AFA National Director and senior member of Martin Marietta Corp.'s professional staff, Winter Park, Fla., this Committee reviews AFA's National Constitution and By-Laws and recommends amendments. The Committee also reviews AFA's State and Chapter Constitutions and By-Laws to ensure their compliance with the National Constitution and By-Laws. Members are **Judge John G. Brosky,** permanent AFA National Director, Pittsburgh, Pa., and **William P. Chandler,** AFA National Director and a salesman, Bankers Life Insurance of Nebraska, Tucson, Ariz.

Constitution Review Task Committee


Chalif


Brendle


Marriott


Reed

This Committee assists State organizations and Chapters in updating their Constitutions and By-Laws to ensure their compliance with the National Constitution and By-Laws. Chairman is **Amos L. Chalif,** National Vice President for the Northeast Region and a dance studio owner, Chatham, N. J. Members are **Cecil G. Brendle,** National Vice President for the South Central Region and an aircraft maintenance officer, Alabama Air National Guard, Montgomery, Ala.; **Edward C. Marriott,** National Vice President for AFA's Rocky Mountain Region and President, Consolidated Maintenance Co., Denver, Colo.; and **Margaret A. Reed,** National Vice President for AFA's Northwest Region and Administrative Secretary, General Electric Aircraft Engine Group, Seattle, Wash.

Audit Committee


Dean


Copeland


Devoucoux


Gisel


Haug


Stewart

Members of this new Committee, appointed by the Chairman of AFA's Board of Directors, meet periodically with AFA's independent and internal auditors. Chairman is **Hoadley Dean,** Rapid City, S. D., National Vice President for the North Central Region and President of Western South Dakota Development Co. Members are **William L. Copeland,** Atlanta, Ga., Georgia State AFA President and President of CICI, Inc. (financial); **R. L. Devoucoux,** Portsmouth, N. H., National Vice President for the New England Region and Account Executive with Dean Witter Reynolds, Inc.; **William G. Gisel,** Buffalo, N. Y., founder and first President of AFA's Lawrence D. Bell Chapter and President of Bell Aerospace Textron; **Roy A. Haug,** Colorado Springs, Colo., AFA National Director and executive with Mountain Bell Telephone; and **Hugh W. Stewart,** Tucson, Ariz., an attorney.

Policy Advisors


Diab


Llenza


Zipp


Rowe


Farr


Morley


Oliver


Kisling


Flynn


Lindberg

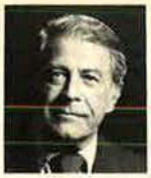

Woods

The following Policy Advisors were selected by the National President to serve during 1979 because of their expertise in areas vital to AFA's mission: **Maj. Gen. Thomas A. Diab, USAFR,** Boston, Mass., Air Force Reserve Advisor; **Maj. Gen. Orlando Llenza,** Adjutant General, Puerto Rico Air National Guard, San Juan, Puerto Rico, Air National Guard Advisor; **John Zipp,** senior civilian executive with the Air Force Accounting and Finance Center, Denver, Colo., Civilian Personnel Advisor; **Kenneth A. Rowe,** Assistant Director, Virginia State Aeronautics Division, Richmond, Va., Civil Air Patrol Advisor; **Col. John W. Farr, USAF (Ret.),** Aerospace Education Instructor, Forest Park Senior High School, Forest Park, Ga., Air Force Junior ROTC Advisor; **Lt. Col. William G. Morley, USAF (Ret.),** Executive Administrator, Arnold Air Society and Angel Flight, Washington, D. C., Senior ROTC Advisor; **Brig. Gen. Dalton S. Oliver, USAFR,** Mobilization Assistant to Air Force Surgeon General, Baton Rouge, La., Medical Advisor; **CMSAF Richard D. Kisling, USAF (Ret.),** a civilian executive with the Air Force Deputy Chief of Staff, Personnel, Oxon Hill, Md., Retiree Advisor; **Maj. Gen. John P. Flynn, USAF Ret.),** Washington, D. C., Special Advisor for the Veterans' Administration Study of Former Prisoners of War; **Capt. Craig Lindberg,** AFA Junior Officer Advisory Council Chairman, USAF Academy, Colo., Junior Officer Advisor; and **CMSgt. J. B. Woods,** AFA Enlisted Council Acting Chairman, Washington, D. C., Enlisted Advisor.

Convention Site Committee


Hasler


Douglas


Gross

This Committee recommends suitable sites for AFA National Conventions. It is chaired by AFA National President **Gerald V. Hasler,** President and Chief Executive Officer of an architectural design and remodeling corporation in Albany, N. Y. Members are AFA Board Chairman **George M. Douglas,** General Manager of Marketing, Mountain Bell Telephone Co., Denver, Colo.; and AFA Treasurer **Jack B. Gross,** businessman and civic leader, Hershey, Pa.

Junior Officer Advisory Council


Lindberg


Noeller


Smith


Baker


Bellinger


Bewley


Compton


Eddy


Huggins


Malone


Mullaney


Murdock


Roggero


Scott


Timmons


Usher

This Council advises the National President on matters affecting junior officers and includes at leas one representative from each Air Force major command and separate operating agency. The Council's Executive Committee is chaired by **Capt. Craig Lindberg,** USAF Academy, Colo. **Capt. Mary C. Noeller,** Peterson AFB, Colo., is Vice Chairman. **Capt. Michael P. Smith,** Randolph AFB, Tex., is Recorder. Other JOAC Executive Committee members are **Capt. John R. Baker,** Langley AFB, Va.; **Capt. Robert W. Bellinger,** Lowry AFB, Colo.; **Capt. David G. Bewley,** Norton AFB, Calif.; **Capt. Richard N. Compton,** Scott AFB, Ill.; **Capt. Paul Eddy,** Andrews AFB, Md.; **2d Lt. Joann Huggins,** Fort Belvoir, Va.; **2d Lt. Dennis Ray Malone,** Mitchell ANG Base, Milwaukee, Wis.; **Capt. Patrick Mullaney,** Eielson AFB, Alaska; **Capt. Robert M. Murdock,** Scott AFB, Ill.; **Capt. Michael J. Roggero** Randolph AFB, Tex.; **1st Lt. Donald H. Scott,** Grand Forks AFI N. D.; and **Capt. Tim Timmons,** Washington, D. C. Council Advisor is **Maj. Gen. William R. Usher,** USAF Director of Personnel Plans.

Enlisted Council


Woods


Zimkas


Swope


Aguirre


Booney


Bryant


Dillon


Gomez


Hume


LaPointe


Porter


Timmer


Vostatek


Gaylor

This Council, which includes Air Force's Outstanding Airmen for 1978, advises the AFA National President on matters concerning the enlisted force. **CMSgt. J. B. Woods,** Washington, D. C., is acting Council Chairman. **CMSgt. Charles P. Zimkas, Jr.,** Peterson AFB, Colo., is Vice Chairman. **A1C Raymond C. Swope,** McClellan AFB, Calif., is Recorder. Members are **Sgt. Arturo C. Aguirre, Jr.,** Elmendorf AFB, Alaska; **SMSgt. Stanley C. Booney,** Lancaster, Calif.; **TSgt. Joe D. Bryant,** Kirtland AFB, N. M.; **SrA James J. Dillon, Jr.,** Nellis AFB, Nev.; **Sgt. Joseph R. Gomez,** Offutt AFB, Neb.; **CMSgt. Larry E. Hume,** Elmendorf AFB, Alaska; **TSgt. Robert L. LaPointe,** Elmendorf AFB, Alaska; **SrA Patricia A. Porter,** Hensley Field, Tex.; **MSgt. John E. Timmer,** USAF Academy, Colo.; and **SMSgt. Cecil F. Vostatek,** Laughlin AFB, Tex. **Chief Master Sergeant of the A Force Robert D. Gaylor** is Council Advisor.

Vietnam Veterans Week, 1979

By the President of the United States of America

A Proclamation

We are a peace-seeking Nation and we are at peace, but we must not forget the lessons war has taught us, nor the brave men and women who have sacrificed so much for us in all our wars.

The decade now drawing to a close began in the midst of a war that was the longest and most expensive in our history, and most costly in human lives and suffering. Because it was a divisive and painful period for all Americans, we are tempted to want to put the Vietnam war out of our minds. But it is important that we remember—honestly, realistically, with humility.

It is important, too, that we remember those who answered their Nation's call in that war with the full measure of their valor and loyalty, that we pay full tribute at last to all Americans who served in our Armed Forces in Southeast Asia. Their courage and sacrifices in that tragic conflict were made doubly difficult by the Nation's lack of agreement as to what constituted the highest duty. Instead of glory, they were too often met with our embarrassment or ignored when they returned.

The honor of those who died there is not tarnished by our uncertainty at the moment of their sacrifice. To them we offer our respect and gratitude. To the loved ones they left behind, we offer our concern and understanding and our help to build new lives. To those who still bear the wounds, both physical and psychic, from all our wars, we acknowledge our continuing responsibility.

Of all the millions of Americans who served in Southeast Asia, the majority have successfully rejoined the mainstream of American life.

To them, and to all who served or suffered in that war, we give our solemn pledge to pursue all honorable means to establish a just and lasting peace in the world, that no future generation need suffer in this way again.

NOW, THEREFORE, I, JIMMY CARTER, President of the United States of America, call upon all Americans to observe May 28 through June 3, 1979, the week of our traditional Memorial Day, as Vietnam Veterans Week. On this occasion, let us as a Nation express our sincere thanks for the service of all Vietnam era veterans.

I urge my fellow citizens and my fellow veterans, and their groups and organizations, to honor the patriotism of these veterans, and to recognize their civilian contributions to their communities in America today.

I call upon the state and local governments to join with me in proclaiming Vietnam Veterans Week, and to publicly recognize with appropriate ceremonies and activities yesterday's service and today's contributions of Vietnam era veterans.

IN WITNESS WHEREOF, I have hereunto set my hand this twentieth day of March, in the year of our Lord nineteen hundred and seventy-nine, and of the Independence of the United States of America the two hundred and third.

Jimmy Carter

The Bulletin Board

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

AFA Urges a New Look at the Draft

The Air Force Association has formally urged the government to "rehabilitate" the Selective Service System and set up plans to register and classify all eighteen-year-olds. The cornerstone of the revitalized system, AFA President Gerald V. Hasler also suggested to a House Armed Services subcommittee in April, should be local draft boards. It must not be "controlled by Washington."

A random sequence lottery "must be an integral part of this system," Mr. Hasler added. His testimony echoed the Association's 1978–79 policy paper, which declares that the All-Volunteer Force is in trouble and that a return to some form of selective service is necessary.

While USAF recruiting and retention is better than that of the other services, Air Force manning would be "immeasurably strengthened if a strong Selective Service System were in being," the AFA executive said.

Meanwhile, a group of anti-draft congressmen wrote the President, urging him to oppose any form of draft. One of the strongest critics, Rep. John F. Seiberling (D-Ohio), declared that various House members are trying to develop a "consensus favoring resumption of compulsory military service," but "we must not allow ourselves to be taken in by it."

Rep. Ronald E. Paul (R-Tex.) called compulsory service "absurd," then made this startling declaration: ". . . citizens of a free country *owe no legal debt whatsoever* to the state." (Emphasis supplied.)

Other lawmakers have other ideas about plugging the military manning gap. Sen. Thad Cochran (R-Miss.), for example, is pushing S. 842, which would exempt from federal taxes up to $5,000 of the pay received by members of the Reserve Forces. It would help attract and retain good people, he told the Senate.

Sens. Pete V. Domenici (R-N. M.) and Donald Stewart (D-Ala.) are cosponsoring S. 954, which provides additional Army ROTC scholarships for cadets at the nation's six military junior colleges. These include Georgia Military Academy; Kemper Military School, Mo.; Valley Forge Military Academy, Pa.; Wentworth Military Academy, Mo.; New Mexico Military Institution; and Marion Military Institute, Ala. After graduation, the cadets would serve in the Army Reserve and Army Guard, the most undermanned of the Reserve components. Rep. Ike Skelton (D-Mo.) is backing a similar measure in the House, H. R. 3308, "to help alleviate the shortfall."

Joining earlier congressional backers of a national service program is Rep. John J. Cavanaugh (D-Neb.). His bill, H. R. 3603, would require universal registration for all youths, followed by a tour in uniform or in civilian service. Both would be at "a subsistence level of pay."

Other significant new military personnel legislation includes:

- S. 921 (George McGovern, D S. D.) provides medical and denta benefits for divorced spouses of mili tary retirees if the marriage lasted a least twenty years.
- H. R. 3226 (Carl D. Perkins, D-Ky. extends GI Bill education benefits t be used at any time, rather than onl within the ten-year period followin discharge.
- H. R. 3487 (John J. LaFalce, D N. Y.) increases the maximum amoun military and Civil Service people can be reimbursed for loss of possessions, such as in Iran, from $15,000 to $25,000 *(see separate item below).*
- H. R. 3314 (Bob Wilson, R-Calif.) reduces the Social Security offset in the Survivor Benefits Plan from 100 to fifty percent and corrects other inequities in the SBP. The House has twice approved these changes, but the Senate has blocked them. The new bill also would give retirees who are not in the SBP 270 days to sign up after passage.

West German President Walter Scheel, center right, and US Ambassador to Germany Walter J. Stoessel, Jr., center left, are welcomed by Gen. John W. Pauly, left, Commander of Allied Air Forces Central Europe and German Air Force General Franz-Joseph Schulze, Commander of Allied Forces Central Europe, to the Joint AFCENT/AAFCE Static War Headquarters in southern Germany. The two toured the installation and were briefed on the mission of the allied operation.

Retirement Act Hit Again

The Uniformed Services Retirement Benefits Act remains a long way from becoming law. The Act—actually a large package of proposals that would overhaul the military re-

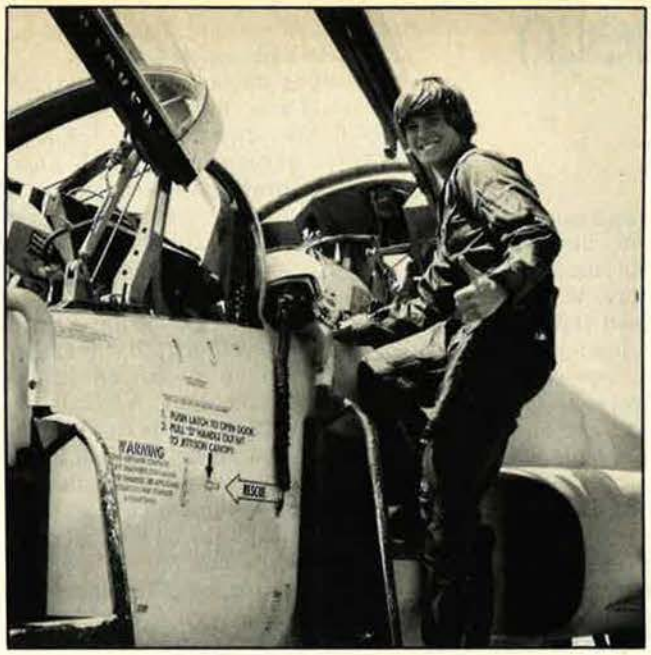
tirement system and address some nonretirement compensation items as well—may never be enacted.

Even so, its very existence and the attendant publicity it receives has a dampening effect on retention and recruiting. That's the feeling among knowledgeable USAF officials who continue to rap the flaws in DoD's big package.

Backing up their contention that the proposed act is bad news for military manning is a recent Air Force survey. It was designed to give management a grass-roots reaction to Defense's proposed retirement system. Participating in the survey were 2,400 officers, 2,600 enlisted people, and 1,000 OTS and basic trainees. The dismal results, the Air Force says, show that if the proposals had already been in effect, half the trainees would not have entered service or would have been undecided. Overall, the survey forecasts that enactment will trigger higher attrition between eleven and nineteen years-of-service groups, loss of experience, higher accession requirements, and loftier training outlays.

Stated another way, one-half to three-quarters of the young USAF people surveyed said the current retirement program had a positive influence on their decision to join up.

Despite such clear-cut warnings of potential disaster ahead, the Defense Department is pushing forward, albeit at a snail's pace, with the Retirement Benefits Act. It does contain several features Hq. USAF welcomes, such as enlisted severance pay and retirement vesting at ten years of service. Even so, the bad features of DoD's package outweigh the good ones. The number-one drawback, of course, is the plan to cut lifetime retirement pay for twenty-year retirees by twenty-five percent.



During a recent flight over Williams AFB, Ariz., A1C Joan M. Combs became the first enlisted woman to fly in a Northrop F-5. The ride in the rear seat of an F-5F was the result of Airman Combs's "complete dedication" and "unsurpassed" reliability in helping to maintain F-5s of the 425th Tactical Fighter Training Squadron, of which she is an F-5 crew chief.

This reduction, Headquarters continues to declare, "would reduce the attractiveness of a military career and make recruiting more difficult in an already tight recruiting market. It would have an adverse impact on retention for all years-of-service groups."

Equally unpopular with USAF officials and rank-and-file members alike is the Social Security offset feature. The Defense Department favors a modified plan that would trim military retired pay, but not actually tamper with Social Security pay, after age sixty-five. However, authorities fear that the Office of Management and Budget will insist on a 100 percent Social Security offset.

The influential OMB was slated to review the Defense package last month, but summer could well arrive before OMB clears the measure for transmission to Congress.

The lawmakers are not expected to act on the proposals in 1979. However, initial hearings later this year before the House Armed Services Military Personnel subcommittee are a definite possibility. So, the threat of approval—and the accompanying damper on recruiting and retention—will be around for awhile.

AFA Believes . . .

Time to Stop Dragging the Anchor

At the end of April, Congressman Bob Wilson (R-Calif.) introduced legislation in the House to establish a "Bill of Rights" for members of the armed forces.

AFA has long supported such a concept. In fact, our 1976–77 Defense Manpower Issues Policy Paper endorsed the Defense Manpower Commission's proposed "Bill of Rights" for people in uniform who have no contractual claims to specific benefits. While we cautioned that "military life is, by its very nature, unstable," we nonetheless felt that a "Bill of Rights" would provide a needed measure of "stability for those in the armed services."

In introducing his bill, Congressman Wilson noted a "growing skepticism with respect to the government's commitment to fulfill the promises made at original enlistment . . . and the situation appears to be going from bad to worse."

He modeled his proposed legislation, he said, on the national Bill of Rights. It calls for, among other things, recognition of the unique dedication of service people; pay, housing, subsistence, and benefits keyed to the unusual demands of service life; guaranteed medical care for active-duty and retired personnel, along with dependents and survivors of both groups; guaranteed commissary and exchange privileges; and a retirement and survivor's benefit program that would not only fairly recompense members for long and faithful service, but that would also attract people to military careers. It ends with a ringing declaration that "the Congress shall enact no laws that abridge or negate the citizen or veteran rights and benefits of any military careerist who has, by dedicated service, earned entitlement to such rights and benefits."

Bob Wilson, an honorary "shipmate" of the Fleet Reserve Association (he's from San Diego, a heavily Navy-populated area), gave credit to that organization for sparking his interest in this legislation and specifically cited the Navy's shortage of skilled petty officers as a factor in his concern. (Congressman Wilson is also a member of the Air Force Association.)

AFA believes, along with Bob Wilson, that "the time is ripe for consideration of such legislation." We'd say, along with our Navy brethren, that it's time for all hands and the ship's cook to get behind it.

—JAMES A. McDONNELL, JR.

The Bulletin Board

The other services also oppose the Defense package and, like the Air Force, are not bashful about saying so. Secretary of the Navy W. Graham Claytor, Jr., even asked DoD Secretary Harold Brown to deep-six the retirement proposals. All the resistance, however, hasn't deterred DoD. "We're going ahead," a top-level source told AIR FORCE Magazine.

Aero Club Expansion Sought

Expand your aero clubs, increase their membership, and modernize the clubs' lightplane fleets, the Military Personnel Center is urging major commands. Center Commander Maj. Gen. L. W. Svendsen, Jr., also told them recently that as commercial and general aviation expand, the aero club program must strive to "keep pace."

Last year was a reasonably good one for the program, though only forty-nine clubs (including fourteen abroad) and 7,472 persons participated. They flew 163,509 hours, fewer than the previous year, in compiling an accident rate of only 6.7 per 100,000 flying hours. The general aviation rate nationwide was 12.6.

The clubs also are in pretty good financial shape, the Center told AIR FORCE Magazine. Their aircraft inventory, consisting of 345 club-operated models, thirty-eight of which are leased from companies or individuals, is comprised mainly of two-seat and four-seat single-engine models. But their average age is about nine years, and newer aircraft generate more flying hours, are safer, reduce down time, and are cheaper to operate and maintain. Accordingly, General Svendsen wants the clubs to buy newer aircraft or, if funds aren't available, to consider leasing them.

Pleasure flying in typical aero club aircraft costs about $17.50 an hour (including fuel), compared to $24 to $28 in civilian general aviation, the Center said.

"Aero clubs," General Svendsen asserted, "furnish members a direct link to the mission of the Air Force by providing a means to develop aeronautical skills and to directly participate in aviation."

Homes Expansion Planned

With already long waiting lists lengthening, officials of both Teresa Village and the Air Force Village are mapping long-range plans for expansion. Teresa Village officially is the Air Force Enlisted Men's Widows Home, located at Fort Walton Beach, Fla.

Various AFA chapters and individual members continue to support the two residences.

The 118 units at Teresa Village are occupied by that many widows of NCOs. Retired CMSgt. Dominick N. Masone, executive director of the governing foundation, reports that there were 150 names on the waiting list the first of the year and "hundreds are awaiting eligibility status." He expects a continuous input of names and requests to be added throughout 1979.

Meantime, Teresa Village officials are mapping plans for an additional 200-unit facility, to be located near the Eglin AFB, Fla., hospital on a recently acquired seventy-nine acre tract. It will include a nursing facility, health spa, dining room, convenience store, a pool, and many other amenities, Chief Masone said.

At San Antonio, Tex., the Air Force Village is home to 271 persons—seventy-seven couples, 101 single women, and sixteen single men. But the application list is bulging at 825, a figure that actually represents about 1,250 individuals. Some, of course, envision entering the Village in later years.

Expansion plans, which include a

Ed Gates . . . Speaking of People

A Look at the Air Force Aid Society

"You are urged to take a liberal approach in helping those who need it . . . and make sure that the Air Force family, active and retired, knows what resources are available."

That message, recently dispatched from the headquarters of the Air Force Aid Society, Arlington, Va., is typical of instructions now flowing to commanders and AFAS offices at bases around the world. It reflects the changing philosophy governing the operations of the thirty-three-year-old charitable organization.

In earlier years, the Society, in some circles at least, had acquired a hard-nosed image. Assistance could be difficult to secure. But that's changing, authorities declare as they authorize much larger sums of money—mostly interest-free loans—for USAF members and their families with financial problems.

The Society this year, for example, plans to distribute $3,380,000 in emergency assistance ($3,110,000 in loans and $270,000 in outright grants); that compares with $2,178,716 last year and just $1,072,965 as recently as 1976. That's more than a threefold increase in three years. While the grant projection appears tiny, it is more than double last year's outlay.

AFAS Director Gen. Louis T. Seith, USAF (Ret.), adds that the $3,380,000 total earmarked for this year "will be increased if the demand requires it." He says emergency assistance needs are rising sharply, and he is leaning on base AFAS offices to react accordingly. General Seith underscored this position in another recent memo to the field:

"AFAS management believes that Air Force people would want it to expose Society funds to a greater risk of default than perhaps has been taken in the past in order to insure that those who truly are in distress will be reached."

In a series of recent moves to reach more Air Force members and, as General Seith explains, to be "more forthcoming," the Society has:

- Set aside $300,000 for loans and grants just for family medical assistance and an equal amount for dental aid.
- Liberalized aid for travel purposes, *e.g.*, to help with the cost of moving and getting set up to live in overseas areas.
- Urged retirees with financial problems to seek its help. Last year, only four percent of the AFAS assistance went to retirees and widows; that's only 377 of the 9,423 emergency aid recipients for 1978.
- Modified the organization's long-standing regulations that focused heavily on such words as "emergency," "urgent," and "unusual" as requisites for obtaining assistance. General Seith and the AFAS trustees hold that this has sometimes led "to a more rigid interpretation than intended."
- Decided to look more favorably on assisting families with serious "self-created" financial problems. Thus, unlike in the past, an airman gambling away the family's rent money might well qualify for AFAS help. However, there is no intention of making this type of "first-aid" money a handout. And where there is a history of previous AFAS loan defaults or where the applicant shows no inclination to "resolve his chronic financial insolvency, assistance nor-

nursing home, are projected on a population of 600. Air Force Village Executive Vice President Col. Ben H. Settles, USAF (Ret.), reported that the nursing-home building fund contains $146,975 in cash and pledges. Colonel Settles forecast greatly increasing demand for Village residency in the next few years.

Pilots Given Greater RegAF Chance

Better than four of every five pilot captains considered for Regular commissions by a late April board are slated to win appointments. The selection rate for the flyers involved —those in the five (1973 TAFCS) and seven (1971 TAFCS) year groups —was purposely set at an unprecedented eighty to eighty-five percent.

The aim, authorities told AIR FORCE Magazine, is to enhance career service and thus help reduce the alarming exodus of pilots. Last year, fewer than half the pilots in the same two TAFCS groups made Regular.

What this year's action means is that out of some 1,600 pilots eligible, about 1,300 will soon receive Regular bids. As Hq. USAF notes, this is a "very significant increase" in selection opportunity. It could be the highest in USAF history.

About fifty percent of the navigators in both year groups also were to receive Regular commissions, an increase of twenty percentage points over last year. This increase is aimed at stemming the rather heavy exodus of navs.

Luis O. Ballester, Commander of the Arnold Air Society's Apollo Sqdn. at the University of Puerto Rico Mayaguez campus, presents AAS Executive Administrator Col. William Morley, USAF (Ret.), a painting of Old San Juan. The occasion was a recent Dining Out marking the tenth anniversary of the unit, the outstanding squadron in AAS's C-1 Area. Colonel Morley was the guest speaker.

As for the 820 nonrated line officers under consideration by the same board, about half were to receive Regular appointments, the same percentage as last year's contending groups.

Officials expect next year's pilot eligibles also will have an excellent chance. Officers generally, they said, should enjoy favorable chances of making Regular for several years.

These moves to attract pilots and navs to extended service constitute still another step to improve officer manning. Continuation of certain passed-over officers, increased promotions and hence fewer passovers, Reserve officer recalls to active duty, and continuation of veteran Reserves beyond their normal twenty years of service are recent innovations USAF has laid on to stem separations and keep officer strength up to authorized levels.

Free VA Counseling Offered

The Veterans Administration has sent more than 1,000,000 Vietnam Era vets invitations to use free VA educational and vocational counseling. "VA counselors can help veterans make informed career, job, or school choices . . . and solve problems associated with choosing and achieving their goals," VA chief Max Cleland said.

nally will not be provided."

The Society leadership strongly supports USAF's Personnel Financial Management Program (PFMP). Conducted at most sites by the base comptroller, the PFMP offers free information, classes, and counseling on personal finances.

General Seith, who became AFAS Director last fall, is readying other innovations. One is a new, tighter accounting and billing system designed to keep close track of loan repayments and curb delinquencies. Outstanding AFAS loans—emergency and educational—total more than $13 million, and many persons outside the active Air Force are late in paying up. The new system, according to General Seith, should bring most of the tardy dollars in on time and also reduce the number of names the Society turns over to collection agencies. Most delinquent funds are eventually recovered, he said.

Last year, the Society's total revenue of $6,320,000 included $3,668,000 in educational and emergency loan repayments. Another $113,141—less than three percent of the total due—was written off as uncollectable.

Also about ready to fly is a major expansion of the Society's General Henry H. Arnold Student Loan Program. Currently, Air Force sons and daughters can borrow up to $2,000 a year for four years, at five percent interest, for undergraduate work. Repayment must be made within ten years after graduation from college. No funds have been available for graduate-school loans.

Under the expansion, slated to be fully operating with the 1980–81 academic year, dependent students may borrow up to $2,500 per year, or a total of $7,500, for undergraduate study, plus up to $5,000 per year, or a total of $15,000, for graduate or professional school. The $15,000 maximum will also apply for a combination of undergrad and graduate schooling. The interest rate will increase to seven percent, a rate officials say most student loan programs charge.

The expanded education loan program will be phased in as a pilot project this coming fall. Local AFAS offices should have application forms and details by now.

The number of student loans has actually dropped in recent years—there were just 1,690 recipients last year—though total loan assistance reached a new high of $2.7 million. The new, broadened educational aid program is expected to attract many new customers.

The Society puts its net worth, as of December 31, 1978, at $36,336,000; about one-third is in loans receivable. The bulk, now approaching $24 million, represents the AFAS investment fund composed mainly of common stocks and corporate bonds. It generates about a nine percent return, of which part is plowed back into additional investments.

This year, for example, the investment fund is expected to generate $1.5 million, or about six percent in dividends and interest. That sum will become part of the loan kitty. Beyond that the fund is expected to grow another three percent year in and year out as the value of its stocks and bonds increases through portfolio management. This, officials believe, should contribute toward growth of the fund so that the Society can be assured of meeting its expansion goals and helping to stay even with inflation.

The investment fund is managed by Investors Diversified Services, Inc. (IDS), of Minneapolis. General Seith calls it "one of the more successful investment managers in the nation."

Contributions from the USAF community come to the Society mainly via the annual Air Force Assistance Fund drive. Last year it produced a record-breaking $1,180,000 for the AFAS. This year's contributions reportedly will exceed $1.7 million, considerably more than forecast and a heartening response from the Air Force membership at large.

The Society, most of the signs indicate, has some good years ahead. ■

The Bulletin Board

The counseling project is the latest in a series of special moves Uncle Sam is taking to help Vietnam Era veterans.

Their unemployment rate has dropped from 7.3 percent to 4.9 percent in two years. Helping greatly in the improvement effort is VA itself, which reports that of its 225,000 employees 36,000, or 16.3 percent, are Vietnam Era vets.

A related VA program only recently approved provides free tutorial assistance for GI Bill students having trouble with difficult courses. No tutorial aid was authorized for World War II and Korean War veterans, but present law allows VA to pay up to $69 per month for such help, with a maximum of $828. Forms and information can be obtained at any VA office, the Washington, D. C., headquarters of the agency said.

Maj. Gen. Richard Bodycombe, left, is sworn in as the new Chief of the Air Force Reserve by the Hon. Hans M. Mark, Under Secretary of the Air Force. Mrs. Bodycombe holds the family bible for her husband as he assumes his new position as the top Air Force reservist.

Relocation Relief Sought

Air Force is seeking financial relief for US military and civilian employees who lost private cars, household goods, and other possessions when they left Iran in a hurry during the turbulence there early this year. Existing law limits reimbursement for most such losses to a maximum of $15,000, though some members say they were forced to abandon possessions worth several times that amount.

Typical is a USAF lieutenant colonel, his wife, and four children who told AIR FORCE Magazine they left behind valuables worth "more than $40,000." Though these belongings were insured for up to $80,000, his insurance company (which does a huge business throughout the military community) won't pay off for situations like Iran.

USAF officials, in trying to come to the rescue, have worked up a legislative proposal that would reimburse such persons up to $25,000 and in some cases for the full value of such property. Army and Navy have endorsed the Air Force plan, which, at press time, was being readied for Defense Department consideration. A bill containing all of these provisions has already been introduced in Congress.

Late last year, shortly before the turbulence peaked in Iran, there were 341 USAF military members and 549 USAF dependents in that country. For more on the exodus of our military from Iran, see the article on p. 72 of this issue.

Aircraft Mishaps Up

The unpleasant facts are that USAF suffered forty-nine pilot fatalities last year, five more than the previous year, while ejection fatalities remained the same at sixteen. Total aircraft fatalities decreased from ninety-one to ninety.

The new USAF "mishap report" says ninety aircraft were destroyed in 1978, an increase of twelve over 1977. Also up was the Class A rate of 3.2 for ninety-eight aircraft mishaps, as compared to 2.8 for ninety mishaps the year before. It reversed a trend of improvements in reducing aircraft mishaps through the 1970s (rates are based on the number of mishaps per 100,000 flying hours).

The safety report for ground fatalities was much improved, however. All told, Headquarters reported, 225 USAF members lost their lives in ground mishaps in 1978—fifty-four fewer than in 1977. The biggest category drop was in private motor vehicle deaths—from 182 to 147. Motorcycle fatalities totaled twenty-nine, down eight. As usual, USAF reported, speed, alcohol, and "lack of defensive driving techniques" were the major cause factors.

Thirty-three Air Force members drowned last year, up nine over 1977.

Short Bursts

USAF is going ahead with plans to enter **300 airmen in the Airman Education Commissioning Program** in FY '80, which starts next October. The move is contingent on congressional approval. With 400 airmen now studying at civilian universities under the AECP, the FY '80 entries will raise the average load to about 500, largest in years. All AECPers are headed for active duty after receiving commissions via OTS—in engineering and computer science fields.

Hq. USAF officials are also trying to talk Congress into funding **6,500 AFROTC scholarships annually,** instead of the present 5,760, as another way of obtaining enough officer engineers.

Old-timers will recall when President Eisenhower, to lessen the country's adverse "gold-flow" problem, slapped a **ban on military dependents going overseas.** The uproar that followed was devastating—to military morale and to Ike's popularity with the services. No single adverse personnel policy decision within memory has come close to churning the waters as did that one. All of which is not lost on present-day Defense Department officials and members of Congress trying to decide what to do about the number of dependents currently abroad; though current law limits the number to 350,000, the actual number overseas at a recent date was **371,400.** One suggestion calls for a freeze on further shipments until the total figure falls under 350,000. But neither Defense nor Congress wants to be the "bad guy." Nevertheless

some action to discourage kin shipments overseas is possible.

Performance far outweighs **professional military education and academic degrees** in the officer promotion process. That's the word from Hq. USAF, which recently looked at several years of promotion-board results. The action followed complaints that some school programs, nonresident PME particularly, are simply "square-fillers." The boards right along have considered education "in its proper role—as a relevant but clearly subordinate factor in assessing potential for higher responsibilities," the Air Force's statement declares.

Top military officials are unhappy over recent rulings by the Court of Military Appeals, especially the Catlow-Russo case where the CMA ruled that the military **cannot court-martial persons who can show that their entry into uniform was caused by recruiter misconduct.** This allows military criminals to escape punishment, service officials feel. To correct the problem, the Senate Armed Services Personnel subcommittee is proposing changes to the Uniform Code of Military Justice.

Men in the Air Force overwhelmingly favor being allowed to **use their umbrellas when it rains** (distaff members can use theirs). That conclusion, not surprisingly, is what the recent "umbrella test" conducted by USAF at the Pentagon revealed. It's the test that prompted Sen. William Proxmire (D-Wis.) to ridicule the Air Force by awarding it his Golden Fleece Award. An official ruling okaying the umbrella for all blue-suiters is expected soon. ■

Senior Staff Changes

RETIREMENTS: M/G Earl J. **Archer,** Jr.; B/G Donald M. **Davis;** B/G Frank M. **Drew;** L/G George G. **Loving,** Jr.; L/G Abner B. **Martin;** B/G Edward **Mendel;** B/G Kenneth R. **Milam,** Jr.; Gen. William G. **Moore,** Jr.; M/G Slade **Nash;** M/G Bobby W. **Presley;** M/G Richard H. **Schoeneman;** M/G Robert **Scurlock.**

CHANGES: Col. (B/G selectee) Leon W. Babcock, Jr., from Exec. to C/S, Hq. SHAPE, Casteau, Belgium, to Cmdr., 601st TCW, USAFE, Sembach AB, Germany, replacing B/G Paul H. Hodges . . . **L/G Marion L. Boswell,** to Senior AF Member, UN Military Staff Committee, in addition to his post as Asst. Vice C/S, Hq. USAF, Washington, D. C. . . . **B/G Theodore D. Broadwater,** from V/C, San Antonio ALC, AFLC, San Antonio, Tex., to Exec. Dir., Supply Ops., DLA, Cameron Station, Alex., Va. . . . **B/G (M/G selectee) Norma E. Brown,** from DCS/Manpower & Personnel, Hq. AFLC, Wright-Patterson AFB, Ohio, to Cmdr., Chanute TTC, ATC, Chanute AFB, Ill., replacing M/G Edwin W. Robertson II . . . **Col. (B/G selectee) Stanford E. Brown,** from Dep. Dir. for Resources, DCS/P&E, Hq. USAF, Washington, D. C., to Asst. DCS/Plans for Plans & Policy, Hq. SAC, Offutt AFB, Neb., replacing B/G Gerald E. McIlmoyle.

B/G William J. Campbell, from Asst. DCS/Plans for Opl. Rqmts., Hq. SAC, Offutt AFB, Neb., to DCS/Plans, Hq. SAC, Offutt AFB, Neb., replacing M/G David L. Gray . . . **Col. (B/G selectee) Robert D. Caudry,** from V/C, Sheppard TTC, ATC, Sheppard AFB, Tex., to Dir., SAF Personnel Council, OSAF, Washington, D. C., replacing retiring M/G Earl J. Archer, Jr. . . . **M/G Edward Dillon,** from Cmdr., 14th AF (AFRES), Dobbins AFB, Ga., to V/C, Hq. AFRES, Robins AFB, Ga., replacing M/G Richard Bodycombe . . . **Col. (B/G selectee) Neil L. Eddins,** from Cmdr., 1st TFW, TAC, Langley AFB, Va., to Cmdr., 552d AW&CW, TAC, Tinker AFB, Okla., replacing M/G John L. Piotrowski . . . **B/G Sloan R. Gill,** from Cmdr., 433d TAW (AFRES), Kelly AFB, Tex., to Dep. to Ch., AFRES, Hq. USAF, Washington, D. C., replacing B/G James E. McAdoo . . . **M/G David L. Gray,** from DCS/Plans, Hq. SAC, Offutt AFB, Neb., to Comdt., AWC, & V/C, AU, Maxwell AFB, Ala., replacing retiring M/G Richard H. Schoeneman.

Col. (B/G selectee) Monroe W. Hatch, Jr., from Dep. Dir. for Strat. Forces, DCS/RD&A, Hq. USAF, Washington, D. C., to Asst. DCS/Plans for Opl. Rqmts., Hq. SAC, Offutt AFB, Neb., replacing B/G William J. Campbell . . . **B/G Paul H. Hodges,** from Cmdr., 601st TCW, USAFE, Sembach AB, Germany, to Dep. Dir., NMCC (#4), J-3, JCS, Washington, D. C. . . . **Gen. Robert E. Huyser,** from Dep. CINC, European Command, Vaihingen, Germany, to CINC MAC, Scott AFB, Ill., replacing retiring Gen. William G. Moore, Jr. . . . **B/G Robert W. Kennedy,** from Asst. for Log. Mgt. Sys., Hq. AFLC, Wright-Patterson AFB, Ohio, to Dir., Electronic Mgt., DCS/OP&R, Hq. USAF.

B/G (M/G selectee) Earl T. O'Loughlin, from DCS/Prcmt. & Pdn., Hq. AFLC, Wright-Patterson AFB, Ohio, to DCS/Maint., Hq. AFLC, Wright-Patterson AFB, Ohio, replacing retiring B/G Kenneth R. Milam, Jr. . . . **B/G James E. McAdoo,** from Dep. to the Ch., AFRES, Hq. USAF, Washington, D. C., to Cmdr., 14th AF (AFRES), Dobbins AFB, Ga., replacing M/G Edward Dillon . . . **B/G Gerald E. McIlmoyle,** from Asst. DCS/Plans for Plans & Policy, Hq. SAC, Offutt AFB, Neb., to Dep. Dir. for Ops. (Strat. & Gen. Ops.), J-3, JCS, Washington, D. C. . . . **B/G Russell H. Mohney,** from Asst. DCS/Log. Ops., Hq. AFLC, Wright-Patterson AFB, Ohio, to V/C, San Antonio ALC, AFLC, San Antonio, Tex., replacing B/G Theodore D. Broadwater.

Col. (B/G selectee) Norris W. Overton, from DCS/Compt., Hq. PACAF, Hickam AFB, Hawaii, to V/C, Army-AF Exchange Svc., Dallas, Tex., replacing retiring M/G Bobby W. Presley . . . **M/G John L. Piotrowski,** from Cmdr., 552d AW&CW, TAC, Tinker AFB, Okla., to Dep. Cmdr., TAC for Air Defense, Peterson AFB, Colo. . . . **M/G (L/G selectee) Freddie L. Poston,** from Cmdr., 13th AF, PACAF, Clark AB, R. P., to C/S, Hq. PACOM, Camp Smith, Hawaii, replacing L/G Marion L. Boswell . . . **M/G Edwin W. Robertson II,** from Cmdr., Chanute TTC, ATC, Chanute AFB, Ill., to Ch., MAAG, Madrid, Spain . . . **Col. (B/G selectee) Donald V. Vogt,** from Asst. DCS/Space Ops., Hq. ADCOM, Peterson AFB, Colo., to Mil. Asst. to Dep. Under Sec. Def., Strat. & Space Sys., OSD, Washington, D. C. . . . **Col. (B/G selectee) Harold J. M. Williams,** from Cmdr., 380th BMW, SAC, Plattsburgh AFB, N. Y., to Asst. DCS/Log., Hq. SAC, Offutt AFB, Neb., replacing B/G James E. Light, Jr.

SENIOR ENLISTED ADVISOR CHANGES: CMSgt. W. D. "Bud" Humphries, from Ch. of Admin., AF Military Personnel Center, Randolph AFB, Tex., to Senior Enlisted Advisor, AFMPC, Randolph AFB, Tex., replacing CMSgt. Ronald J. Esposito, who will remain as AFMPC First Sergeant. ■

Airman's Bookshelf

Airborne All the Way

Paratrooper!, by Gerard M. Devlin. St. Martin's Press, New York, N. Y., 1979. 717 pages, with photographs, maps, epilogue, appendix, bibliography, and index. $20.

Vertical envelopment. No one knows who coined the phrase, but to visionary Billy Mitchell in the final months of attrition warfare on the Western Front in 1918 the concept was clear: Use aeroplanes to parachute entire armies behind enemy lines, thus shattering the stalemate of static warfare.

It was an idea—like massed attacks by armor—whose time was to come twenty years hence, when German airborne assaults in World War II provided the vanguard for a new kind of offensive—blitzkrieg.

Then came Crete. German airborne units—and airborne alone (despite horrendous losses later kept secret)—in just eight days prevailed over a larger number of battle-experienced Commonwealth and Greek troops who were dug in and awaiting the aerial assault.

The lesson was not lost on Great Britain or the US, whose embryonic airborne forces then consisted of a handful of men and planes. The Allies hurried to play catch-up, in many cases incorporating training techniques pioneered by the Germans. The Army Air Corps almost became US airborne's parent service a la the Luftwaffe, but Gen. H. H. "Hap" Arnold's bid was unsuccessful.

This book, by a former paratrooper and combat veteran of Korea and Southeast Asia, is a history of the evolution of airborne forces in World War II. Although it chronicles every aerial assault and ground battle fought by US paratroopers, it details as well British, German, Japanese, and other airborne operations.

But *Paratrooper!* is more than a comprehensive combat narrative laced with accounts of individual sacrifice and bravery. The author goes back as far as Leonardo da Vinci to trace the development of the parachute and parachuting. The parachute was one of the few inventions in history not created to solve a specific problem; Leonardo thought it was just a good idea. The book is also a compendium of paratrooper folklore, documenting how the traditions, training, tactics, equipment, insignia, and the celebrated esprit of the airborne units all came about.

While *Paratrooper!* doesn't offer the meticulous treatment of specific battles such as the late Cornelius Ryan's *A Bridge Too Far*, it is crammed with details of the events that marked the history of the airborne soldier in World War II.

The book has an extensive account of airborne operations in the Pacific, which are largely overshadowed in many histories by the massive undertakings in Europe. In the US airborne assault on Corregidor, three battalions of paratroopers were readied to drop on what intelligence estimated as no more than a 600-man Japanese garrison. It turned out to be a force of 5,000, most of whom were Imperial Marines. In the face of a suicidal defense fought from Corregidor's famous maze of tunnels and caves, the paratroopers took just twelve days to retake that island fortress.

In what has become known as the classic operation of its kind, a combined amphibious/airborne force attacked the Japanese garrison at the Los Banos prison camp in the Philippines and destroyed it without a single death among the 2,147 Americans in the camp.

The concept of vertical envelopment has always generated controversy, even to this day. The essential question is whether the price in men and resources was worth the results achieved. This book helps provide an answer.

Paratrooper! is a must for the libraries of military historians.

— Reviewed by William P. Schlitz, Assistant Managing Editor.

Strength of the Gentle

I Was a Stranger, by John Winthrop Hackett. Houghton Mifflin Co., Boston, Mass., 1978. 219 pages. $8.95.

This narrative of Sir John Hackett's escape from Nazi captivity during World War II is enjoyable reading and well worth a professional soldier's time.

Hackett, who retired as the commander of the British Army of the Rhine, was, like James Gavin, a fighting airborne general at Arnhem. In the closing days of that Allied debacle, he suffered a severe stomach wound from a piece of shrapnel several inches square that perforated his lower intestine in a dozen places. He was surrendered to a prison hospital disguised as a corporal, and operated on by a POW doctor who was permitted to perform surgery on British prisoners. Fortunately, this Commonwealth surgeon disregarded the advice of the chief German doctor, who recommended that Hackett be heavily sedated and left to die because of the severity of his injuries.

Because Hackett was masquerading as a corporal, he drew little attention from his captors, and Dutch partisans stole him away soon after his operation. He was nursed back to health by a family who knew the penalty was certain death if the British brigadier should be discovered. When Hackett was taken in by the de Nooij family, his wounds were still draining and he was too weak to care for or protect himself. For many months this family shared their meager food and clothing rations with this "stranger."

While necessarily anecdotal in approach, Hackett's spare prose style wastes no words. His goal is to demonstrate thoroughly the quiet courage of his hosts, and he succeeds admirably. One example from the book will have to suffice for many. The backyard of the home of the de Nooij family adjoined a German military police station. Early in his painful convalescence Hackett's sleep at night was constantly disturbed by the barking of a large dog kept by the chief of the German military police. Finally, Anna de Nooij marched up to the German officer and demanded "Look, someone in my house is very

sick. This person cannot sleep because of that dog of yours and the awful noises it makes at night. Will you please have the goodness to see that it is kept locked up?" The German officer apologized for disturbing the invalid and shut up his dog at night.

Countless acts like these prompted Hackett to write that he had been a witness to a courage and a "faith, simple, unobtrusive, and imperishable." He wrote that he had "often seen bravery in battle," and now he "also knew the unconquerable strength of the gentle."

I Was a Stranger, the title taken from St. Matthew's quote of Christ at the Mount of Olives, is Hackett's worthy tribute to the family that took him in and to their quiet fortitude.

— Reviewed by Lt. Col. Alan Gropman, Hq. USAF.

New Books in Brief

Anti-personnel Weapons, by the Stockholm International Peace Research Institute. The book makes a case for restricting or prohibiting the more indiscriminate conventional weapons such as napalm and fragmentation munitions. Chapters cover the use of weapons and their effects from antiquity through Vietnam as well as the development of laws of war regarding their use. Crane, Russak & Co., Inc., New York, N. Y., 1978. 329 pages. $26.50.

Brassey's Defence Yearbook, 1978–79. Fifth edition of this reference highlights the year's significant political and military events, reviews the military posture of a NATO ally, surveys East and West preparedness, examines insights in strategic thinking and deployment of forces, details technological advances, offers a chronology of major events, and includes a bibliography of recent defense literature. Photos. Crane, Russak & Co., Inc., New York, N. Y., 1979. 265 pages. $49.50.

The Irony of Vietnam: The System Worked, by Leslie H. Gelb with Richard K. Betts. While US foreign policy in Vietnam failed, the decision-making system worked, the authors contend. They arrive at this startling conclusion by analyzing the commitment to Vietnam through six administrations. They say that no matter how questionable that commitment, that it was kept proved the system worked as it was designed to. Researching previously classified documents, the authors find with few exceptions that US leaders were realistic about the chances for success. But they persisted. The reasons why are explained in this thorough account of decision-making from 1946–68. As long as the doctrine of military containment of communism remained the consensus, military action in Vietnam followed suit. The final chapter explains how mistakes may be avoided by future policymakers. The Brookings Institution, Washington, D. C., 1979. 387 pages. $14.95 cloth; $5.95 paperback.

Military Vehicles of the World, by Christopher F. Foss. Tracked and wheeled cargo vehicles found in front-line army service throughout the world are covered in great detail in this volume. Second edition is revised to include all new vehicles, and each entry contains specifications and photos. Index. Charles Scribner's Sons, New York, N. Y., 1979. 192 pages. $8.95.

Principles of Electronic Warfare, by Robert J. Schlesinger. Here is an overview of EW technology and tactics. Re-released in unabridged form, the book covers radar countermeasures techniques, electronic intelligence, air combat analysis, problems inherent in electronic reconnaissance systems, and the effects of incomplete information on the outcome of electronic warfare. Included are actual electronic warfare scenarios. Index, bibliography, graphs. Peninsula Publishing, P. O. Box 867, Los Altos, Calif. 94022, 1979. 213 pages. $10.50.

Space Transportation Systems, 1980–2000, edited by Robert Salkeld, Donald W. Patterson, and Jerry Grey. During development of the Space Shuttle, new technologies have begun to appear that promise substantial cost reductions and revolutionary capabilities in space transportation toward the end of this century. This book, first in a series presented in the public interest by the American Institute of Aeronautics and Astronautics, offers an overview of these possibilities. American Institute of Aeronautics and Astronautics, New York, N. Y., 1978. 91 pages. $12.50.

The Vietnam War: The Illustrated History of the Conflict in Southeast Asia, edited by Ray Bonds. More than thirty years of war in Southeast Asia are detailed in this large volume. Dramatic photos and commentary by authorities provide a vivid account of events. The book includes a battle-by-battle analysis, chronology of main events, and summary of weapons and warfare techniques. Foreword by Gen. William C. Westmoreland. Index. Crown Publishers, New York, N. Y., 1979. 248 pages. $17.95.

—Reviewed by Robin Whittle

Recent and of Interest

B-26 Marauder at War, by Roger A. Freeman. Charles Scribner's Sons, New York, N. Y., 1979. 192 pages. $14.95.

Federal Aviation Regulations for Pilots. Aviation Book Co., P. O. Box 4187, Glendale, Calif. 91202, 1979. 128 pages. $2.50.

Jane's Surface Skimmers 1979, edited by Roy McLeavy. International survey of hovercraft and hydrofoils. Franklin Watts, Inc., New York, N. Y., 1979. 388 pages. $72.50.

Pursue & Destroy, by Leonard "Kit" Carson. Illustrated story of Eighth Air Force fighter groups in World War II. Aviation Book Co., P. O. Box 4187, Glendale, Calif. 91202, 1979. 175 pages. $19.95. ■

Perspective
Comment & Opinion

By Dr. M. R. Gustavson, LIVERMORE, CALIF.

CTB: A Precedent in Restricting Inquiry?

The United States is approaching the possible consummation of a Comprehensive Test Ban (CTB) treaty with the Soviet Union; yet little concern has been shown for the precedent-setting quality of such an agreement. This is true despite the fact that some fundamental issues are at stake—ones of the broadest possible significance, and fundamental to our way of life. Indeed, the precedent involved—the foreclosing by law of particular lines of technical investigation—is one that needs to be deeply considered by our citizenry as a whole. Few seem to have any clear impression of how fundamental are the issues involved.

With the Carter Administration and some congressional leaders beginning to establish their positions on a CTB, much of the attendant discussion is focusing on a relatively narrow, albeit important, range of details having to do with the manufacture of nuclear warheads, their reliability, stockpile maintenance, and verification of adherence to a ban on testing.

While some of the arguments for and against a CTB clearly are two-sided, it seems obvious that a ban on testing would make it impossible to maintain a cadre of experienced and knowledgeable individuals in this highly specialized field. That may well be the key point, for, with a CTB, where would experienced and knowledgeable personnel come from and how will their expertise be validated?

There appears also to be general agreement that a CTB observed for many years will erode the capability of any nation to move forward in nuclear-weapon design. Indeed, advocates of a CTB seem unanimous in seeing as one of its principal merits this hobbling effect of no testing on innovation. Some CTB advocates hope, and many opponents fear, that not only will there be the hobbling effect on innovation, but that it will not even prove feasible to maintain the existing competence indefinitely.

Thus, among the conclusions of CTB opponents and of some advocates, too, are: that testing is required to train and certify experts, that testing is required to make advances, and that testing is an aid to maintaining competence. What is shocking is that proponents of a CTB are implicitly, if not explicitly, taking the position that ignorance is better than knowledge. Can this be so?

In the Western world since the Middle Ages, we have been taught the importance of knowledge. Yet, we move toward consummating a CTB that would establish as an act of law the foreclosing of certain lines of technical inquiry without, it would seem, fully taking into account its role as a precedent in restricting inquiry.

It is true that we need not follow this precedent in other cases. Or are we mistaken in seeing this as an isolated event, not noticing similar postures being struck with respect to research in genetics, DNA manipulation, nuclear breeders, *in vitro* fertilization, and other areas? If ignorance will serve as well in the nuclear-explosives area, why should not action of the same or analogous kind be taken in other areas?

Why, if this vision seems appalling, have we then as a nation pursued a CTB with such vigor over so many years? Probably it is not really because we secretly believe in ignorance, but because we fear the uses to which new knowledge may be put. This is not an unreasonable fear, for each element of human knowledge has many potential uses.

But if it is the applications that concern us, then it is toward controlling these applications that our attention should be directed. In this effort, it is knowledge and insight that are required. As we are finding in so many fields, our ability to act in a wise and prudent way is most limited by our lack of knowledge. If we knew more about the role of carbon dioxide in ecology and the dynamics of the "greenhouse" effect and about countless other aspects of our world, we could act more wisely.

Then, too, it is reasonable at least to consider how effective past attempts at controlling the growth of knowledge have been. Our historically unprecedented laws restricting the transfer of knowledge about atomic energy have not precluded five more nations from exploding nuclear devices.

Nor have any other efforts to stop the growth of knowledge done any more than defer for a limited time, and perhaps transfer to a different place, the taking of the next step. On the record it would appear that our only hope is to control applications, not understanding.

In this sense, efforts toward a CTB may constitute the squandering of assets better spent on limiting what arms will be manufactured and in what quantity.

Thus, it would seem that efforts directed toward a CTB are at least of dubious value in controlling the growth of armaments; at worst, such efforts may establish a precedent with the gravest of consequences. Considering the seriousness of the issue being addressed and the fundamental nature of the precedent that may be set, the debate on a CTB deserves much more widespread consideration than it has so far received. How this issue is resolved and the implications of that resolution cannot fail to touch the lives of us all.

Dr. M. R. Gustavson has been actively engaged for many years in the synthesis and evaluation of both civilian and military systems. He is a member of the staff of the Lawrence Livermore Laboratory, University of California.

HOW TO SHARE YOUR PERSPECTIVE

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

AFA's 1979 National Convention and Aerospace Development Briefings and Displays

September 16-20 ★ Washington, D.C.

AFA's 1979 National Convention and Aerospace Development Briefings and Displays will be held at the Sheraton-Park Hotel, Washington, D.C., September 16-20. The old main building of the Sheraton-Park will be closed and demolished this summer. In September, we will be using the Motor Inn, Wardman Tower, and one of the three sections of the new Sheraton Washington Hotel (see photo), opening September 8th. Consequently, the number of rooms available in September will be below our normal demand. We have reserved a block of additional rooms at the nearby Shoreham-Americana Hotel.

All reservation requests for rooms and suites at the Sheraton-Park should be sent to: Reservations Office, Sheraton-Park Hotel, 2660 Woodley Rd., N.W., Washington, D.C. 20008. Requests for the Shoreham-Americana Hotel should be sent to: Reservations Office, Shoreham-Americana Hotel, 2500 Calvert St., N.W., Washington, D.C. 20008.

Due to the shortage of available rooms at the Sheraton-Park Hotel this September, we urge you to make your hotel reservations as soon as possible. To assure acceptance of your reservation request at either hotel, please refer to the AFA National Convention.

Arrivals after 6:00 PM require a one-night deposit or major credit card number. Guaranteed reservations must be cancelled by 4:00 PM on date of arrival to avoid being charged for that night.

Convention activities include AFA Business Sessions, luncheons honoring the Secretary of the Air Force and the Air Force Chief of Staff, Aerospace Education Foundation Luncheon, the annual Salute to Congress, AFA Delegates Reception and the Air Force Anniversary Reception, and Banquet. On Sunday evening, September 16th, we will again have a private opening of the National Air and Space Museum, which is featuring "Worlds of Tomorrow" in the Albert Einstein Spacearium, plus new exhibits. Registration information will be presented in forthcoming issues of Air Force.

Top, 1978 Convention ceremonies; middle, Gen. David C. Jones at exhibits; left, the new Sheraton Washington Hotel.

AFA News

By Don Steele, AFA AFFAIRS EDITOR

The 1978 Collier Trophy selection committee included AFA's National President and four Past National Presidents. They are, from left, John P. "Jock" Henebry, current President Gerry Hasler, John Alison, Art Kelly, and J. B. Montgomery.

Gen. William Moore, center, Commander in Chief, Military Airlift Command, was the guest speaker at a luncheon sponsored by the Kiwanis Club of Indianapolis, the largest Kiwanis Club in the world. Arrangements for his appearance were made by the Indiana State AFA and its Central Indiana Chapter. Shown with General Moore are Chapter President Tom Correll, left, and Kiwanis Club President Max Schumacher, right.

Maj. Gen. Cecil E. Fox, Commander, Oklahoma City Air Logistics Center, was the featured speaker at the Tulsa, Okla., Chapter's March meeting. Shown are, from left, Dr. L. A. Yarbrough, Oklahoma AFA Education Director; Tulsa Chapter President Ed McFarland; retired Astronaut William R. Pogue; Oklahoma State AFA President Bill Webb; Central Oklahoma (Gerrity) Chapter President Gaylord Giles; General Fox; and AFA National Director Dave Blankenship.

At a recent dinner meeting of AFA's Andrews Chapter in the Andrews AFB, Md., Officers' Club, AFA National Director Richard Emrich, on the right in each of these photos, presented AFA Medals of Merit to: Mrs. Barbara Arnold (left), Lt. Col. David Van Poznak (center), and Mrs. Evie Dunn (right). All the awards were presented for outstanding assistance at several AFA national conventions.

chapter and state photo gallery

AFA National Director Steve Ritchie, right, the guest speaker at the Texas State AFA Executive Committee meeting on March 24, at Bergstrom AFB, Tex., received a Texas Honorary Citizenship Certificate from Austin Chapter President Hank Cline, left, as G. H. "Bones" Oldenburgh, center, administers the oath of citizenship. During the program, the State AFA's $1,000 Earle North Parker scholarship was presented to Julia Shain by Mr. Parker. Miss Shain is from Muleshoe, Tex., is a daughter of a retired Army master sergeant, and was sponsored by AFA's Lubbock Chapter.

Gen. William Westmoreland, USA (Ret.), left, the featured speaker at a joint meeting of AFA's Salt Lake Chapter and the Salt Lake Kiwanis Club, accepts an AFA Certificate of Appreciation from Salt Lake Chapter President William C. Athas.

COMING EVENTS

Wisconsin State AFA Convention, Milwaukee, June 6 . . . **Ohio State AFA Convention,** Granville Inn, Granville, June 9 . . . **New Hampshire State AFA Convention,** Pease AFB, June 9–10 . . . **Oklahoma State AFA Convention,** William Center, Tulsa, June 15–17 . . . **Missouri State AFA Convention,** St. Louis, June 16 . . . **Oregon State AFA Convention,** Portland, June 22–23 . . . **Indiana State AFA Convention,** Indianapolis, June 23 . . . **Colorado State AFA Convention,** Stapleton Plaza, Denver, June 29–30 . . . **Pennsylvania State AFA Convention,** Viking Motor Inn, Pittsburgh, June 29–30 . . . **Texas State AFA Convention,** St. Anthony Hotel, San Antonio, June 29–30 . . . **Virginia State AFA Convention,** Arlington, June 30 . . . **New York State AFA Convention,** Dutch Inn, Islip, Long Island, July 13–15 . . . **AFA's 33d Annual National Convention,** Sheraton-Park Hotel, Washington, D. C., September 16–19 . . . **AFA's Aerospace Development Briefings and Displays,** Sheraton-Park Hotel, Washington, D. C., September 18–20.

Miss Sharon Geddes was selected as the winner of the "Handicapped Professional Woman of the Year" Award for 1978 and received her award on March 20 of this year at Barksdale AFB, La., Officers' Club. Miss Geddes, a blind social worker, was nominated by AFA's Ark-La-Tex Belle Chapter of Shreveport, La. The annual award is cosponsored by the Pilot Club International, The President's Committee on Employment of the Handicapped, and Sears, Roebuck and Co. Shown are, from left, Louisiana State AFA President Tom Keal, Miss Geddes, Chapter Communications Director Billie Hanrahan, and Chapter President Ruth Mann.

AFA News

Alamo, Tex., Chapter President Walter Galligan, right, Lt. Gen. USAF (Ret.), presents an AFA Community Partner certificate to F. R. Kirkpatrick, Chairman of the Board of the National Bank of Fort Sam Houston.

James K. Dowling, left, outgoing President of AFA's Hawaii Chapter, received an engraved pen set from Lt. Gen. James D. Hughes, center, Commander in Chief of the Pacific Air Forces, in appreciation for his more than four years of outstanding service as Chapter President. William B. Taylor, the incoming President, is at the right. The presentation was made at a luncheon in the Hickam AFB Officers' Open Mess, hosted by General Hughes for Mr. Dowling and the Chapter's Board of Directors.

More than 200 guests, including a number of AFROTC cadets from the University of Connecticut, attended a recent dinner meeting sponsored by AFA's Igor Sikorsky, Conn., Chapter. Gen. William J. Evans, USAF (Ret.), a former Commander of the Air Force Systems Command, was the guest speaker. Shown are, from left, Connecticut State AFA President Joseph Falcone, General Evans, Cadet 1st Lt. Amy Carson Bond, and Cadet Col. John Schmid.

AFA's Central Indiana Chapter sponsored a dinner on March 16 at which three college juniors were honored as the outstanding AFROTC Aerospace Studies 300 cadets at three universities located in Indiana. The three—from right, Cadet Lt. Carol A. Buscanics from the University of Notre Dame; Cadet Capt. Harry E. Dean III from Purdue Univ.; and Cadet Lt. Mark C. Morton from Indiana University—are shown with the featured speaker, Brig. Gen. Donald L. Lamberson, deputy director for development and acquisition, Armament Development and Test Center, AFSC, Eglin AFB, Fla.

For the second consecutive year, the AFJROTC unit from Orangeburg-Wilkinson High School of Orangeburg, S. C., was judged the Best Air Force Uni competing in the Tiger Drill Meet at Clemson University. Col. Edwin F. Rumsey, left, Commander of Clemson's AFROTC Detachment, presents the trophy. The annual event is jointly sponsored by Clemson's AFROTC and Army ROTC detachments. The trophy is sponsored by the South Carolina State AFA.

photo gallery

Nine awards were presented at the Fourth Annual AFLC/AFA Logistics Awards Banquet on March 6, at the Wright-Patterson AFB, Ohio, Officers' Club. The event recognizes outstanding services that contribute to the AFLC mission, and is cosponsored annually by the Air Force Logistics Command Headquarters and AFA's Wright Memorial Chapter. The awards recipients and the program principals are, from left, CMSgt. Alvin E. Shadowens; Robert L. Moore; Clifton M. Wheeler; Col. A. Paul Bruno; Chapter President Norman C. "Dutch" Heilman; Gen. Bryce Poe II, Commander AFLC; Capt. Charlie E. Jones; Col. Charles A. York; Capt. Lee S. Johnson; Lt. Col. Joseph A. Sabin; and Lt. Col. Carey W. Daniel, Jr.

Colorado State AFA recently presented Fall Term Awards to cadets at the Air Force Academy. State President Steve Brantley made the presentations. Participants in the ceremony were, from left, C1C Joel R. Maynard; Mr. Brantley; C2C Jeffry G. Jackson; Lt. Col. Charles L. Martin, Jr., Military Liaison Officer, Colorado AFA; C1C Charles H. Ayala; C1C Stephen M. Dickson; C1C Roger K. Ellison; and C2C Joseph P. Corso.

The AFJROTC cadets at Samuel Clemens High School in Schertz, Tex., hosted their Third Annual Aerospace Symposium on March 12. The program was cohosted by the Texas State AFA. More than 400 AFJROTC cadets from throughout Texas attended the day-long program. Symposium speakers included, from left, Col. Carey Deckard, USAFRES, the master of ceremonies; Texas State AFA President Frank Manupelli; Thomas J. Hill, Education Specialist from NASA's LBJ Space Center; John V. "Jack" Sorenson, Civil Air Patrol National Headquarters; Charles Rouse, Samuel Clemens High School principal; and Lt. Col. Odis Loosier, AFJROTC Aerospace Education Instructor at the high school, the program chairman.

AFA State Contacts

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Donal B. Cunningham,** 1 Keithway Dr., Selma, Ala. 36701 (phone 205-875-2450).

ALASKA (Anchorage, Fairbanks): **David W. Robinson,** P. O. Box 1120, Anchorage, Alaska 99510 (phone 907-274-3561).

ARIZONA (Phoenix, Tucson): **E. D. Jewett, Jr.,** 7861 N. Tuscany Dr., Tucson, Ariz. 85704 (phone 602-297-1107).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Gordon W. Smethurst,** RR #2, Box 43D, Cabot, Ark. 72023 (phone 501-374-2245).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hawthorne, Hermosa Beach, Long Beach, Los Angeles, Marysville, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Edward A. Stearn,** P. O. Box 5867, San Bernardino, Calif. 92412 (phone 714-889-0696).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Ft. Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **Stephen L. Brantley,** 1089 S. Buchanan St., Aurora, Colo. 80010 (phone 303-320-7153).

CONNECTICUT (East Hartford, North Haven, Storrs, Stratford, Windsor Locks): **Joseph R. Falcone,** 14 High Ridge Rd., Rockville, Conn. 06066 (phone 203-565-3543).

DELAWARE (Dover, Wilmington): **John E. Strickland,** Rt. 6, Box 408, Dover, Del. 19901 (phone 302-678-6070).

DISTRICT OF COLUMBIA (Washington, D. C.): **George L. J. Dalferes,** 12602 Tartan Ln., Oxon Hill, Md. 20022 (phone 301-897-6620).

FLORIDA (Bartow, Broward, Cape Coral, Ft. Walton Beach, Gainesville, Jacksonville, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa): **Eugene D. Minietta,** Box 286A, Route 1, Oviedo, Fla. 32765 (phone 305-420-3868).

GEORGIA (Athens, Atlanta, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **William L. Copeland,** 1885 Walthall Dr., NW, Atlanta, Ga. 30318 (phone 404-355-5019).

HAWAII (Honolulu): **William B. Taylor,** 233 Keawe St., #630, Honolulu, Hawaii 96813 (phone 808-524-3535).

IDAHO (Boise, Twin Falls): **Ronald R. Galloway,** Box 45, Boise, Idaho 83707 (phone 208-385-5247).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, Peoria): **C. W. Scott,** P. O. Box 159, O'Fallon, Ill. 62269 (phone 618-632-7003).

INDIANA (Indianapolis, Lafayette, Logansport, Marion, Mentone, South Bend): **Roy P. Whitton,** 916 Oak Blvd., Greenfield, Ind. 46140 (phone 317-636-6406).

IOWA (Des Moines): **Ric Jorgensen,** 4005 Kingman, Des Moines, Iowa 50311 (phone 515-255-7656).

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum,** 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-681-5445).

KENTUCKY (Louisville): **Dill Dotson, Jr.,** 3736 Mamaroneck, Louisville, Ky. 40218.

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **Thomas L. Keal,** 404 Galway, Shreveport, La. 71115 (phone 318-868-9688).

MAINE (Limestone): **Alban E. Cyr,** P. O. Box 160, Caribou, Me. 04736 (phone 207-492-4171).

MARYLAND (Andrews AFB, Baltimore): **Robert J. Beatson,** 7813 Locris Ct., Upper Marlboro, Md. 20870 (phone 301-336-5400).

MASSACHUSETTS (Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Mary Anne Gavin,** 38 Tremlett St., Boston, Mass. 02124 (phone 617-282-2059).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Lansing, Marquette, Mount Clemens, Oscoda, Petoskey, Sault Ste. Marie, Southfield): **Howard C. Strand,** 15515 A Dr., N., Marshall, Mich. 49068 (phone 616-963-1596).

MINNESOTA (Duluth, Minneapolis, St. Paul): **David J. Little,** 1888 Princeton Ave., St. Paul, Minn. 55105 (phone 612-699-3600).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Billy A. McLeod,** P. O. Box 1274, Columbus, Miss. 39701 (phone 601-328-0943).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **Donald K. Kuhn,** 3238 Southern Aire Dr., St. Louis, Mo. 63125 (phone 314-892-0121).

MONTANA (Great Falls): **Lucien E. Bourcier,** P. O. Box 685, Great Falls, Mont. 59403 (phone 406-453-1351).

NEBRASKA (Lincoln, Omaha): **Lyle O. Remde,** 4911 S. 25th St., Omaha, Neb. 68107 (phone 402-731-4747).

NEVADA (Las Vegas, Reno): **James L. Murphy,** 2370 Skyline Dr., Reno, Nev. 89509 (phone 702-786-2475).

NEW HAMPSHIRE (Manchester, Pease AFB): **Charles J. Sattan,** 53 Gale Ave., Laconia, N. H. 03246 (phone 603-524-5407).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Edison, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Newark, Trenton, Wallington, West Orange): **Leonard Schiff,** 1216 Taurus Ct., Forked River, N. J. 08731 (phone 609-693-7886).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Joseph H. Turner,** P. O. Box 1946, Clovis, N. M. 88101 (phone 505-762-4557).

NEW YORK (Albany, Bethpage, Binghamton, Buffalo, Catskill, Chautauqua, Griffiss AFB, Hartsdale, Ithaca, Long Island, New York City, Niagara Falls, Patchogue, Plattsburgh, Riverdale, Rochester, Staten Island, Syracuse): **Kenneth C. Thayer,** R. D. #1, Ava, N. Y. 13303 (phone 315-827-4241).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Greensboro, Kitty Hawk, Raleigh): **William M. Bowden,** 509 Greenbriar Dr., Goldsboro, N. C. 27530 (phone 919-735-4716).

NORTH DAKOTA (Concrete, Fargo, Grand Forks, Minot): **Ernest J. Collette, Jr.,** Box 345, Grand Forks, N. D. 58201 (phone 701-775-3944).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Toledo, Youngstown): **Robert J. Puglisi,** 1854 SR 181, Crestline, Ohio 44827 (phone 419-683-2283).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **William N. Webb,** 404 W. Douglas, Midwest City, Okla. 73110 (phone 405-734-2658).

OREGON (Corvallis, Eugene, Portland): **Clayton Gross,** 3124 SW Doschdale Rd., Portland, Ore. 97201 (phone 503-244-9592).

PENNSYLVANIA (Allentown, Beaver Falls, Chester, Dormont, Erie, Harrisburg, Homestead, Lewistown, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **Lamar R. Schwartz,** P. O. Box 79, Fogelsville, Pa. 18051 (phone 215-967-3387).

RHODE ISLAND (Warwick): **Charles H. Collins,** 143d TAG (RIANG), Warwick, R. I. 02886 (phone 401-737-2100).

SOUTH CAROLINA (Charleston, Columbia, Greenville, Myrtle Beach, Sumter): **Robert H. Morrell,** RR 2, Hopkins, S. C. 29061 (phone 803-776-2041).

SOUTH DAKOTA (Rapid City): **D. L. Corning,** Camp Rapid, Rapid City, S. D. 57701.

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Thomas O. Bigger,** Sverdrup/ARO, Inc., AEDC Div., Arnold AFS, Tenn. 37389 (phone 615-455-2611, ext. 243).

TEXAS (Abilene, Austin, Big Spring Commerce, Corpus Christi, Dallas, De Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Frank Manupelli,** P. O. Box 5250, San Antonio Tex. 78201 (phone 512-349-1111).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Lee Mohler,** 2605 Bonneville Terr., Ogden, Utah 84403 (phone 801-777-3421).

VERMONT (Burlington): **John Navin,** 134th DSES, ANG, Burlington IAP, Vt. 05401 (phone 802-658-0770).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Jon R. Donnelly,** 8539 Sutherland Rd., Richmond, Va. 23235 (phone 804-649-6425).

WASHINGTON (Seattle, Spokane, Tacoma): **Frank R. Troutman,** 196 Dorado Dr., Issaquah, Wash. 98027 (phone 206-655-0540).

WEST VIRGINIA (Huntington): **James Hazelrigg,** Rt. 2, Box 32, Barboursville W. Va. 25504 (phone 304-755-2121).

WISCONSIN (Madison, Milwaukee) **Charles W. Marotske,** 7945 S. Verdev Dr., Oak Creek, Wis. 53154 (phone 414-762-4383).

WYOMING (Cheyenne): **Lloyd A Flynn,** 1907 Laurel Dr., Cheyenne Wyo. 82001 (phone 307-634-5901).

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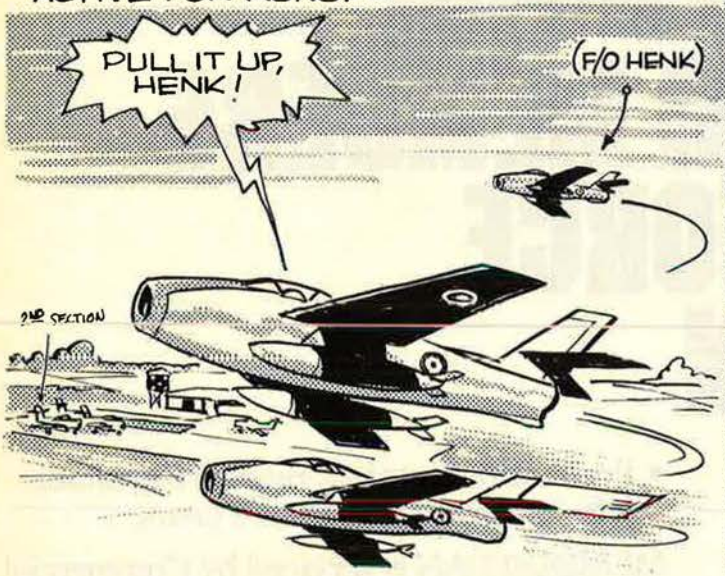
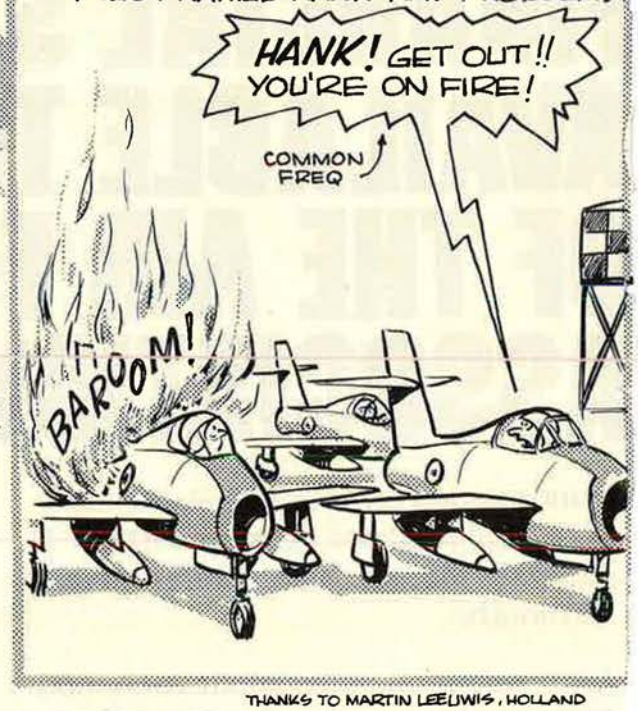
WAY BACK IN '56, A FLIGHT OF DUTCH F-84F'S* LAUNCHES INTO A LOW OVERCAST. A 2ND SECTION PULLS ONTO THE ACTIVE FOR RUNUP–



* WHICH HAD A PROPENSITY FOR BLOWING UP.

JUST BEFORE BRAKE RELEASE, NO. 2 IN THE SECOND SECTION – A PILOT NAMED HANK – HAS PROBLEMS



THANKS TO MARTIN LEELIWIS, HOLLAND

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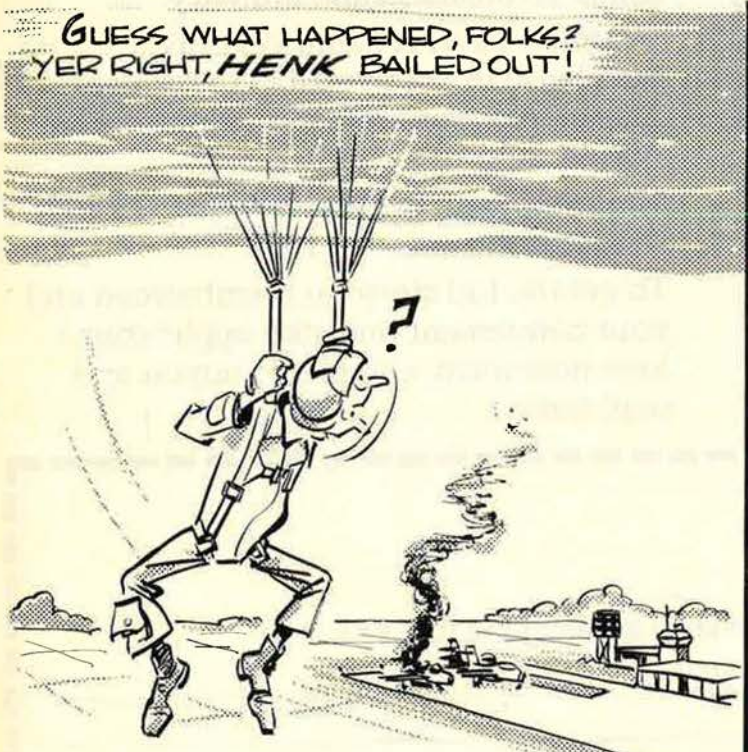

P.S. HIS ACFT FLEW AROUND – PILOTLESS – FOR ABOUT 10 MIN. BEFORE AUGERING IN!

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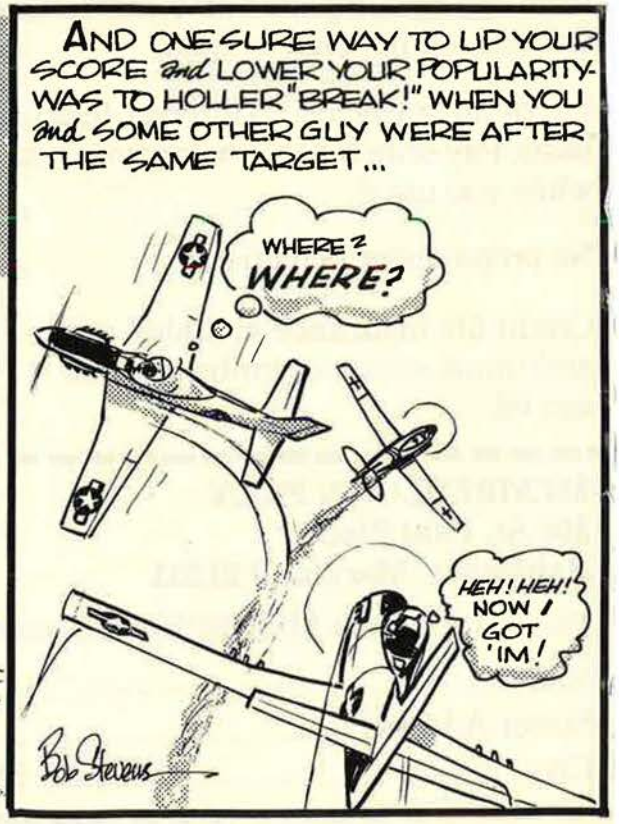

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"Eagle two, we have 9 hostiles, 10 degrees, angels 70"...

The challenge? Intercept any threat. Response: The F-15 Eagle. With all-weather armament, advanced multi-mode radar, extended range, and Mach 2.5 speed, this aircraft is ideally suited to the USAF strategic defense mission.

The F-15

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