

OCTOBER 1979/\$1

AIR FORCE

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MAGAZINE



Research for Tomorrow's Flying Safety

Air Force Power



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CF6-50-POWERED KC-10A ADVANCED TANKER/CARGO AIRCRAFT



CF6-50-POWERED E-4A ADVANCED AIRBORNE COMMAND POST

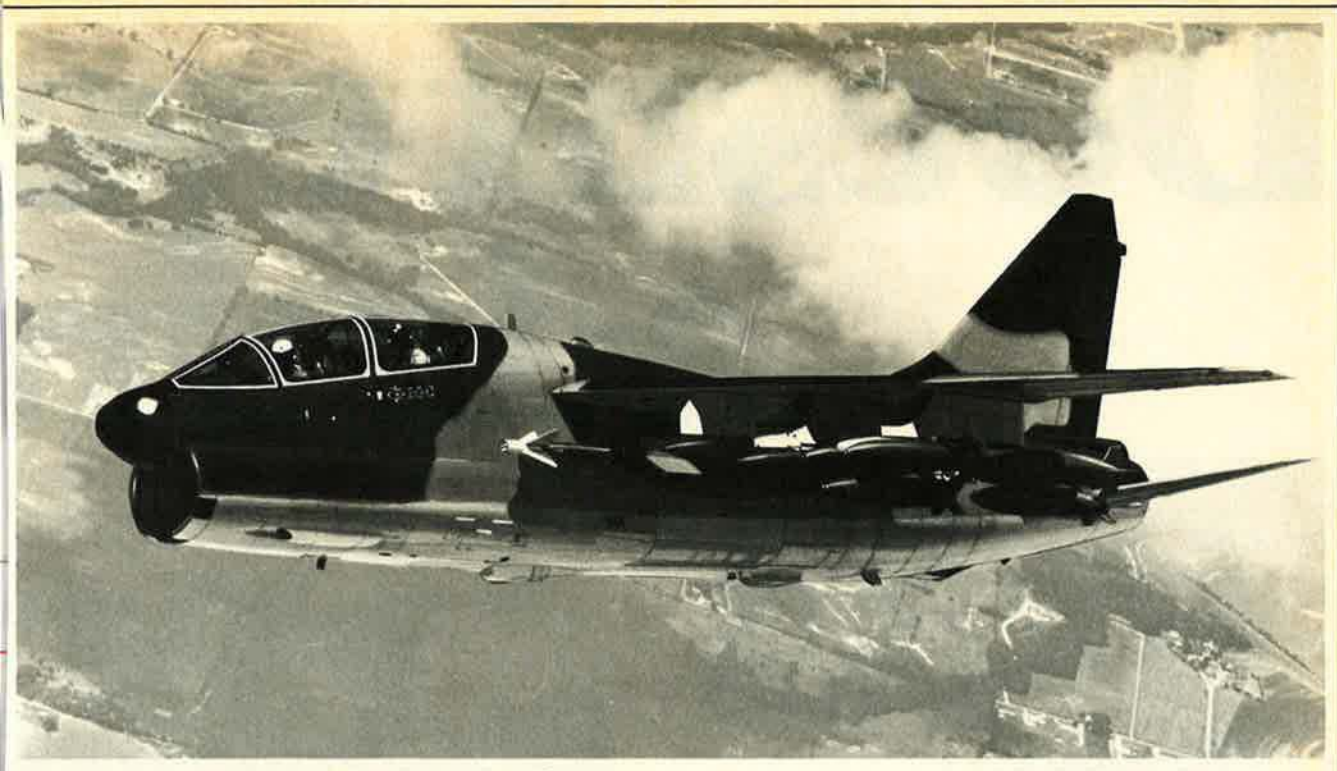
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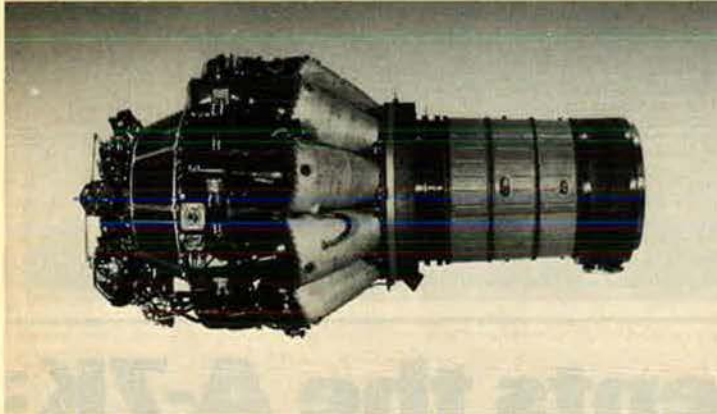
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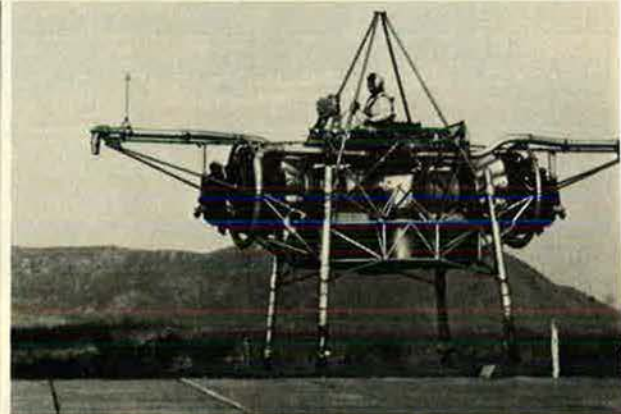
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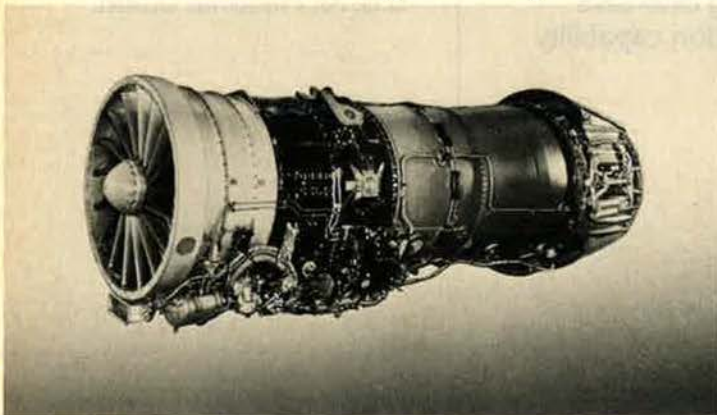
1953. First jet vertical take-off. Developed by Rolls-Royce.



1954. First commercial prop-jet in North American service. Powered by Rolls-Royce



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1960. First turbofan engine. Built by Rolls-Royce.



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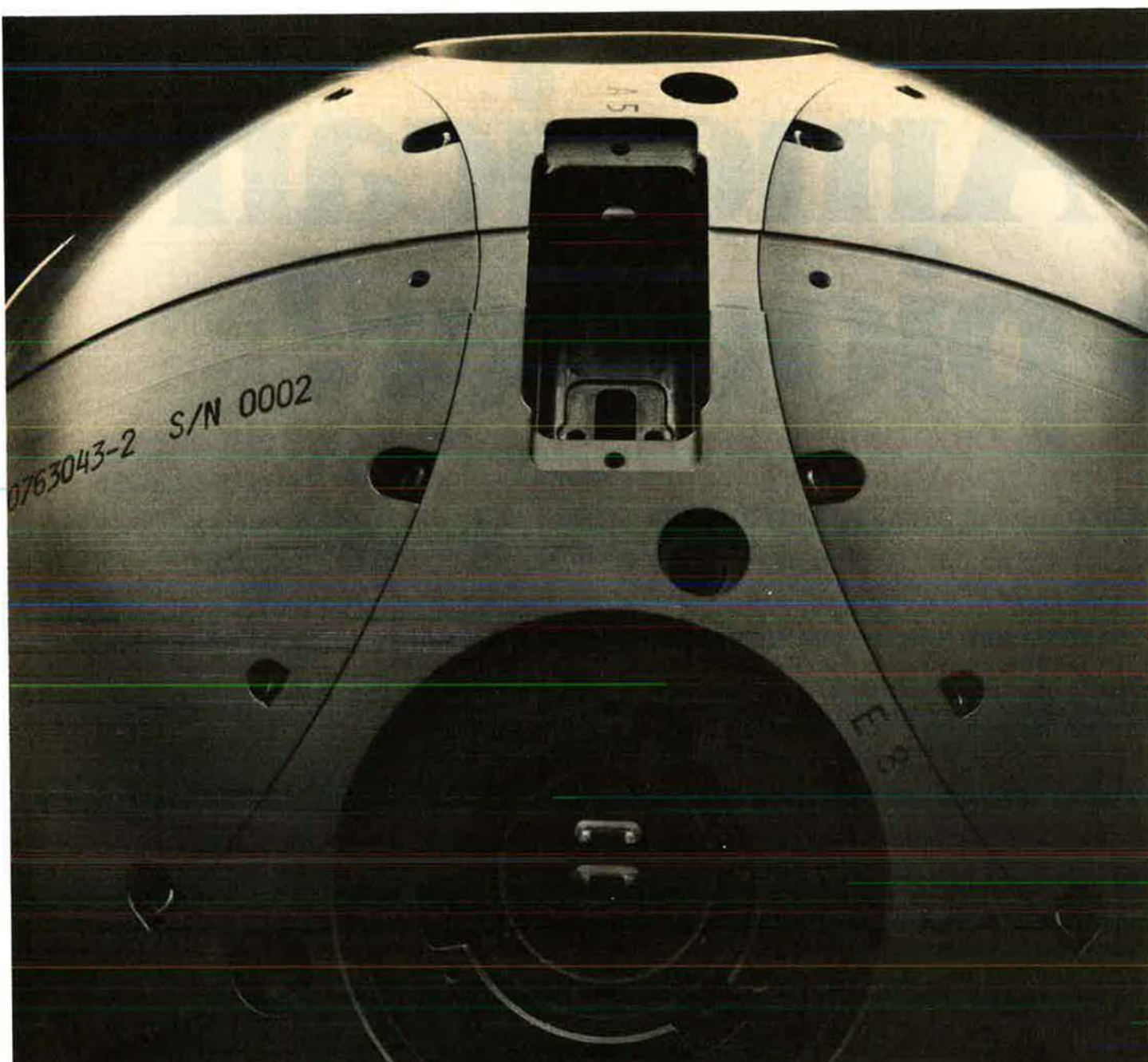
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ABOUT THE COVER



Landing-system technology is but one aspect of the National Aviation Facilities Experimental Center's comprehensive development of tomorrow's civil air traffic control and safety systems. For a report on NAFEC's R&D efforts, see story beginning on p. 42.

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He has ~~45,000~~ 50,000.**



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DEFENSE SYSTEMS DIVISION

The Military Balance 1979-80

EACH year, in early September, the International Institute for Strategic Studies in London publishes "The Military Balance" for the current and coming years. Through an exclusive arrangement with IISS, AIR FORCE Magazine has reprinted the Institute report in our December issue for the past eight years. We will publish it again in December 1979.

The Institute, as most of our readers know, is an independent center for research in defense-related areas and is universally recognized as the leading authority in its field. Its reputation has been built on adherence to cold facts and, where judgments are made, on cautious conservatism. To paraphrase a TV commercial, when IISS speaks, people listen.

In the past, we have reserved comment on "The Balance" until it appeared in AIR FORCE Magazine. Because of some unusually significant reporting and analysis, we are breaking that precedent.

The Institute reports this year that in the strategic area, "the capabilities of the Super-Powers will continue to increase despite SALT II, if asymmetrically. On the Soviet side, older land-based missiles are being replaced by more accurate systems carrying greater numbers of warheads. Extrapolation of this trend will create a theoretical vulnerability of US land-based systems by the mid-1980s which greater hardening cannot redress. . . . Given the time lag inherent in the production and deployment of new strategic systems and the new constraints introduced by SALT II, it will be eight to ten years before the US could again restore a degree of invulnerability to their land-based deterrent forces. . . ."

That means the deterrent value of US strategic forces will be pretty much limited—by 1982, we believe—to preventing an attack on the US itself. This unwelcome wind of change will have turned inside out the nuclear umbrella that has protected US allies and external interests. That leads to another significant IISS judgment.

Until this year, it generally has been accepted that the US had some 7,000 tactical nuclear weapons in Europe, compared to about 3,500 for the USSR—an apparently comfortable margin that should give the Kremlin long thoughts about starting trouble in Europe (or other theaters, for that matter) or about first use of nukes if a conventional war were launched.

Now the Institute finds that instead of the rough parity reported in our March 1979 issue (p. 47), "there currently exists a 25% advantage to the Warsaw Pact in terms of *deliverable* [our emphasis] warheads likely to be deployed in a European conflict and a moderate 13% advantage to the Warsaw Pact in terms of the effectiveness of those warheads when measured against the three parameters of survivability, assurance of penetration, and flexibility. . . . We note that this balance is

sustained by American central systems (*Poseidon* SLBMs) allocated to SACEUR for Europe's defense but counted in SALT. If these central systems are removed from the equation, the Warsaw Pact advantage rises to almost 60% in both numbers and effectiveness. Continued deployment of SS-20 intermediate-range ballistic missiles . . . will alter the balance substantially in favor of the Warsaw Pact if NATO's Theater Nuclear Forces are not increased or modernized or both."

It follows from this that if US strategic and theater nuclear forces are both neutralized, potential conflict between the superpowers or their alliances is most likely to be at the conventional level, where the USSR has an advantage in military manpower and a wide quantitative lead in offensive equipment.

For example, the USSR's inventory of tanks, according to "The Balance," stands at about 50,000, compared to 10,500 for the US, and the Soviet Navy continues to emphasize amphibious ships and attack submarines. Finally, the Soviet Union is stockpiling (our term) large quantities of up-to-date military equipment in such strategic locations as Libya, South Yemen, Ethiopia, and Vietnam along the West's oil and raw materials supply routes.

From this evidence and a great deal more comparative data in the new "Military Balance," we find strong support for our belief that the USSR is implementing a carefully integrated global strategy, elements of which claim fleeting public attention but which, as a unified strategy, has been obscured by the shadows of détente, oil, and inflation.

In ten years, the USSR has moved patiently, step by step, from strategic inferiority to parity-plus, headed for superiority; from gross inferiority in theater nuclear forces to parity-plus, headed for superiority; from parity in conventional forces to superiority; and from a landlocked continental nation to a global presence, headed for global hegemony. "Hair by hair," as the Russian proverb goes, "you can pluck the whole beard."

This outbound passage from military inferiority has cost the Soviet people dearly—from eleven to fifteen percent of each year's gross national product. But the Kremlin's goal of world domination has been judged by the few who rule to be worth the sacrifices of the many who serve.

The relative decline of Western power is not likely to be reversed by anything short of heroic measures. We do not see such measures in the immediate offing, but there is a growing grass-roots recognition—at least in this country—that all is not well. That's a first step. If the people will tell their leader where they want to go, perhaps the leader will lead them.

—JOHN L. FRISBEE, EDITOR

THE EXPERIENCE OF THE GEOLOGICAL SURVEY WITH THE TELECONFERENCE



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

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

"They conduct a meet-

ing—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.

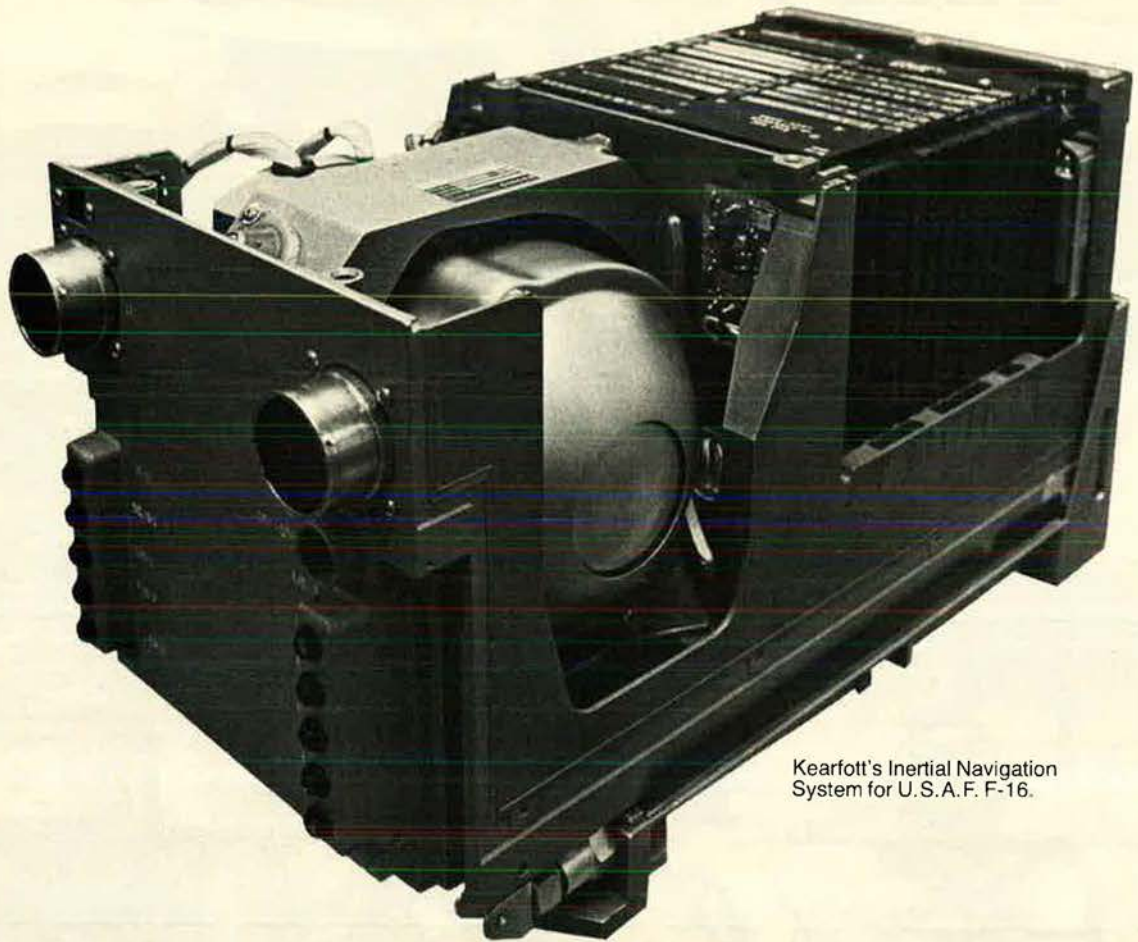
"Another unusual thing about this network," Mr. Frantz points out, "is that you can dial a point outside the circuit.

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.

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

- Present Position—Latitude, Longitude, Altitude
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- Aircraft Velocity—Horizontal and Vertical
- Steering Information—Track Angle Error

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inputs in MUX serial format (MIL-STD-1553):

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Significant features:

- MUX interface (MIL-STD-1553)
- Lightweight—33 pounds
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Airmail

Something Worth Defending

Two articles in the July 1979 issue of AIR FORCE Magazine concerned me very much. One was the "In Focus . . ." column, by Edgar Ulmer, and the other was "A Strategy—Or a Capacity for Revenge?" by Gen. T. R. Milton. If the picture they paint of growing Soviet R&D and increasing capabilities vis-à-vis US R&D and fielding of new, technically advanced systems is correct, we must ask ourselves the following questions:

Is the US goal to achieve the ability to observe warheads coming into our country and to watch as they destroy us? Or is our goal to achieve a monitoring capability tied to an interception capability?

It may be assumed that the concept of Mutual Assured Destruction is as mad as its acronym suggests. The possession of an offensive force that our stated policy is to not use is no deterrent and no protection. The US needs to develop and deploy a defensive system to be coupled with our offensive systems—if we are to develop a real deterrent. We must also modernize our offensive force, from bombers to submarines. Unless we do this while we still have some technological advantage, the USSR and/or People's Republic of China will do so and our position relative to them will be one of increasing inferiority.

The last question we must ask ourselves is: Do we have the desire to reverse the trend of increasing USSR and decreasing US military capability? . . .

We must overcome the belief that strength is bad and realize that the goodness or evil of strength lies in how it is used. I don't think there is much question about how the USSR sees hers.

We must realize that we use ours to defend our way of life and that our way of life is worth defending. This is a question not of money, but of belief. The beliefs that we hold should provide us with the will to remain a leading world power, not subject to the blackmail attempts of the leading imperialist power since the 1700s—the USSR. If we are unwilling to expend the energy, dedication, and

some degree of self-sacrifice necessary to be the leading free world power, perhaps we should wonder how long we will be truly free.

If our beliefs are worth defending, we must have the will to defend them in the face of even strong opposition. If our beliefs are subject to compromise or abandonment, perhaps we should eliminate our military and become as apparently vulnerable as we may actually be.

Capt. Thomas J. Powell, USAF
APO San Francisco

The End Mission Is Still the Same

There are, as with most controversial subjects, some valid and well-stated points in the two letters printed in the August issue captioned "In Business to Fight and Win." However, both writers seem to have a hang-up about the SAC motto "Peace Is Our Profession" and suggest it presents a false, Madison Avenue-type morality. They obviously cared enough about what they see as Air Force and US defense problems to write and express many strong statements about the facts of military involvement, but I think they are very wrong about the validity of military mottoes related to peace.

Wars are fought between those attempting to gain some long-term advantage (usually economically motivated) and those attempting to prevent some long-term disadvantage. Peace is simply the period between combative wars, and may itself include some very intense noncombative warfare. US policy has been, at least since the Indian, Mexican, and Spanish wars (which were economically motivated to acquire valuable territory), to engage in combative warfare only in defense against aggression, toward either ourselves or our friends at that time. Because of the terrible consequences of a nuclear first strike by an aggressor, our policy since the advent of the cold war had been to deter aggression by convincing all potential adversaries that we had both the will and military strength to absorb a first strike and then deliver an unacceptable return blow to the aggressor. There is no winner in such an exchange. Victory in the nuclear age can only be gained by achieving a nation's objectives

without expending nuclear weapons, either by threat or counterthreat.

My military science professor used to say, "Deterrence is the decoupling of capability and intent." If the military arms, training, and state of readiness of the US triad has decoupled Communist aggressive intents from their obvious capabilities these last thirty-four years, then it can truly be said that peace, at least from nuclear war, has been the viable profession of the post-WW II US military establishment. If peace from conventional warfare did not also exist throughout that period, it can rightly be concluded that our conventional fighting strength was not a sufficient deterrent by not presenting unacceptable losses to an aggressor. It is, in fact, hard to label any real victors in the various wars that have been fought under the nuclear umbrella.

The intent of my response is not to quibble with other readers about military philosophy or psychology, but to reinforce the real issue of the SALT II debate: If the US does not maintain evident strategic superiority over the USSR, then what peace we have experienced during our professional careers will fall prey to Soviet nuclear blackmail. I was always motivated to the highest levels of professionalism to maintain that peace when I flew on a SAC combat crew, and we should all be motivated now to maintain peace by military, diplomatic, technological, and managerial professionalism.

Theodore H. Smith
McLean, Va.

After defining "false morality" as "an excessive preoccupation with [war's] moral aspects" and then propounding the dictum, "War in itself is an immoral act," Lt. Col. Hector Andres Negróni (August '79 "Airmail") does a fast one-eighty: his absolutely immoral war becomes instantly moral if we employ "all means at our disposal" to end it as quickly as possible, because this costs fewer lives than protracted war.

I certainly agree with his second position, which is straight out of the moral theology textbook, and with his example, the atomic bombing of Hiroshima and Nagasaki. Given the data and projections available, President Truman made a sound moral choice; like most such, it was not between absolute good and absolute evil, but between fifty-one and forty-nine percent, discerning the two-percent difference.

I understand also his concern and that of other correspondents about

Airmail

the undermining of fighting spirit, though "Peace Is Our Profession" is such obvious flackery to con the public that most of the troops see through it. Of far greater concern to me is Colonel Negroni's dictum: "War in itself is an immoral act." I have heard this more than once from young combat pilots. I never let it pass from them, in private; I will not let it pass from him, in public, though I will let pass his boomerang logic, confusion of "ends" for "means," and the redundancy of "excessive preoccupation."

Throughout our history, the end of our wars has always been not victory, not peace (those are means), but freedom—for ourselves and for other peoples. True, hindsight shows that our national, moral intent in going to war has always been flawed in some degree and that every war has produced countless specific immoral acts.

It is true, too, that after victory and peace, we have faltered in pursuing freedom, for blacks, for Filipinos, and for others; but those were failures not of national moral intent in war but of postwar indifference.

Erosion of confidence that America's moral intent in war, future and past, is the positive moral good of freedom cynically turns the "noble profession of arms" into gangsterism.

Lt. Col. Neunert F. Lang,
Chaplain, USAF (Ret.)
Port Charlotte, Fla.

Re the discussion of Lt. Col. Baucom's recent letter: Many years ago I attended the MATS ITC at Palm Beach AB and there met the Instructors' Instructor, Kermit M. "Spike" Ross. His definition of the USAF mission was direct, simple, and proper. His statement: "The USAF mission in time of war is to kill the enemy; the USAF mission in time of peace is to train itself to kill the enemy."

I have not heard it better said.
Frank Parr
Oklahoma City, Okla.

Sentimental Journey Aloft

Reference Colonel Schwehm's July issue letter—at least one B-17G is still flying. *Sentimental Journey*, a B-17G owned by the Confederate Air Force and assigned to the Arizona Wing, has just completed a "homecoming"

at the Boeing plant in Seattle and the Paine Field Air Show.

Restoration of our B-17G is partially complete with a missing top turret our biggest problem. The chin and ball turrets will be reinstalled by October '79. The August issue of *Air Classics* tells the *Sentimental Journey* story, with pictures.

Colonel Schwehm is correct about the G-model on Route 99. What a waste! We intend to keep ours flying as a tribute to the men and women who built and flew them. By displaying our B-17G at civilian and military airports we are telling the proud story of how our country produced over 300,000 warplanes in just three and a half years from December 1941 to August 1945. This, coupled with the ability of the brave young men who flew them, is a part of our history that we can point to with great pride and is a story that must be told.

SMSgt. R. M. MacMillan,
USAF (Ret.)
Executive Officer
Arizona Wing of the CAF
Phoenix, Ariz.

Specialization or Leadership?

In the "Perspective" department of your August '79 issue, Lt. Col. Raymond R. Fischer contends that Air Force officers should be viewed as specialists who, "in all but rare cases, remain in a specialty for an entire career." Correspondingly, he maintained that we should "promote these specialists on the basis of the needs of the Air Force, expressed as quotas for each specialty area."

This point of view has been advocated from time to time and has a certain surface appeal. It may be useful, therefore, to briefly explain why the Air Force has not adopted the "corps concept" or implemented a policy of "promotion by specialty" for its officers.

One answer is that this is not the intent of the law. The statutes that govern Air Force promotions and appointments provide for the designation of certain categories of officers to perform professional or otherwise highly specialized functions. The clear intent is that all other officers will be considered together for promotion without further designation or differentiation.

The law can be changed, of course. The more fundamental point which lies behind the law is that Air Force officers—commissioned by the President with the advice and consent of the Senate—hold a distinctive place in our nation. The status and obliga-

tions conveyed by this appointment are paramount as compared to technical expertise or specialization, despite the obvious importance of the latter. It logically follows that consideration for advancement in the officer corps should, in the final analysis, turn on potential for service in the higher grade as a *commissioned officer*.

The point is that the Air Force is an organization of specialized talents and skills, not simply an aggregation of specialties. The job of orchestrating the efforts of men and women with highly technical skills and performing complex tasks is not usually enhanced by further specialization. Other services—which have operated under the corps concept—recognized this and are generally moving toward the Air Force system. Air Force specialties are and must be dynamic, not static. Concentrating on specialized expertise would tend to create vested interests in the status quo by the functional manager of each specialized group, and would probably also result in such attendant difficulties as vying for additional authorizations and "jurisdictional" disputes.

In summary, there are members of the total force who are brought into the Air Force based upon their technical expertise and promoted or otherwise compensated based upon their performance in and potential for highly specialized duties. Many officers also possess such skills and perform specialized tasks. But the responsibility of the commissioned officer is, ultimately, that of leadership—bringing the best effort from all specialties in the interest of a mission-effective, combat-ready Air Force.

Col. R. E. Conaway, USAF
Chief, Policy Division
Directorate of Personnel Plans
Hq. United States Air Force
Washington, D. C.

Colonel Fischer's proposal was interesting and might well receive support from certain segments of the officer population who think they are consistently wronged. But it advocates turning to a system that could prove very injurious to the Air Force as a whole while benefiting only certain career fields. Few would maintain that all specialties are promoted using the same percentages, and contend that they should not be. Certainly this is a technical organization made up of many specialists, but it is still a service directed toward the

The talk of the services... Raytheon AN/TRC-170.

For the highly mobile field unit, there is no substitute for fast, reliable communications. The all-digital AN/TRC-170 troposcatter radio system—developed by Raytheon for the U.S. Air Force's Electronic Systems Division—provides the secure communications capability needed to meet this essential requirement.

A vital element in the Tri-Service Tactical Communications Program (TRI-TAC), AN/TRC-170 utilizes a Raytheon-patented receiver that counters the dispersive effects of the troposphere. The result is a system that produces very low bit error rates even with severe signal dispersion. Now completing full-scale develop-



ment, AN/TRC-170 will be available in separate versions to meet three over-the-horizon range requirements—100, 150 and 200 miles—as well as line-of-sight.

Raytheon is also producing for the U.S. Army a family of Digital Group Multiplexers that will operate with virtually all elements of the TRI-TAC system. For the

AN/TRC-170, these units will provide access for up to 64 channels of digital voice traffic.

For details on AN/TRC-170 and other Raytheon communications equipment, please write: Raytheon Company, Government Marketing, 141 Spring Street, Lexington, Massachusetts 02173.

RAYTHEON



SCIENCE/SCOPE

Without ever having to leave the ground, B-52 bomber crews can learn to use new electronic countermeasure (ECM) systems. The crews train on an advanced simulator that duplicates "adversary" radar beams and electronic tracking modes. The simulator, called the ALQ-14, can create threat environments and evaluate the crew's response and performance. It was designed to be flexible enough to accommodate new ECM systems as they are developed to meet emerging threats. The system was built by Hughes for the U.S. Air Force.

An advanced goggle that allows soldiers to see at night has been developed by Hughes for the U.S. Army's Night Vision Laboratories. The device, called a holographic one-tube goggle, employs thin-film diffraction optics and advanced electronics. It amplifies dim visual light and near-infrared radiation, then superimposes the enhanced image over the wearer's view. Aided by studies on how the brain overlaps the field of view of each eye, human engineering specialists designed the goggle so that the image intensifier tube, which extends from above the bridge of the nose, would not block any portion of a person's view.

The way in which the brain processes visual information has been used to develop a set of rules to portray how combat pilots locate ground targets. The concept, which draws on years of research involving realistic simulations, was created by Hughes to improve equipment, procedures, and training. It divides the pilot's search into three stages -- an orientation, a preliminary look, and an examination of likely targets. Each step, the pilot makes decisions based on what he sees or expects to see. Because the concept follows the pilot's thinking, engineers can determine which stage of the target acquisition process is most difficult, and how it might be simplified by the design of more efficient systems.

U.S. Navy commanders will have a better picture of air, surface, and undersea combat operations when a new data display subsystem goes into operation soon. The AN/UYQ-21 standard display console and its related support equipment is the first set of common system elements able to satisfy the needs of diverse surface ships ranging from small hydrofoils to aircraft carriers. The set can display data from sonar, radar, television, and electronic warfare equipment, as well as provide tactical symbology, graphics, and alphanumeric. Hughes is building equipment for eight different ship systems for the Naval Sea Systems Command.

A new video link for remotely piloted vehicles revives an old but surprisingly simple technique to resist jamming. The approach calls for video signals to be transmitted using phase modulation (PM) rather than frequency modulation (FM). Hughes engineers have found that with this method the TV picture gradually degrades as the jamming signal strength increases. By contrast, the performance of an FM system deteriorates rapidly after falling below a certain threshold. Phase-modulated signals, when properly processed, require less bandwidth and can be coded using pseudo-noise and spread-spectrum techniques, thus reducing the chance of enemy detection.

Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY
CULVER CITY, CALIFORNIA 90230

pointed end, an end that happens to be aircraft-related. Knowing that, each of us makes a conscious decision to make the Air Force a career, accepting the ground rule that the "needs of the service" come first.

A system that would keep an individual in a specialty for his entire career would cause an exodus of young officers after their period of obligated services. The ability to both broaden and return to one's career field or cross-train is a light at the end of the tunnel for many officers. People change, and over the course of a career an individual may well prove of more benefit in a new area. . . .

If we identify ourselves as pilots, navigators, EWOs, WSOs, supply specialists, etc., haven't we missed the point that we are, first and foremost, officers? . . .

Colonel Fischer is looking back on his career and seeing inequities. I am still looking forward to the remainder of mine and I see some problems, but none that would put me in any corner that favors the structured corps system of some of our allied or sister services. I would feel much more comfortable working for someone who won his eagles or stars on an across-the-board competitive basis rather than strictly within his specialty. I don't want to work for someone just because he is a good technician—I want to work for good officers. . . .

Let's not tear down the structure just because it has some minor faults; those faults might lie within our desire to be assured of too many equalities in an unequal world. And maybe there is an even more basic question to be asked: If we continue to demand of ourselves an identification as specialists, should we even be considered as officers? I think not.

Capt. Michael F. Monaghan,
USAF
North Bay, Ontario, Canada

Everyone Included

Thank you for printing in the August issue a letter from Lt. Alan Kifer expanding on my suggestion, which appeared in June, to the effect that pilots should have broadened career opportunities. I certainly did not intend to exclude nonpilots, but was simply addressing the much-

discussed specific problem of pilot retention.

A program to improve a specific, acknowledged problem might have some chance of implementation, but if it is stated too broadly, it simply becomes a general policy like "people orientation," which means nothing until it is brought down to specific actions that are probably different for various categories of people, and perhaps for each individual.

I would still like to see my program start with young pilots, and if successful, by all means let it include everyone.

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

The Military Club

Although I recognize that Ed Gates's article, "Can the Military Club Dilemma Be Solved?" in the August issue of AIR FORCE Magazine depicts the findings of the January 15, 1979, GAO report, the article's premise that clubs "are in a rather unhealthy state" is unfounded. As the Director of Morale, Welfare and Recreation, clubs are of vital interest to me. I, therefore, feel compelled to set the record straight as it pertains to Air Force clubs.

For the first six months of FY '79, sales, membership, and net earnings are up considerably over the same period in FY '78. This not only reflects the strong interest Air Force people have in the club program, but points out the success of our efforts to help local managers enhance their operations. For example, we have quadrupled our training budget. The primary emphasis has been placed on food programs, and food sales are up \$5 million (12½ percent) so far this year. Admittedly, some individual clubs still encounter financial problems; however, it is usually the result of the environment (small membership, remote location, impending base closure, etc.), and we foresee that losses this year will be down from last year.

All too often, club critics fail to realize that the mission of an open mess is threefold. In addition to providing a recreation outlet for an association of members through social, dining, and entertainment activities, it is used for essential feeding of authorized personnel and as a facility in which the commander may host required command and community protocol events. Based on the above, we feel strongly that as the most used MWR facility, clubs are entitled to appropri-

ated fund support and should continue to share in package store earnings.

In keeping with military tradition and the need for good order and discipline, we continue to support the policy of separate facilities for enlisted and officer personnel. However, we have consolidated some clubs at small installations. Additionally, some of our clubs have combined management, administrative, and warehousing functions.

Your interest in military clubs is appreciated; however, the facts are that Air Force clubs are healthy, alive, and improving. We are optimistic that these trends will strengthen and continue to grow in the future.

Col. Irv R. Gerrow, USAF
Director of Morale, Welfare
& Recreation
Hq. Air Force Manpower &
Personnel Center
Randolph AFB, Tex.

Memory Lane Revisited

In your August 1979 issue, I have just read "Down Memory Lane," a letter by Lt. Col. Frank T. Hughes, USAF (Ret.), of Madera, Calif.

The Colonel is correct regarding the distinctive accomplishment of Lt. Dale Spencer—however, the mission that day was to Sorau (not Soran), Germany, and Colonel Hughes must have been assigned to the 615th Bomb Squadron (H) of the 401st Bomb Group (H), and not to the 315th Bomb Squadron, as there was not such a squadron in the 401st Bomb Group (H).

This is for the record. I also was there, and was the lead bombardier. We clobbered the target.

William W. Dolan
St. Louis, Mo.

After Thirty-three Years

In 1945, I commanded the 2234th Air Force Truck Co., 43d Air Service Group, Fifteenth Air Force, stationed in Cerignola, Italy. On March 23, 1945, a B-24 of the 740th Bomb Squadron, 455th Bomb Group, crashed near my headquarters after being shot down during a mission assignment. Two NCOs of my command and I rescued the ten crew members from the wreckage of the plane, administered first aid, and were credited with saving the lives of these men. The Group Deputy Commander, through Maj. Herbert A. Meyer, Jr., Squadron Commander, sent a letter of commendation, recommending awards "for heroism and courage. . . ."

The picture and caption appearing

Airmail

in the July AIR FORCE Magazine, p. 26, shows Gen. Richard Ellis, SAC Commander in Chief, awarding the medals to me—thirty-three years later!

I would appreciate hearing from any former members of my command and others from the 43d ASG and 534th ASG, Fifteenth Air Force, and from members of the B-24 crew and/or 740th Bomb Squadron and 455th Bomb Group who may still remember this incident and/or our service together.

Dr. Charles S. Wehrer
2932 S. 93d Plaza, Apt. 8
Omaha, Neb. 68124

Phone: (402) 392-1536

Rejuvenating a Superfortress

The Imperial War Museum is engaged in the restoration of Superfortress 461748 to a flying condition so that it may make air passage to Britain, to take up residence at Duxford Airfield, Cambridgeshire. The writer is at present a temporary resident at the US Naval Weapons Center, China Lake, Calif., for the purpose of liaison with our restoration contractors.

Have any readers encountered this aircraft during service with USAF? We would appreciate information regarding its career since neither of the Research Centers (at the USAF Museum, Wright-Patterson AFB, and at Maxwell AFB) holds sufficient detailed historical records.

We are hoping to obtain sufficient material to restore it to bomber configuration, mainly as representing the type, though it may not have served in this role. Its present condition indicates some other use, possibly target-towing, certainly not tanker, though there appears to be five or six bomb-mission markers under the pilot's side window. Externally, the black lower finish has been applied, it would seem in some hurry, and other standard markings proliferate.

Having stood around fifteen years in the desert here, and generally appearing decrepit, it was most heartening to see the old girl come to life again as her undercarriage legs were reinflated, and most remarkably, to hold the inflation pressure. Work is now under way to restore the fabric of the control surfaces. All the glazing is being renewed and a full mainte-

nance program will be carried out before flight from NWC.

It would be much appreciated if appropriate information could be directed to:

Mr. D. J. Penn
Keeper of Exhibits and Firearms
Imperial War Museum
Lambeth Road, London SE1 6HZ
Great Britain

Geoff Bottomley
China Lake, Calif.

Buzzin' the Yanks

In the fall of 1943 it was rumored that a B-17 crew, on their way to England, buzzed Yankee Stadium during a World Series game. Apparently the story was quashed in the interest of national security. Try as I might, I could not get confirmation of the story from the Yankee organization or the New York newspapers.

Recently I contacted Royal D. Frey, Curator of the Air Force Museum at Wright-Pat, who confirms my memory of the incident and states that he thinks it was written up in *Stars & Stripes* around the latter part of 1943.

Can anyone identify the crew and their whereabouts? I'd like to get in touch with one or more of them.

Howard W. Crandall
1196 Meadowbrook S.E.
Warren, Ohio 44484

Col. Edward M. Kirby

I am attempting to locate a Col. Edward M. Kirby, or his heirs, or anyone else who knows of his present whereabouts. He was formerly Chief, Radio Branch, War Department, during WW II and was #2 in the Allied Expeditionary Forces Program service of the British Broadcasting Corp. (AEFP/BBC) until October 1944. He was attached to the staff of SHAEF and served for a time in England. Following the war he established a public-relations counseling service with offices in Washington, Nashville, New York, and London.

Henry F. Whiston
2444 Benny Crescent #508
Montreal, Quebec, Canada
H4B 2R3

Det. 055 Alumni

The 1979 graduating class of AF-ROTC Detachment 055 at UCLA is organizing a UCLA AFROTC Alumni Association. If you are a graduate of Detachment 055 and have not been contacted, please write to:

Department of Aerospace Studies
University of California
Los Angeles, Calif. 90024
Attn: AFROTC Alumni Association

386th Bomb Group

I am doing research for a history book about the 386th Bomb Group, WW II and would like to hear from former members. Please contact me for a data sheet.

Chester P. Klier
1455 Bluefield Dr.
Florissant, Mo. 63033

Command Patches

I collected Air Force shoulder patches while on active duty during WW II and have these for the 1st through 20th commands but lack them for the US Strategic and Mediterranean air forces. There are some duplicates for the 1st, 2d, 3d, 4th, 7th, and 13th commands I will swap for the above patches on a one-for-one basis. Am willing to buy if the prices are reasonable.

Walter H. Poppe
7127 S. Sunnycrest Rd.
Seattle, Wash. 98178

UNIT REUNIONS

Airlift Association

October 19-21, Maxwell House Hotel, Nashville, Tenn. Military airlift up-date briefings and industrial displays. New membership apps accepted with convention reservations. **Contact:** Col. Ken Chatfield, 2613 Mesa Dr., Nashville, Tenn. 37217.

National Pilots Association

Midcontinent Fly-in and State Pilot Association organizational meetings, scheduled for October 4-7 in Wichita, Kan., have been postponed. NPA's annual membership meeting now scheduled for December 6-7, Palm Beach, Fla. **Contact:** John Ryan, 805 15th St., N. W., Washington, D. C. 20005. Phone: (202) 737-0773.

REC III

November 9-12, Gunter Hotel, San Antonio, Tex. All past and present rec types and friends. For registration forms **Contact:** Col. Tex McVeigh, P. O. Box 888, Randolph AFB, Tex. 78148. Phone: (512) 661-7150.

Class 40-G

39th annual reunion, November 8-11, Indigo Inn, Daytona Beach, Fla. Friends of 40-G welcome. **Contact:** Col. John J. LaRoche, USAF (Ret.), P. O. Box 224, Altamonte Springs, Fla. 32701. Phone: (305) 831-2859.

354th Fighter Group, 9th AF

Hq., 353d, 355th, 356th Fighter Squadrons, 472d Service Group, and attached units (November 1942-November 1945) December 12-16, Hotel Sahara, Las Vegas, Nev. **Contact:** 354th Pioneer Mustang Fighter Group, P. O. Box 68123, Indianapolis, Ind. 46268. Phone: (317) 291-6010.

WE JUST LOWERED THE COST.



For a detailed account of Boeing's work on its ALCM AGM-86B, read on.

NEW MATH FOR

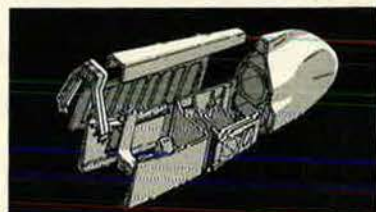
Boeing's business is airplanes. The B-52, the 747 and lots of points in between. Boeing's business is missiles. SRAM is a name that quickly comes to mind.

Our business is also innovation — creative

engineering that lowers cost of production and labor while maintaining product reliability.

The air launched cruise missile, ALCM, is a real case in point.

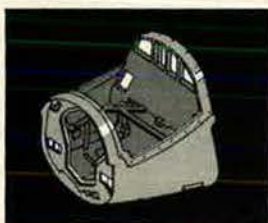
When our first design was released, we were



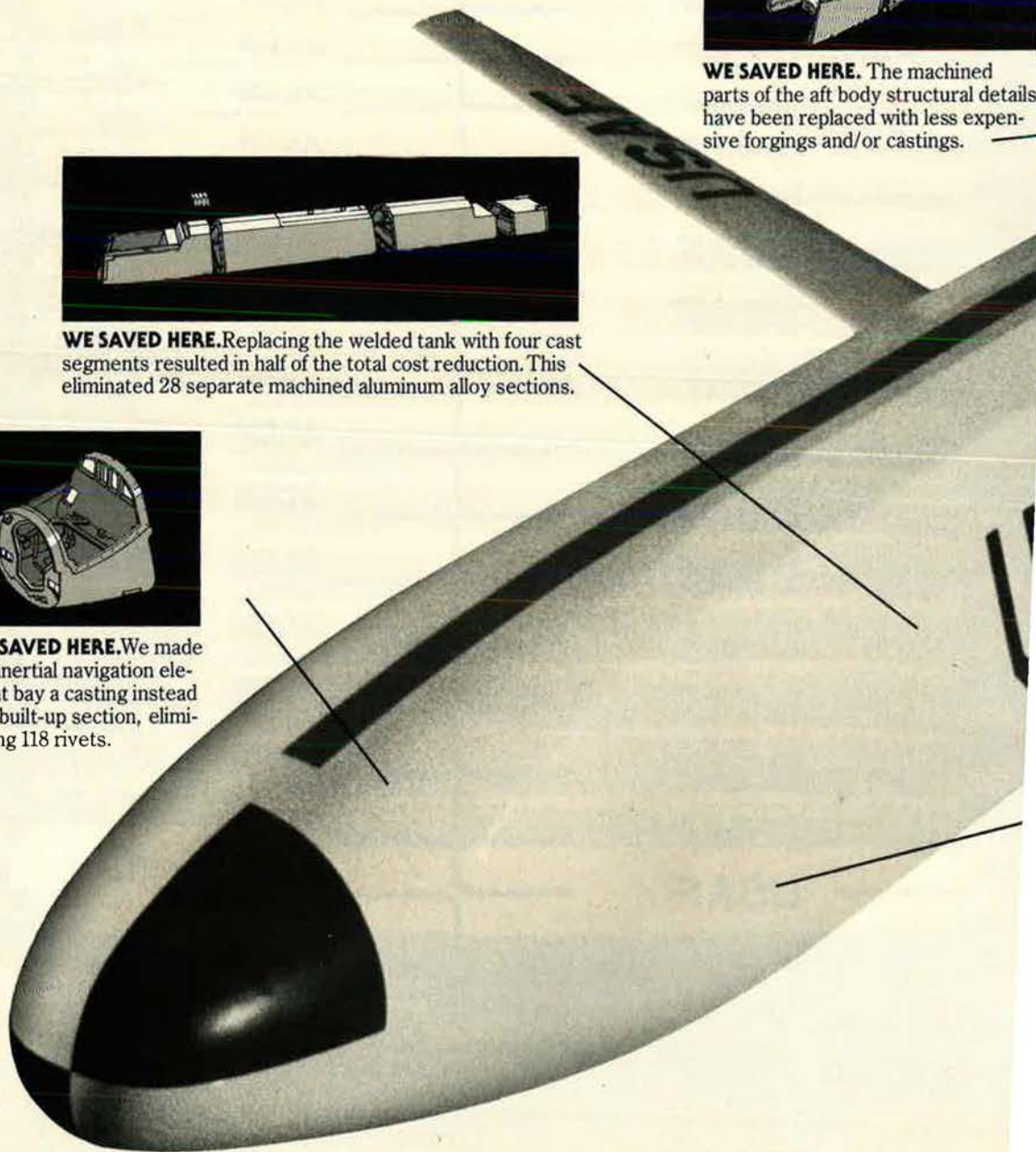
WE SAVED HERE. The machined parts of the aft body structural details have been replaced with less expensive forgings and/or castings.



WE SAVED HERE. Replacing the welded tank with four cast segments resulted in half of the total cost reduction. This eliminated 28 separate machined aluminum alloy sections.



WE SAVED HERE. We made the inertial navigation element bay a casting instead of a built-up section, eliminating 118 rivets.

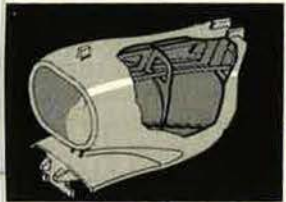


BOEING ALCM.

costing out a project that was a third higher than is today. With the concurrence and encouragement of the Department of Defense, we found new ways to fabricate, assemble, use new materials and cut overall labor costs on

every missile. Without changing the critical performance characteristics one bit.

Each step of the major savings is outlined here. We think it makes especially good reading.



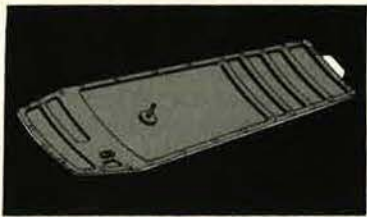
WE SAVED HERE. The engine inlet has been changed to a casting instead of a built-up part eliminating 184 rivets.



WE SAVED HERE. The composite fin was previously constructed by "hogging" out plates and bonding them together, then machining the end product. Now it is made of molded graphite composite.



WE SAVED HERE. We've replaced aluminum elevons with compression molded graphite-epoxy elevons. Result: reduced machining and forming.



WE SAVED HERE. Now we're making the payload bay covers from castings instead of the original sheet metal.

WE JUST LOWERED THE COST.



BOEING

InFocus...

BY EDGAR ULSAMER, SENIOR EDITOR

Washington, D. C. Sept. 10 Pentagon, CIA Clash Over MX

Early in August, the final meeting on MX of the National Security Council's Program Review Committee (PRC) produced an unexpected, vexing surprise when Adm. Stansfield Turner, USN (Ret.), Director of Central Intelligence, took a dissenting, strongly negative position on the survivability and verifiability of modern land-based ICBMs. Admiral Turner's opposition, highly placed sources claim, was based far more on broad philosophical considerations than on intelligence analyses.

What made the intelligence boss's stance perplexing was the fact that the Defense Department and the Air Force, several days prior to the PRC meeting, held a day-long review at CIA headquarters with senior specialists of that agency on the so-called closed-loop or "racetrack" basing mode of MX (see "In Focus," September '79). The CIA officials participating in the review concluded that this MX basing mode provided for adequate security, survivability, and SALT-related verifiability.

Admiral Turner's subsequent negative stance in fact reversed the earlier findings of the agency's technical experts and, according to congressional sources, appeared to center on the contention that land-based ICBMs ought to be abandoned in favor of an expanded dyad whose sea-based element should be strengthened beyond the levels currently planned by the Administration. Admiral Turner's opposition to the MX basing mode recommended by the Pentagon, and okayed by the State Department, the Office of Management and Budget, and the National Security Council staff, initially caused a mood of doom and gloom among MX advocates. At least one principal member of the PRC reportedly favored deferring a decision on the MX program.

But rapid and forceful action by Dr. Zbigniew Brzezinski, White House Assistant for National Security, led to an in-depth critique of Admiral Turner's arguments against MX. Reportedly, they were roundly refuted.

While there was no explicit request of the intelligence boss to revise his views, there was conveyed to him the implicit recommendation that he deal with the MX issue in terms of direct intelligence factors rather than on the basis of indirect, notional concerns.

Apparently because of the unified, broad opposition organized by Dr. Brzezinski, Admiral Turner decided eventually to retract his original position in a secret communication to the PRC. This document reportedly reflected a broad tolerant position on the MX weapon system. This reversal opened the door to a full meeting of the National Security Council on MX, presided over by President Carter on September 5. The meeting culminated in the decision to start full-scale engineering development of both the ten-warhead, 190,000-pound missile and its closed-loop survivable basing mode. The President announced that the first MX squadron is to achieve operational status in 1986. All 200 weapons will be operational by 1989. Cost of the system is estimated at \$33 billion.

Republicans Urge Restructuring of Intelligence Community

The Republican National Committee, following a detailed study by its special intelligence panel, has called for restructuring the US intelligence community, including creation by Congress of a Joint Committee on Intelligence. The Republican body, with obvious partisan gusto, charged that "if we were to continue to try to work with the Administration's proposed intelligence charter . . . we would in effect be accepting the initial logic of those who believe their mission to be that of 'chaining the rogue elephant' of American intelligence. By accepting their charter, we would in effect be accepting their curiously biased view that the main threats to our liberties come from our own government instead of from our external enemies."

Alleging that a wide range of deficiencies mars the Administration's proposed intelligence charter (known as the "National Intelligence Reorganization and Reform Act of 1978"),

the Republican National Committee's counterproposal calls for a chief intelligence advisor to the President who would provide liaison and guidance to the intelligence community without participating in the national intelligence estimates. The intelligence advisor would also give Congress the President's views on intelligence matters and serve as the intelligence community's sole contact with the news media.

The Republican plan recommends further that the several agencies making up the Intelligence community be headed by directors whose terms of office would overlap administrations to increase independence and depoliticize the intelligence process. The clandestine branches of the various intelligence agencies would be merged into a specialized "Foreign Operations Service," charged with secret intelligence gathering, covert operations, and counterintelligence abroad. This service "would be wholly clandestine; every agency of the US government would be required to furnish the [Foreign Operations Service] with full credentials, working assignments abroad for 'cover,' and full cooperation. New legislation should also provide immunity for American corporations and other entities in the private sector in connection with any lawsuits directed against them for permitting intelligence officers to use their activities as a 'cover.' Finally, the law should neither inhibit nor prohibit any American citizen from lending assistance to his country's clandestine intelligence if he so desires."

The Republican group found pervasive flaws in the way National Intelligence Estimates (NIEs) are arrived at. Asserting that "nothing has so endangered the United States" as the NIEs' chronic underestimation of the Soviet Union's strategic buildup, the Republican group characterized these misassessments as "an intelligence abuse of the first magnitude." The Republican task force called for reestablishing the President's Foreign Intelligence Advisory Board that was disbanded by the Carter Administration—or a similar permanent agency—to perform a constant "audit" of national intelligence resources and to assure that "its own opinion and counsel reach the President, his top advisors, and the Congress free of any institutional, organizational, or policy bias."

The Republican group also proposed that more than one element of the intelligence community author

national intelligence estimates "in order to have constructive competition and to foster impartiality." The National Foreign Assessment Center, at the moment the only intelligence organization making intelligence estimates, should be competing against either "a much-improved Defense Intelligence Agency or a wholly new source of alternative analysis."

A Free Ride for 900 Soviet SS-16 Missiles?

SALT II grants Moscow a free ride for its SS-16 ICBM, a weapon system considerably larger and packing greater nuclear yield than USAF's Minuteman III, according to Lt. Gen. Daniel O. Graham, USA (Ret.), the former Director of the Defense Intelligence Agency (DIA) and now cochairman of the Coalition for Peace Through Strength.

In personal letters to members of Congress and at a press conference, the former Pentagon intelligence boss charged that the so-called common understanding of SALT II that provides for a halt in the test and production of the SS-16 "is not verifiable." The SS-16, the Soviet Union's latest solid-propellant ICBM, has completed twenty-seven successful test flights, including troop firings. The three-stage missile carries either a single warhead with a yield of about two megatons or three MIRVs with a yield of about half a megaton each, and is capable of mobile deployment, according to General Graham. About 200 SS-16s have been deployed, thus making the three-year SALT II ban on deploying mobile ICBMs "something of a farce," General Graham said.

The SS-16 launcher, he said, is road-mobile, using a wheeled launcher/erector: "The missile is cradled in this apparatus, transported to its firing position, erected, and launched. This launcher is now being deployed in the USSR with the Soviet Strategic Rocket Forces." The same wheeled launcher/erector, in slightly modified form, is also used by the intermediate-range ballistic missile (IRBM), the SS-20, which is the SS-16 minus one stage, General Graham said. The SS-20 is not covered by SALT II. Converting an SS-20 into an SS-16 takes only a few hours.

Deployment and testing the SS-16 has involved ultrasecret procedures. Testing took place at a base near the Arctic Circle, at Plesetsk, rather than at Tyuratam, the only launch complex used for ICBM testing heretofore. The SS-16, he said, "was kept under cover and was tested at night to avoid satel-

lite photography. Telemetry signals from the tests of this system were among the first to be encrypted to deny us [telemetry] information. The Soviets have never displayed the SS-16 in their Moscow parades, where most Soviet ICBMs have been exhibited." Over the life of SALT II, some 900 SS-16s could be produced, shipped to deployment areas, and "hidden away with little or no chance of discovery by US intelligence," the former DIA Director warned. Such a covert action—largely outside of US detection capabilities—would add 1,800 megatons, or more than the total throw-weight of all US ICBMs, to the Soviet nuclear arsenal.

As reported previously in this space, there are hundreds of other Soviet ICBMs—either weapons removed from their silos or hoarded under cover—that are not controlled by SALT II and are available for use in wartime. The US, General Graham pointed out, "rarely" is able to observe the thousands of large Soviet ICBMs as they are being transported to and from deployment sites.

In the case of the SS-16, General Graham said, US intelligence knew as far back as 1975 that Soviet minimum production exceeded one hundred weapons, and "even this minimum number cannot be accounted for in deployment or firings."

Washington Observations

- Senior Pentagon analysts suspect on the basis of new evidence that the principal role of the Backfire strategic bomber would be to cripple vital US command control communications and intelligence systems (C³I) in the opening phase of a nuclear war. Both the ability of this nuclear-armed supersonic bomber to carry out surprise penetration of the US and the virtual absence of US air defense seem to underlie Soviet contingency plans to blind this country by Backfire strikes against vulnerable C³I facilities.

- A recent test-flight by a Soviet SS-18 ICBM involved the release of at least twenty objects. The SS-18 is the world's largest ballistic missile with a throw-weight roughly twice that of the largest US ICBM permitted under SALT II. Intelligence analysts are uncertain about the precise nature and purpose of the unusual test. They point out, however, that the test "probably" did not constitute a violation of the recently signed SALT II accord, which holds the number of SS-18 warheads to ten. Additional objects, such as decoys and other

penetration aids, can be launched by the SS-18 as long as the release maneuvers differ clearly from those of the warheads. In the last SS-18 test, several objects were released simultaneously in separate maneuvers.

- One of the more talked-about media events during the summer dog days, both in Idaho and the nation's capital, was the demand by Sen. Frank Church (D-Idaho) that the White House take forceful, immediate action concerning the 2,300 to 3,000 Soviet ground troops in Cuba. There is general inclination on Capitol Hill to see the unusual pro-defense action by one of Congress's most virulent defense critics as a ploy to reassure Idaho voters about his voting record. Senator Church appears to be running into strong opposition in his reelection campaign, with his anti-defense positions a central issue. He and like-minded Sen. John C. Culver (D-Iowa) were, among others, architects of the campaign that killed the B-1. While Soviet activities in Cuba have picked up in tempo—as reported in this space last month—the presence of Soviet ground troops is neither new nor nearly as portentous as the introduction last year of nuclear-capable MiG-23 aircraft that could strike parts of the US mainland. Cuba, as one senior Defense official remarked to this writer, "was permitted to become a Soviet base with the seizure of power by Fidel Castro. Senator Church is about twenty years late in finding out about this geopolitical fact of life." The number of Soviet advisors, technicians, and combat troops in Cuba has been as high as 20,000.

- Attempts by the US to persuade its NATO allies to permit a reduction of US nuclear weapons in Europe while upgrading their efficiency has fallen on deaf ears. US nuclear weapons experts and other defense planners have concluded that an arsenal of about 4,500 modern and reliable nuclear warheads assigned to NATO is adequate. European NATO members doggedly insist, however, that any reduction of the 7,500 warheads currently available to NATO's theater nuclear forces (TNF) would have negative psychological effects on Europe and could embolden the Warsaw Pact. The irony is that both the US and European NATO nations know that a significant percentage of the older tactical nuclear weapons in Europe is likely not to work when needed. This inflexibility also appears to indicate that European opposition to new theater nuclear missiles is

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InFocus...

motivated by perceptions rather than facts. The tendency is to reject as destabilizing and provocative such US weapon concepts as a scaled-down Minuteman, in fact a two-stage derivative of the three-stage USAF ICBM. Such a modification would transform Minuteman into a medium-range or perhaps intermediate-range ballistic missile in the same manner that the Soviets have changed their SS-16 ICBM into the SS-20 IRBM.

Ironically, there is no compunction in Europe about deploying the Army's Pershing II TNF missile. US defense planners point with frustration to the fact that Pershing II is essentially a new weapon system that shares little beyond a name with the currently deployed shorter-range Pershing I.

- There is tentative evidence that the Soviet Union is considering its new wide-body commercial jetliner, the Il-86, for the role of an air-launched cruise missile carrier. The Il-86, as is not uncommon for new types of Soviet jetliners, encountered considerable and protracted growing pains. It is a four-engine design similar to but smaller than the Boeing 747.

- Soviet preoccupation with the People's Republic of China continues unabated. Latest manifestation of the Soviet "China syndrome" is a broad and intensive program to improve internal lines of communications in order to be able to reinforce border areas more quickly and dependably.

- The Air Force is taking another look at adding V/STOL capabilities to future combat aircraft designs. The current review has led to a relatively optimistic assessment of V/STOL payload and weight penalties. Prospects for this technology are not immediate, however. V/STOL is not being considered for the next aircraft program, the Enhanced Tactical Fighter.

- US tactical airpower may be on the threshold of solving the age-old night and all-weather problem. Intensive analysis of a new concept is highly encouraging, senior officials report. Core of the promising new approach is an autonomous FLIR (forward-looking infrared)/laser designator/computer system. The unit probably will fit into existing pods and is a candidate for the F-16 and the A-10.

- Next arms control goal of the

Carter Administration—being pursued with a minimum of fanfare—is to conclude a Comprehensive Test Ban Treaty within eighteen months. Major stumbling block is British balking at complete cessation of all underground testing. Under Secretary of Defense for Research and Engineering Dr. William J. Perry recently ordered a study by the Defense Science Board of the problems associated with CTB to be "approached in the perspective of a three-year agreement that may or may not be replaced."

- USAF's ALL (Airborne Laser Laboratory), an extensively modified EC-135 aircraft, continues to encounter schedule slippages. No tests of the system against airborne targets have taken place.

- New studies of what USAF's next manned strategic penetrator should look like have not yet determined whether a new bomber or some other kind of weapons platform offers the optimum solution.

- Rep. Jack F. Kemp (R-N. Y.) recently informed Congress of a noteworthy parallel between Soviet "negotiating deceptions" at the time of SALT I and Moscow's present obdurate refusal to furnish information concerning its strategic weapons essential for the just-signed SALT II accord. USAF intelligence warned as early as 1971 that the Soviets planned to replace their small SS-11 ICBMs with a much larger and heavier ICBM (later identified as the SS-19). Yet it took the US intelligence community until 1975 to establish the excessive size and throw-weight of the SS-19 with sufficient certainty to permit US protests of Soviet duplicity, Mr. Kemp said. He pointed out in Congress that in the case of SALT II, US failure to nail down a "baseline" limiting the size of new ICBMs makes this central element of the new accord a "dead letter."

- The Soviet Union has proposed to the thirtieth session of the United Nations General Assembly sweeping international prohibitions against new types of "mass-destruction" weapons. The definitions appended to the Soviet resolution make clear that Moscow wants to bar directed energy (laser, particle beam, etc.) weapons as well as missiles, artillery shells, and bombs deploying fuel-air explosives.

- Gen. James E. Hill, Commander in Chief of the North American Air Defense Command (NORAD), told the Senate Foreign Relations Committee that Soviet Long-Range Aviation's

150 Bear and Bison bombers, more than 100 air-refuelable supersonic Backfire bombers, and thirty Bison aerial tankers, represent a significant threat to the US mainland and Canada. Increasing the threat, he said, is the absence of adequate US air defenses. NORAD's current inventory, General Hill testified, consists of 315 aircraft, "essentially the same aircraft we had in 1958, F-106s and F-101s, now augmented with some TAC F-4s and a few F-15s. This fighter force is inadequate to stop a large determined attack." He explained that over the past twenty years NORAD's radars were cut by about seventy percent, the Distant Early Warning Line radars by nearly sixty-two percent, and the control centers by eighty-three percent.

- A total of 1,678 retired generals and admirals signed a joint letter to the US Senate urging rejection of SALT II as inimical to the security of the United States and its allies. In presenting the joint statement to the Senate Foreign Relations Committee, Adm. Thomas Moorer, USN (Ret.), testified that "only four" of the retired officers contacted declined to sign the letter because they supported SALT II. The letter asserted in part: "As military professionals, and with all due respect for our more circumscribed colleagues still bound by their active service, we strongly urge that you reject SALT II as injurious to the security interests of the United States and its allies. . . . Senate ratification of this treaty would commit the US to another seven years of pursuing peace through trust of the Soviets and adherence to the obviously bankrupt doctrine of Mutual Assured Destruction (MAD)."

- The verification provisions of SALT II will add between \$7 billion and \$12 billion to the cost of the survivably based MX ICBM system, according to Sen. Larry Pressler (R-S. D.). In a letter to President Carter, Senator Pressler asserted that "spending an additional \$7 to \$12 billion for verification on the MX system is an awfully high price to pay for a treaty which is supposed to limit arms development. . . . I urge you to promptly supply the Senate and the American people with an explanation on the SALT verification-related costs of the MX missile system."

- The Soviet Union again appears to have violated the 150-kiloton limit permitted for underground nuclear weapons tests. US intelligence put the yield of a Soviet test firing in July at 200 kilotons or higher. ■

The New Rockwell-Collins 728U airborne HF. A strong defense against high costs.

You're looking at the next generation in airborne HF, the new Rockwell-Collins 728U. Selected by the U.S. Air Force for its HF modernization program, 728U follows in the tradition of such outstanding radios as the AN/ART-13, AN/ARC-58 and AN/ARC-94/102 (618T).

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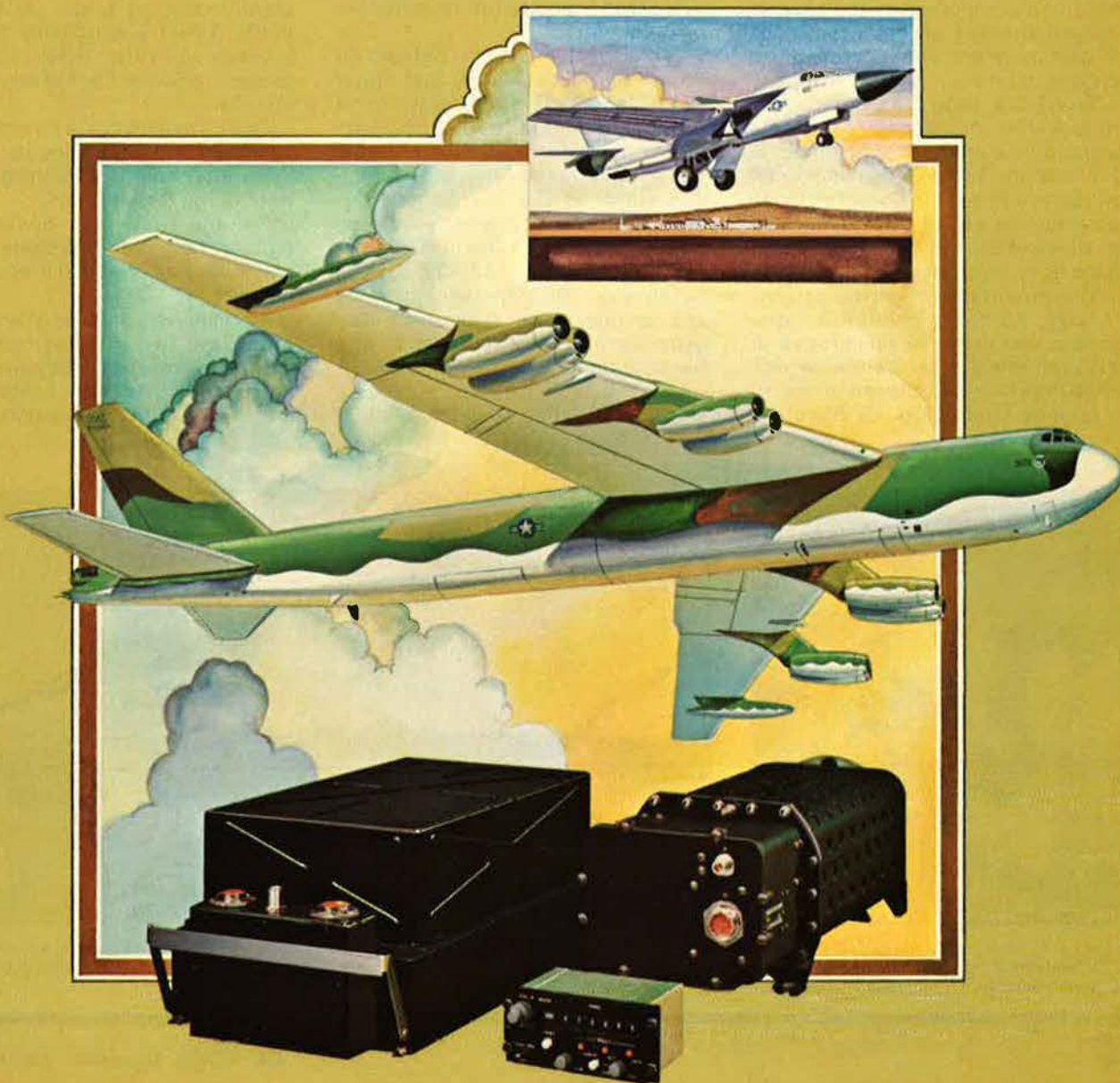
operation with functions like selective call scanning (SEL/SCAN) and remote frequency management.

After years of faithful service, many of today's airborne HF radio systems are due for retirement. Parts are scarce. Maintenance costs are spiraling. The solution? 728U, the strongest defense yet against high costs. For details, contact Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. Phone 319/395-3796. TELEX 464-435.



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Aerospace World

By William P. Schlitz, ASSISTANT MANAGING EDITOR

Washington, D. C., Sept. 10
★ USAF has initiated development of a long-range radar system capable of detecting and tracking massed enemy armor in rear areas and then guiding air- and ground-launched missiles to it.

The new tactical defensive concept, TAWDS (for Pave Mover/Target Acquisition Weapons Delivery System), is a component of the broader Assault Breaker program, designed to destroy enemy armor before it can engage in battle.

TAWDS's long-range airborne radar will be connected by data link to a ground-based processing and control station. The side-looking radar will be equipped with a scanned-array antenna that will function in real time in all weather, and can detect either fixed or moving targets.

The ground station will evaluate the threats, compute guidance commands, and then task units for air or ground missile launches, which TAWDS will guide to target areas.

Hughes Aircraft Co., El Segundo,

Calif., will develop and test the Pave Mover/TAWDS system under a \$12 million contract.

★ Two production-type F-16s assembled in Europe recently completed the longest flight to date, nonstop from Kleine-Broghel, Belgium, to Wright-Patterson AFB, Ohio, in eight hours, forty minutes. The transatlantic passage required three aerial refuelings.

The aircraft, piloted by Belgian Air Force Maj. Jeff Deheyn and Royal Netherlands Air Force Maj. Steve Heyboer, then flew to Hill AFB, Utah, to participate in the F-16 Multinational Operational Test and Evaluation effort. At Hill, the General Dynamics-developed aircraft will be assigned to the 16th Tactical Fighter Training Squadron, 388th TFW, to be put through their operational paces and to train fighter pilots from Belgium, Denmark, the Netherlands, and Norway, along with USAF pilots.

★ Israeli Air Force chief test pilot Lt.

Col. I. "Jeff" Peer recently completed an F-16 flight evaluation program in preparation for Israel's acceptance of the first of seventy-five F-16s in January 1980.

Colonel Peer began the test series at Edwards AFB, Calif., in an F-16B fighter-trainer that he put through its paces to include simulated strafing and bombing and evaluation of the plane's fire-control radar in air-to-air and air-to-surface modes.

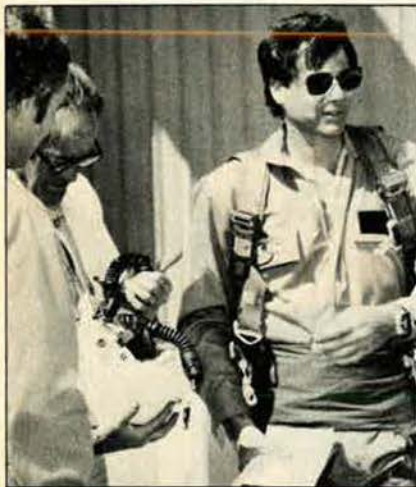
Colonel Peer then visited General Dynamics's Fort Worth, Tex., facility, where he flew the single-seat prototype YF-16, maneuvering the aircraft in various external weapons-load configurations, including heat-seeking Sidewinder missiles and external fuel tanks, and Sidewinder and all-weather Sparrow missiles. Colonel Peer hit a top speed of Mach 1.4 and maximum altitude of 35,000 feet (10,668 m) during the flights.

★ After a journey of 72,240,000 miles aboard orbiting space station Salyut-6, Soviet Cosmonauts Vladimir Lyakhov and Valery Ryumin returned to earth in Soviet Central Asia on August 19.

Their stay in space, a new record of 175 days, thirty-six minutes, earned them their country's highest medal, Hero of the Soviet Union.

For the first time, Soviet news agency Tass reported plans for the conclusion of the space mission in advance.

A preliminary medical examination found the two in good health, although the most difficult period of readjustment to gravity following almost six months' of weightlessness



Israeli Air Force chief test pilot Lt. Col. I. "Jeff" Peer, above left, recently put a prototype F-16 through its paces. This coming January, Israel is scheduled to receive the first of seventy-five of the advanced fighters ordered from developer General Dynamics, the sixth country to include the F-16 in its combat inventory.

would come ten to fifteen days after their return, Soviet doctors said.

Lieutenant Colonel Lyakhov, thirty-eight and a member of the Soviet Air Force, who flew in space for the first time on the mission, and Mr. Ryumin, forty and a civil engineer, set the third successive Soviet endurance record in space, all three aboard Salyut-6. The space station, in orbit now more than two years, has been manned by seven crews for a total of 441 days and has been resupplied by seven unmanned Progress spacecraft.

According to Soviet scientists, the mission proved the feasibility of establishing factories in space to take advantage of weightlessness in producing such materials as crystals and new alloys.

★ Under a \$4 million-plus AFSC contract, Sierra Research Corp., Buffalo, N. Y., is developing a radar bomb scorer that will electronically measure the accuracy of bombing simulated by SAC aircraft.

Known as "Seek Score," the system will be used to train and evaluate aircrews and will be made up of a computer, ground radar, and air-to-ground communications. After tracking an aircraft to its test target, the system will immediately ascertain precisely where the bomb would have landed and the hit or miss distances involved.

Besides the initial unit, USAF has options on another twenty. Current plans call for installing eleven at CONUS training bases and three for SAC training sites overseas. Five are to be mobile for shipment where needed, one will be sent to ATC for teaching purposes, and one to Air Force Logistics Command for back-up.

The first Seek Score system is expected early in 1981.

★ In mid-August, India's space program experienced another setback when a launch vehicle with an eighty-eight-pound satellite aboard failed to achieve orbit and plunged the payload into the Bay of Bengal, some 300 miles from launch.

If India had succeeded in orbiting the satellite, she would have joined the exclusive group of nations—the US, France, the USSR, China, and Japan—that has such capability.

The shot was India's first attempt to orbit a satellite entirely on her own; two previous satellites, launched by and in the Soviet Union, were failures: A satellite orbited in April 1975 lost its



A scale model of a possible fighter of the future featuring vectored engine-over-wing design was recently the subject of wind-tunnel tests at Arnold Engineering Development Center, Arnold AFS, Tenn. The concept is intended to enhance the aircraft's low- and high-speed maneuverability as well as providing for short-field takeoff and landing. Test conditions simulated flights at speeds from Mach 0.2 to 1.97 (150 to 1,400 mph; 240 to 2,250 km/h).

power system, and this past June a resources mapping satellite with two video cameras aboard did return some ocean data but the primary mission involving the cameras failed.

There would also have been significant military implications in a successful flight: Launch vehicles that can orbit satellites have intermediate-range missile capability, and satellites equipped with infrared television cameras can also be used for reconnaissance activities over, say, Pakistan or China, India's foes in recent conflicts.

★ An airborne computer system designed to aid in conserving aircraft fuel has successfully completed initial flight tests aboard an RC-135 reconnaissance aircraft, SAC officials said.

In terms of SAC operations, fuel savings translate directly into greater bomber and tanker range, longer endurance for command and control aircraft, and additional range and endurance for reconnaissance aircraft, as well as reduced day-to-day training expenditures. (The Air Force uses the largest amount of energy within DoD and SAC is USAF's biggest user—about twenty-five percent.)

Cost of installing the Fuel Savings Advisory System is about \$100,000 per aircraft, but the resultant fuel economies should recoup the outlay

in three or four years, officials said.

To use the FSAS, a flight crew would feed into the computer such data as takeoff weight, field elevation, atmospheric temperature, distance of flight, etc. The computer then provides information on how best to conduct the flight, such as climb and descent rates and speeds (flight phases with the greatest potential for fuel savings).

SAC wants to install the system aboard all RC-135s (the tests determined at least a 4.2 percent fuel saving for this type of aircraft) and plans to test it on KC-135s and B-52s.

With JP-4 aviation fuel soaring in price from \$0.107 per gallon in 1973 to a current figure of \$0.437 and further increases expected, significant fuel conservation could result. (A single B-52 consumes about 4,000 gallons of fuel an hour.)

For a rundown on the Air Force's across-the-board program to conserve energy in this era of dwindling oil supplies, see story beginning on p. 67.

★ In mid-August, the world's largest powerplant fueled by solar cells went into operation at Mt. Laguna AFS, Calif., sixty miles east of San Diego.

The system, employing 97,000 solar cells, is expected to produce about eight percent of the daytime electricity needs of the remote radar station,

Aerospace World

or about sixty kilowatts daily. It is one of a series of such power stations planned by the Department of Energy to demonstrate the feasibility of photovoltaic systems. Other, bigger plants are already on the drawing boards, DoE officials said.

The money spent on the Mt. Laguna system—\$1.6 million—and on the others to follow is considered seed money for the fledgling solar-cell energy industry, which will have to expand significantly in terms of solar-cell production capability in order to reduce costs enough to compete economically with conventional energy sources. DoE officials predict that the cost of solar-cell systems will be competitive with other electricity-generating systems by 1990.

In another energy-related matter, Lackland AFB, Tex., in mid-August put into operation its uprated Energy Monitoring and Control System (EMCS), which, through the system's computers, keeps tabs on electricity use in ninety buildings located on the base. EMCS operators can check the room temperatures at any of 5,368 points on the base.

Through strict adherence to the federal guidelines on thermostat settings of seventy-eight to eighty degrees in summer (sixty-five to sixty-eight in winter), the base estimates it will shave energy consumption by sixteen percent. Coupled with other base energy conservation efforts, this will save an average \$30,000 a month, officials said.

★ Under a joint Air Force/NASA program, a KC-135 equipped with "winglets" is in the midst of a series of flight tests to determine aircraft performance and flying characteristics.

The winglets—airfoil-like devices attached to the aircraft wingtips—are expected to cut aircraft drag at cruising speed by about eight percent, officials said, which translates into an estimated annual fuel saving for the KC-135 series of about 45,000,000 gallons, based on 1975 use rates.

Besides the fuel saving and about a ten percent increase in rate of climb, wind-tunnel tests have shown improved range, better fuel offload

performance, and a higher average cruise altitude.

For the flight tests—to continue into December—the KC-135's winglets have been instrumented with accelerometers, strain gauges, and pressure taps, and their position can be varied to determine optimum effectiveness. The aircraft's airframe and engines have been instrumented to record loads, lift, drag, and stability characteristics.

It has also been estimated that if the KC-135A and Q aircraft are retrofitted with winglets, the entire cost could be recouped before the last plane is modified, at the end of a four-year program. Under the current schedule, the production retrofit of the fleet could begin in 1983.

★ In an effort to relieve air traffic congestion at metropolitan airports around the nation, FAA plans to upgrade satellite fields with electronic landing systems, automated weather-reporting gear, and improved runways, taxiways, and aircraft parking aprons.

The action, which will cost about \$100 million over a four-year span and is intended to ease traffic at fifty-six larger airports in thirty-four states, is in the interest of flying safety, FAA officials said. The hope is that the move will encourage thousands of light planes to use the improved airfields. "Our goal is to relieve congestion and reduce the mix of commercial and noncommercial aircraft at major hub airports by making satellite fields more attractive to private and business flyers," FAA Administrator Langhorne M. Bond said.

Equipping the satellite fields with instrument landing systems will also reduce the need of pilots to practice ILS approaches at the heavily congested larger fields, he said. It was just this sort of activity that contributed to the collision of a Boeing 727 jetliner and a lightplane at San Diego's Lindbergh Field in September 1978, killing 144. While the planning to improve satellite airfields was initiated well before that accident, the program was accelerated because of it, Mr. Bond said.



Winner of AFA's award for Best Military Scale Model at the 1979 National Model Airplane Championships at Lincoln Municipal Airport, Lincoln, Neb., was Hal Parenti, of Westchester, Ill. His F8F Bearcat has retractable landing gear, and radio-controlled engine speed, elevators, rudder, flaps, and ailerons. The model of the Grumman fighter weighs ten pounds, and the engine has a 0.6 cubic inch displacement.

Lord Louis Mountbatten, 1900–1979

Col. Philip G. Cochran, 1910–1979

Two distinguished World War II leaders and former comrades in arms died within days of each other in August. Lord Louis Mountbatten, Earl of Burma, was killed on August 27 in the explosion of an Irish Republican Army bomb aboard his small power cruiser off the west coast of Ireland. He was seventy-nine. One of his last acts was to order a floral wreath for the funeral of Col. Philip G. Cochran in Erie, Pa., sent with the following message:

"In memory of a courageous pilot, an outstanding Allied leader I was proud to have in my command"—Mountbatten of Burma.

Cochran, an ardent equestrian, had died of a heart attack on August 25 while warming up his hunter for a fox hunt at Geneseo, N. Y. He was sixty-nine.

Their paths had crossed long years before, this scion of the British royal family and the charismatic fighter pilot from Erie. Mountbatten was then Admiral, Lord Louis Mountbatten, Supreme Allied Commander for Southeast Asia. Cochran, then a lieutenant colonel in the AAF, commanded the unique 1st Air Commando Force, whose delivery behind Japanese lines of more than 9,000 troops (and some 2,000 mules) contributed much toward Mountbatten's ultimate victory in Burma.

Over the years the two had kept in close touch. Their last meeting was this past June, at the thirty-fifth anniversary reunion of the Air Commandos and the Chindits Old Comrades Association in London. (Ground troops of the campaign were called "Chindits," after an indestructible creature in Burmese mythology.) On that occasion, Cochran was Lord Mountbatten's house guest.

To the jaunty Cochran, Mountbatten was affectionately known as "Louis the Lord" or "El Supremo." Both men were legends in their own time before they ever got to Burma—Mountbatten for feats of bravery which few senior officers ever equaled, Cochran for fighter-pilot exploits in Morocco and Tunisia that inspired cartoonist Milt Caniff to use him as the model for the character Flip Corkin in "Terry and the Pirates." (Later Caniff incorporated Cochran into the "Steve Canyon" strip as General Philerie, a character discontinued by Caniff on Colonel Cochran's death.)

The concept of an Allied airborne invasion of Burma came out of the Quebec Conference of 1943. The exploits of British Gen. Orde Wingate, guerrilla-war expert whose Long-Range Penetration groups were giving the Japanese fits there, had caught the eye of British Prime Minister Winston Churchill. At Churchill's invitation, Wingate attended the Quebec conference, where the problem of the jungle evacuation of Wingate's wounded came to the attention of US Chief of Staff Gen. George Marshall. With air evac the only possibility, Marshall turned the matter over to his chief airman, Gen. Hap Arnold. Arnold quickly expanded the idea of air evac into a plan for the full-blown airborne invasion of Burma. In his characteristically unconventional way, he placed the new 1st Air Commando Force in the hands of two top fighter pilots, Cochran and another young lieutenant colonel, John R. Alison. The two had gone to flying school together, but Cochran outranked Alison, so he became Commander with Alison as deputy.

Mountbatten took great personal interest in the campaign and in the 1st Air Commandos, Alison told this writer. As Supreme Commander, Mountbatten had to approve all plans. "He was easy to get along with, he frequently visited our training camps, he flew in our airplanes," said Alison. "He and Phil were a great pair." (AFA members know Johnny Alison as a past National President and Board Chairman. He now is a permanent member of AFA's Board.)

Cochran was a long-time member of AFA and of New York's Iron Gate Chapter. In 1972, Mountbatten served as Honorary Chairman of that Chapter's National Air Force Salute, which he attended and at which he spoke warmly of his wartime association with Cochran and Alison.

It's a great temptation to say about Cochran and Mountbatten, "They don't make 'em like that anymore." And it might even be true.

—JOHN F. LOOSBROCK



Mountbatten, left, and Cochran, right, together in India, preparing for the 1944 airborne invasion of Burma. The two had a mutual regard for each other's leadership.

Aerospace World

Other than the safety considerations, a side benefit will be the reduced time and fuel expended in holding patterns at hub airports, the FAA Administrator said.

For a report on the major effort to improve flying safety to meet the coming decades' surge in air traffic, see article beginning on p. 42.

★ The Space and Missile Systems Organization (SAMSO), Los Angeles, Calif., is being deactivated, effective October 1.

In a move to realign Air Force space and missile systems research, development, and acquisition, two new organizations are to be established and will report directly to Air Force Systems Command: the Ballistic Missile Office and the Space Service Division.

The restructuring reflects "the increasing importance of the development of a new land-based ICBM—the MX—and the expanded role of Air Force space activities. This action will streamline the organizational structure and contribute to increased management efficiency," officials said.

The Ballistic Missile Office, to be located at Norton AFB, Calif., will be responsible for MX development, a new survivable land-based ICBM currently expected to begin deployment in 1986. BMO will also oversee work concerning Minuteman and Titan ICBMs and advanced ballistic missile technology.

The Space Service Division will assume SAMSO's space-related activities with a realignment of mission operations on the East and West Coasts. Activated on the East Coast at Patrick AFB, Fla., and on the West Coast at Vandenberg AFB, Calif., will be two space and missile centers, to report directly to the Commander, SSD.

The Eastern Space and Missile Center is to encompass the Eastern Test Range, the 6555th Aerospace Test Group, and the 6550th Air Base Wing. The Western Space and Missile Center will consist of the 6595th Aerospace Test Wing and Western Test Range.

According to officials, personnel actions in these realignments will be

minimal, with no reduction in force anticipated.

★ The Aviation Hall of Fame, Dayton, Ohio, recently conducted enshrinement ceremonies for four aerospace notables:

Neil Armstrong, engineer, astronaut, and the first man to walk on the moon, who is currently Professor of Aerospace Engineering at the University of Cincinnati. As a Navy pilot, Armstrong flew seventy-eight combat missions during the Korean War. His seventeen-year career with NASA included command of Gemini-8, during which the first space docking took place. (The tenth anniversary of the first lunar landing was observed in July.)

Sherman M. Fairchild, 1896–1971, an aviation pioneer and inventor who founded both Fairchild Industries and Fairchild Camera & Instrument Corp. His host of contributions to the advancement of aviation, astronautics, and photography spanned five decades.

Charles F. Kettering, 1876–1958, world-renowned scientist and inventor who was taught to fly by the Wright brothers and who kept active in aviation into his seventies. He

capped his career in industry by becoming vice president and general manager of General Motors Corp., and later a consultant.

Anne Morrow Lindbergh, wife of Charles A. Lindbergh who participated in many of her husband's pioneering and exploratory flights around the world, and who later became the best-selling author of books about her experiences.

★ To try to reduce the shortfall in engineer recruiting (see *September '79 issue, p. 130*), USAF will send a number of college graduates selected for Officer Training School to earn master's degrees in certain engineer disciplines.

Following completion of the twelve-week OTS course at Lackland AFB, Tex., from twenty-five to fifty officer candidates will attend the Air Force Institute of Technology, Wright-Patterson AFB, Ohio.

The Air Force will pick up the tab—about \$62,000 per student—for the advanced degree program, including tuition and related fees, salary, and allowances. "We've initiated this program to attract the best qualified engineer school graduates available," said an Air Force Recruiting Service

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THE MXT 1200

The **TEMPEST** terminal that combines complete message handling capabilities with a high-speed impact matrix printer.



TEMPEST: The Microprocessor based MXT 1200 Message Terminal is designed to meet TEMPEST requirements of NACSEM 5100, and EMI/EMC requirements of MIL-STD-461.

HIGH SPEED: The MXT 1200 utilizes Dataproducts' unique 14 wire dual column long-life print head to deliver a bidirectional print speed of 340 characters per second. The compact ribbon cartridge is operator replaceable in seconds.

PRINT QUALITY: Character configuration is based on a 7 x 7 dot matrix which provides the excellent print quality. The MXT 1200 also accommodates either fanfold or roll paper as a field-interchangeable option.

KEYBOARD: The keyboard is in accordance with MIL-STD-1280 Type 1, Class 1; with operating and editing keys logically positioned for facility of operation.

INTERNAL CONTROL PANEL: The MXT 1200's internal control panel provides, among others, such features as BAUD rate select (50 to 4800 BAUD), BAUDOT/ASCII select, full or half duplex, and self test.

PARTIAL LINE DISPLAY OPTION: This optional component provides the benefits of a full video display unit, but at a fraction of the cost; and the basic units' compose memory of from 4K to 16K characters facilitates hard copy composition and editing.

AUXILIARY STORAGE OPTION: An auxiliary magnetic dual tape storage unit provides the capability to: receive from line, transmit to line, receive from (or transmit to) the MXT 1200 and can be configured to receive alternately as each tape is filled.

RECEIVE ONLY PRINTER: A keyboardless MXT 1200 is offered as a receive-only printer (the RO unit is provided with a 4K buffer for use at higher data rates).

For more information on the MXT 1200 Message Terminal, contact your Dataproducts Account Manager or call Don Moseley, Toll Free, at 1-800-243-4485.



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Sperry Update

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

Specialized Sperry equipment aids Project Galileo.

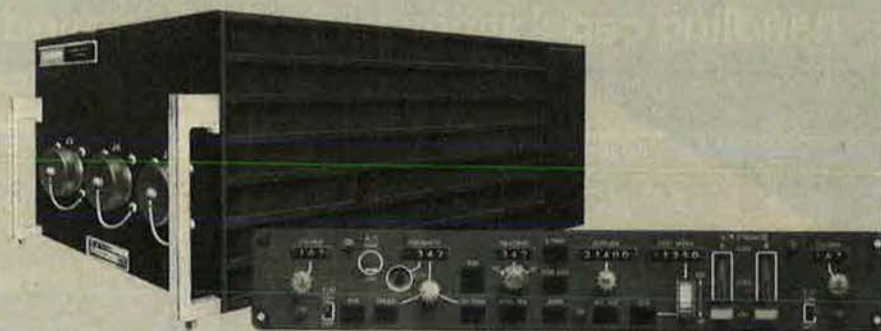
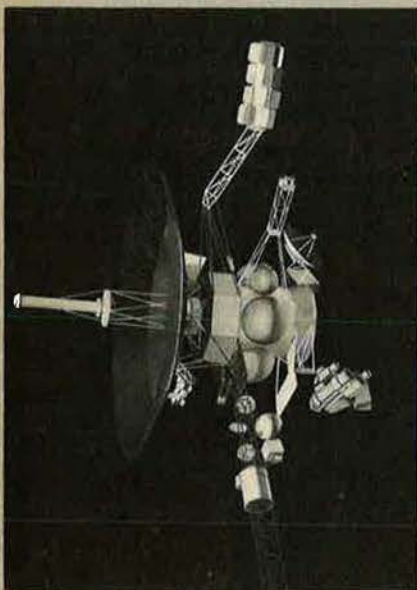
Sperry involvement in the space program continues with the award of contracts for two systems to be used in the Project Galileo spacecraft, which is expected to orbit Jupiter in mid-1985.

Innovative, high reliability systems from Sperry will link main sections of the craft electrically and will also perform precision pointing and control of the science experiment platform.

Under a contract from Jet Propulsion Laboratory (JPL), Sperry's unique Spin Bearing Assembly, with a Sperry-patented roll-ring, will complete an electrical circuit between the spinning and non-spinning sections of the orbiter.

The advanced technology of the roll-ring technique will provide higher reliability than previously available, due to positive contact without the traditional problem of wear debris, which can cause short circuiting.

Also to be provided under JPL contract is a Sperry Standard Articulation System (SAS-A), a fully integrated mechanical and electrical system which will provide extremely accurate pointing of the spacecraft's science scan platform.



Sperry provides digital flight control for 737s.

Shown here is equipment included in Sperry's SP-177 digital flight control system, which will replace the analog system formerly used in the Boeing 737 airliners.

The equipment will fly in Boeing's advanced 737-200s, combining in two boxes the functions which previously required six analog computer boxes. The system reduces weight and power requirements, while increasing system capability and reliability.

Business and commuter aircraft manufacturers choose Sperry equipment.

Integrated autopilot/flight director systems and instruments from Sperry Flight Systems' Avionics Division have recently been selected as standard equipment for several new business and commuter aircraft.

The SPZ-650L system, chosen as standard on the Lear Fan 2100, includes a torque-programmable autopilot, a digital air data computer and cockpit displays including an attitude director indicator, horizontal situation indicator and other instruments.

Mitsubishi's Solitaire and Marquise and the British Aerospace HS-748 will join the growing family of SPZ-500 autopilot/flight director users.

The aircraft will also be equipped with air data computers and cockpit displays.

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-8), Box 21111, Phoenix, Arizona 85036.

Sperry air data instruments picked for Boeing 767/757.

Boeing has selected Sperry air data instruments for the cockpits of its new-generation 767 and 757 airliners.

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spokesman, "and expect those selected to be at the top of their undergraduate class academically."

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★ It was in March of 1918 that a group of French-speaking American women volunteers sailed for Europe to serve in the Signal Corps Female Telephone Operators Unit and to free men for combat roles. Since no law existed enabling them to enlist in the military, the women served as civilians.

Now, more than sixty-one years later, Defense Secretary Harold Brown has determined that, under the GI Bill Improvement Act, the women were in active service in the US armed forces and are entitled to benefits of veterans.

Across the land, the eighteen known survivors of that group, ranging in age from eighty to ninety-one, will attend ceremonies at which they will receive Honorable Discharge Certificates from senior Army officers.

This follows by several months the award of discharge certificates to World War II's Women's Airforce Service Pilots, also declared to have been on active duty and entitled to veterans' benefits.

★ **NEWS NOTES**—The USAF Security Service (USAFSS) has been redesignated the **Electronic Security Command (ESC)** and remains a major command.

NASA has begun **accepting applications for Space Shuttle astronauts on an annual basis**. Applications by civilians can be submitted between October 1 and December 1, with a one-year training and evaluation period for astronaut candidates—both pilots and mission specialists—beginning in mid-1980. For information, write to the Pilot or Mission Specialist Candidate Program, Code AHX, NASA Johnson Space Center, Houston, Tex. 77058. Military personnel should apply through their respective departments.

Air Force Communications Service has a **continuing need for officers O-3 and O-4** to serve as **Airborne Communications Controller Officers** aboard SAC Post Attack Command

Control System (PACCS) aircraft and National Emergency Airborne Command Post (NEACP) aircraft at Ellsworth AFB, S. D., and Offutt AFB, Neb. Applicants in grade O-3 with Air Force Specialty Code 3024 and O-4 (AFSC 3016) must pass a Class III flying physical, and if accepted would receive hazardous duty/incentive pay. Contact the SACCA Director of Airborne Ops, AUTOVON 271-5932.

TAC Commander Gen. W. L. Creech recently established **trophies for the Maintenance Professional of the Year Award** to be presented annually to the airman and NCO in each wing who exhibit outstanding performance in support of aircraft sortie rates.

Fort Irwin, Calif., has been selected as the **Army's National Training Center**, a facility that will provide simulated but **realistic battlefield conditions** and a "total combat environment" under which some forty-two battalions and support units will train each year in two-week rotations.

USMC has picked **Leland D. Crawford**, 1st Marine Division Sergeant Major and a twenty-eight-year veteran, to replace retiring Sgt. Maj. John R. Massaro as **Marine Corps Sergeant Major**, the ninth such.

USAF Capt. Sally D. Uebelacker, 43d Security Police Squadron, Andersen AFB, Guam, this past summer became the **first woman security police member to graduate from the FBI Academy**. Her husband, Capt. Robert Uebelacker, is a B-52 pilot also stationed at Guam.

Died: Lt. Gen. Gordon T. Gould, USAF (Ret.), a West Pointer who served in China during WW II. He was Director of the Defense Communications Agency at his retirement in 1974. The AFA Charter Member was sixty-three at his death in August.

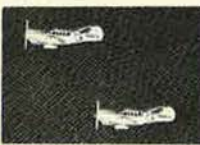
Died: Hanna Reitsch, a Hitler favorite who flew the last plane out of Berlin before the city fell in 1945, at her home in Bonn, West Germany, in August. She was sixty-seven. Miss Reitsch was the first person to fly a glider over the Alps, the first woman helicopter pilot, and the first woman test pilot. During her career, she set more than forty flight records in powered and glider aircraft. Interned and released at war's end, she continued her flying career.

Died: Gen. O. P. Weyland, USAF (Ret.), former Commander of the Far East Air Forces, UN Air Forces, and TAC, of a stroke at Lackland AFB, Tex., in September. He was seventy-seven.

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The Senate's SALT II hearings seem to have scored poorly in terms of television ratings, but did lead to a constructive, long-overdue examination of US military requirements and congressional moves to modernize the country's strategic forces . . .

SALT Debate Aids Defense Awareness

BY EDGAR ULSAMER, SENIOR EDITOR

THE Senate's Foreign Relations and Armed Services Committees labored through the first round of SALT II hearings and produced few surprises except for one fringe benefit: The month-long exercise proved to be a tutorial for Congress about the worsening military balance between the US and the Soviet Union and the urgency of doing something about it. Ironically, the resultant linkage between SALT II approval and prospective boosts in defense spending provoked the wrath of the accord's normally most faithful constituency, the traditional defense critics, in Congress and out. Threats by these quarters of renegeing on their support of SALT II probably need not be taken any more seriously than oblique signals by the Administration about its long-term willingness to increase defense spending to the levels suggested by some current Senate rhetoric.

The basically docile tone of the hearings—far below the level of stridency and animus expected originally by both friends and foes—probably is attributable to television and the Administration's star witness, Defense Secretary Harold Brown. Operating on the notion that the "folks back home" would be watching the hearings on their television sets, many opponents of the treaty decided against crossing swords with the formidable Dr. Brown, whose debating skills and mastery of SALT II intricacies triumphed "image-wise" even in what by rights should have been persuasive arguments against specific weaknesses of the treaty. The fear of suffering image damage among their constituents thus kept many of the committee members from directly challenging the Administration's interpretation of SALT II. Senate insiders predict, however, that these apprehensions will fade in the second round of the hearings—scheduled to get under way in September—because TV viewer interest apparently is minimal.

Because of this set of peculiar circumstances—and the resultant often-biased press coverage—most objective observers score the first round for the SALT-sellers, but reserve judgment about the ultimate outcome, now expected sometime in November.

Probably the most significant by-product so far was a joint letter by three of the Senate's more influential SALT critics—Sam Nunn (D-Ga.), Henry Jackson (D-Wash.), and John Tower (R-Tex.)—to President Carter pointing out bluntly that the price for the Senate's approval of the treaty is a boost in defense investments.

There is now substantial testimony before the Senate Armed Services Committee, the three Senators wrote, "that the SALT II treaty should not be ratified, and indeed is not in the national interest, in the absence of sustained and significant real increases in US defense spending and capabilities over the coming years."

The letter, dated August 2, 1979, sets their terms for support of SALT II at a four to five percent real increase in defense spending with this statement: "Like the Joint Chiefs and others who have testified, we believe that real increases of at least four to five percent in the overall [defense] budget are essential if the US is to begin reversing the unfavorable trends in the military balance. It is important not only that real increases be undertaken, but also that they be allocated properly. According to our calculations, a five percent real increase in overall defense spending, coupled with firm steps to improve the efficiency of defense programs, would yield an increase of twelve to fifteen percent in the crucial area of real military investment (in weapons, ships, equipment, and research and development), which represents one-third of the defense budget."

Pointing out that a treaty that fails to halt the Soviet drive toward strategic superiority while the theater and conventional balances continue to shift against the West



Defense Secretary Harold Brown's testimony seems to have boosted SALT II's chances in the Senate.



Sen. Sam Nunn fears that the Administration has succumbed to the "tranquilizer effect" of SALT II.

simply serves as an instrument for "registering the US slide into military inferiority," the three senators informed the President that under these circumstances, "we could not support ratification." They specifically called for a "fundamental change in our strategic and military doctrine [because] a strategic doctrine that bases our security primarily on the threat to destroy the civilian population of the Soviet Union is neither credible nor desirable; and a willingness to tolerate inferiority in theater nuclear as well as conventional and strategic power is not acceptable either to us or, we believe, to the American people."

The letter requests the President to "make public during the coming weeks your intentions" with regard to the Administration's defense budget for the coming five years, and poses a series of specific questions to be answered by the White House. Earlier, on July 25, Senator Nunn charged before the Senate Armed Services Committee "the Administration's budgets for the past two years and the President's defense budget projections through FY '84, together with [Defense Secretary Harold Brown's] own testimony, make it abundantly clear that the Carter Administration is not yet prepared to compete effectively with the Soviet Union in the military arena."

Quoting the Joint Chiefs of Staff to the effect that the defense budget proposed for FY '81 pays for anticipated growth in strategic spending primarily by "reductions in spending for nonstrategic forces," Senator Nunn said that the "Administration already appears to have succumbed to what the Joint Chiefs have called the 'tranquillizer effect' " of SALT II.

SAC and SALT II

One of the most effective and respected military witnesses to testify during the SALT II hearings, Gen. Richard H. Ellis, Commander in Chief of the Strategic Air Command and Director of Strategic Target Planning, JCS, stressed that "perhaps the most significant point to emerge from the nation's debate on SALT II, and certainly from these Senate hearings, has been the close association . . . between the treaty and the need for US strategic force modernization."

General Ellis told the Senate Committee that over the past decade, when operating costs are set aside, the annual investment for improving the US bomber and missile forces has averaged \$1.4 billion or "less than 1.5 percent of the defense budget over that ten-year period. . . . We have been living off the investments made in SAC forces during the preceding two decades."

In the period from 1980 to 1985, the US "is very likely to lose strategic equivalence with the Soviet Union," he testified: ". . . for nearly two decades the Soviets have been engaged in an unprecedented and unrelenting surge in all areas of strategic endeavor." The problem is being compounded, General Ellis told the committee, because under SAC's original modernization program, six out of a scheduled seven B-1 wings would have been operational within about five years, to balance some of the Soviet strategic growth. Also, a general restraint of other SAC force modernization programs over the past few years is heightening further the imbalance of US and Soviet strategic offensive forces, according to SAC's Commander in Chief.



Sen. Henry Jackson is one of three senators who urge a five percent increase in defense spending.



Sen. John Tower cosigned a letter to the President requesting revisions of US nuclear strategies.

The "most promising and timely solution" to redress impending Soviet strategic preponderance in the early 1980s, General Ellis said, is the early modification of 155 FB-111s and F-111s into FB-111B/Cs involving "new engines, enlarged weapon capacity, and sharply increased range capabilities."

Such a step, he told the committee, "would not only help in the early 1980s but would also provide a strategic penetrator for the entire decade of the 1980s as the B-52s are phased into the ALCM [air-launched cruise missile] role [after 1985] and until the advanced manned penetrator is available in the early 1990s."

Commenting on modernization programs now under way, General Ellis declared that the ALCM "promises to be a valuable supplement to our capability for the rest of this century" and advised that "we should continue to pursue vigorously the work being accomplished on a second-generation ALCM."

SAC, according to its Commander in Chief, expects "the ALCM-equipped B-52G to be employed in a 'shoot-and-penetrate' role until 1985, at which time we recommend it transition to an all standoff ALCM carrier. The B-52H model will be upgraded to ensure it has the ability to penetrate until the late 1980s. Then, SAC recommends that it, too, be converted to an ALCM standoff carrier role. With the entire B-52 force in the pure ALCM role, we can delay the costly introduction of a new cruise missile carrier until the 1990s. This decreases the financial bow wave of the middle 1980s that is expected with on-going strategic programs."

Preliminary work on an advanced strategic manned penetrator for the 1990s is under way "at a very low funding level and mostly in the form of studies. Important decisions regarding direction will be required within the next year, and we will watch progress with interest," according to General Ellis.

While General Ellis approved of SALT II in a qualified fashion, he expressed concern about two critical aspects of the treaty, "the SS-18, the Soviet heavy modern ICBM which we are not permitted to duplicate, and the Backfire bomber."

During SALT II—which terminates in 1985—he warned "we can expect the Soviets to concentrate on identification of methods for exploiting in the post-treaty

period the enormous throw-weight available in the [SS-18], almost twice that of the MX. The technology of fractionation [increasing the number of warheads carried by a missile] is well known to the Soviets, and I expect them to progress in this area during the course of and within the limitations of the treaty." Predicting that the Soviets will exploit concurrently their "excessive" throw-weight advantage through continued accuracy improvements and increases in warhead yields, the SAC Commander in Chief expressed the hope that subsequent accords, beyond SALT II, "will cancel out this clear Soviet advantage."

Other witnesses warned that fractionation limits for specified weapon systems, stipulated by SALT II, are at best a soporific since the Soviets legally could double or triple the number of warheads carried by their ICBMs once the agreement expires at the end of 1985.

With no new US ICBM at that time—at best the MX won't attain full operational status until three or four years later—this country would have no way to counter such a Soviet action. The assumption that the Soviets would negotiate away such an overwhelming advantage in SALT III—at a time when the US can be presumed to lack any real bargaining leverage—is difficult to accept in light of Moscow's past negotiating policies and record.

The Backfire strategic bomber, which is not covered by the treaty, "should have been considered a strategic nuclear delivery vehicle," General Ellis testified. "The promised production constraint [orally asserted by President Brezhnev to be not greater than thirty aircraft annually] can be monitored in peacetime, but whether the

Soviets would use the Backfire in a strategic role during a crisis is a matter for conjecture. The fact remains that in the post-treaty period, the Soviets could have a force of some 300 or more Backfires with which we will have to contend," according to General Ellis.

An Unusual Conflict

An unexpected sequel of the SALT hearings was public criticism by General Ellis of views attributed to Gen. David C. Jones, Chairman of the Joint Chiefs of Staff. On August 13, SAC's Commander in Chief informed the press that recent statements attributed to General Jones "on how best to use any additional defense appropriations may be somewhat confusing to those who have been closely following the SALT II hearings before the Senate."

Referring to press reports that General Jones did not endorse additional strategic programs, but prefers to use increased defense expenditures for what the JCS Chairman termed "mundane" purposes in the area of readiness and spares, General Ellis pointed out that "there is deep disagreement between SAC and General Jones." He contended that in case of a boost in defense spending, bomber modernization, command control improvements, and upgrading of the KC-135 tanker force should take precedence. "I do not believe that we can rely on strategic initiatives programmed for the late 1980s to deter in the early 1980s."

In apparent contrast with the views of the JCS Chairman, General Ellis fears that "simply improving our training, or filling our supply bins, or plugging the leaky

The Treaty Ratification Process

One of the more persistent and widespread misconceptions about how the Constitution vests and divides power centers on the procedures involving negotiating, signing, and ratifying treaties of state. The notion generally is that the Senate ratifies treaties. Yet, contrary to this popular impression, the Constitution restricts the role of the Senate to exercising advice and consent. Thus, the Senate may consent to the ratification of treaties by the President—subject to whatever conditions that body wishes to append to its resolution of ratification—but it does *not* ratify such accords. Ratification of a treaty of state is an *executive* act signifying the nation's intent to be bound by the accord. Even *after* the Senate passes a "resolution of ratification," it is the President's prerogative not to ratify if he disagrees with the Senate's changes or for other reasons.

The Senate, on the other hand, has a range of options for dealing with treaties, under the Constitution and by legal precedent, beyond accepting or rejecting the document as submitted by the executive branch. At its discretion the Senate can change or even substantially rewrite a treaty. It can return

the treaty to the President for renegotiation. Or it can fail to act on the treaty altogether. The voting procedures associated with these options vary somewhat, however. The resolution of ratification requires a two-thirds affirmative vote of the senators present for adoption. A two-thirds vote also is required if action on a treaty is to be postponed indefinitely. All other options and actions by the Senate associated with treaties are dealt with by a simple majority vote. It follows, for instance, that critics of SALT II stand a better chance of voting the treaty "down" (which requires only one-third of the members present) than of passing by a majority vote so-called "killer amendments" that would cause the executive branch, the Soviet Union, or both, not to ratify the accord.

Once the resolution of ratification is agreed on, the treaty is returned to the President. In preparing the instruments of ratification to be exchanged with the cosigner (the Soviet Union), the President must include all conditions appended to the treaty by the Senate. Such conditions must be accepted by the cosignatory party before the treaty will be binding upon the United States.

Some aspects of treaties, or ar-

rangements that in effect are treaties, are subject to varying interpretation. The Senate, for instance, may elect to leave the actual text of a treaty unchanged, but attach additional statements to the resolution of ratification, such as attempts to clarify specific obligations by the United States under the treaty. These additions can take the form of "reservations," "understandings," "declarations," or "statements," and are legally distinguishable from amendments because they are offered to modify the resolution of ratification rather than to change the provisions of the treaty. The uncertainty attendant to these types of changes rests on the question of whether or not they affect in a substantive sense the intent of the treaty and thus need to be communicated formally to or approved by the cosigning power.

Another "gray-area" issue could be the Administration's declared intent to abide by the provisions of the SALT II treaty even if there is no Senate approval. Constitutional and other experts are divided about the legality and feasibility of such an act by the executive branch and the resultant political ramifications.



Gen. Richard H. Ellis, Commander in Chief of SAC, testified that strategic force modernization is imperative.



Dr. Henry Kissinger recommends "linking" SALT II to moderation of Soviet global adventurism.

roofs at our bases will not correct the fundamental issue—we [still] will lack sufficient numbers of strategic weapon systems compared to the Soviet Union in the very near future. Therefore, the recent call for additional defense spending is viewed as a special requirement specifically designated to correct the strategic imbalance that will occur in the first half of the 1980s."

Dr. Kissinger's Dire Warning

Climax of the first round of the SALT II hearings was the testimony of former Secretary of State Dr. Henry Kissinger. Seized on by both proponents and opponents as allegedly confirming their particular and contrasting views, Dr. Kissinger's detailed and erudite message can be distilled into one central tenet: If SALT II were to impart major new momentum to the modernization of US strategic capabilities, the accord's minuses, if modified somewhat, probably will be acceptable.

Dr. Kissinger's warning against viewing the treaty in a vacuum was telling: "The Senate has an opportunity at least to begin to reverse the unfavorable trends in the military balance and to put the Soviets on notice that we consider the constant probing of every regional equilibrium and the encouragement of subversive and terrorist groups as incompatible with any definition of coexistence. Without such an affirmation, SALT will become a soporific, a form of escapism."

The former Secretary of State urged the Senate to examine ominous tilts against the US. The unprecedented Soviet use of proxy forces in Africa, the Middle East, and Southeast Asia, and "the turmoil caused by radical forces and terrorist organizations sponsored by Moscow's friends, mark ours as a time of upheaval. . . . If present trends continue, we face the chilling prospect of a world sliding gradually out of control, with our relative military power declining, with our economic lifeline vulnerable to blackmail, with hostile forces growing more rapidly than our ability to deal with them, and with fewer and fewer nations friendly to us surviving."

At the core of the nation's defense problem, Dr. Kissinger told the Senate's Foreign Relations Committee, is the inexorable growth of Soviet strategic forces, aggravated by the fact that "our intelligence estimates of their

plans invariably turned out to be too low; contrary to popular mythology, the Soviets *did* build on the scale of the 'worst-case' hypothesis of our intelligence community and not on the level that was defined as 'most probable.' "

Exacerbating the tilt in strategic capabilities is the Soviet Union's long-standing emphasis of large land-based ICBMs in contrast to the US orientation toward light ICBMs, less vulnerable but also less accurate SLBMs, and more versatile but also more vulnerable bombers. The US disadvantage, Dr. Kissinger testified, results from the fact that "the land-based ICBM is always likely to be the most accurate and powerful strategic weapon, and the one most capable of a rapid attack against the military targets of the other side. In short, the Soviets have emphasized quick-reaction forces by modernizing their ICBMs; we concentrated on slow-reacting forces like air-launched cruise missiles. Thus, the asymmetry of the two sides to destroy each other's military targets has grown with every passing year."

Compounding the deteriorating strategic nuclear balance is the broad buildup of Soviet theater nuclear forces (TNF), Dr. Kissinger told the Senate: "The Soviet Union has deployed scores of new missiles of 2,000-mile range—the SS-20—which [carry] a MIRVed warhead of three reentry vehicles. Several hundred supersonic Backfire bombers will threaten all peripheral areas in the eighties. . . . A Soviet superiority in theater striking forces is, therefore, upon us. The inequality is demonstrated by the fact that we have had to assign part of our strategic forces—a number of Poseidon boats—to cover targets threatening NATO. Thus, in case of war we are likely to be strained either with respect to our strategic or with respect to our theater nuclear coverage."

In synchrony with the widening Soviet lead in strategic and theater nuclear forces, Dr. Kissinger testified, Moscow's advantage in conventional forces also has grown. "The reach of Soviet power has been extended by the rapid development of the Soviet Navy, an expanding long-range airlift capability, the acquisition of Soviet bases in countries like South Yemen and Vietnam, and the establishment of vast Soviet arms depots in such countries as Libya and Ethiopia, which will enable the Soviet Union to move its own or proxy troops rapidly to their prepositioned weapons. At the same time, our Navy declines and our access to overseas bases shrinks."

The disadvantageous US military position, the former Secretary of State suggested, was not induced purely by crafty Soviet action: "We imposed [it] on ourselves by our choices, theories, and domestic turmoil. It is therefore in our power to alter [this condition]." In a scathing critique of the "assured-destruction" doctrine that helped bring on the present dilemma, Dr. Kissinger suggested that this strategy—whose die-hard adherents linger on in positions of governmental power—is both immoral and a "formula for mutual suicide." He stressed the paradox of the most conciliatory segment of American society clinging to "the most bloodthirsty targeting strategies, in the hope that these would obviate the need to strengthen or increase our strategic forces."

Suggesting that President Carter may be considering a return to a pure "assured-destruction" strategic doctrine, Dr. Kissinger told the Senate that such a step could

delay resolution of "our strategic dilemma," which he defined as meeting the threats of the 1980s with forces designed in the 1960s. Such programs as the B-1, MX, Trident, and various cruise missiles, he charged, have been "canceled, delayed, or stretched out by the current Administration, so that we are at a point where only the Trident (with only the most limited counterforce capability) can be operational during the period of the projected SALT treaty. In addition, even the Minuteman production line was closed down, leaving us without an emergency hedge for rapid buildup in unexpected contingencies. . . . My principal worry is not only the growing vulnerability of our land-based forces—though this must be remedied—but the growing invulnerability of Soviet land-based forces."

The consequence of the US being confined to a single strategic action, the threat to "initiate the mutual mass extermination of civilians," he warned, is the gradual "slide toward strategic, and, therefore, eventually geopolitical paralysis." The result is, he said, that "in the 1980s regional conflicts—whether deliberately promoted or not—threaten increasingly to grow out of control unless we drastically reverse the trend. . . . No responsible leader can want to face the 1980s with the present military prospects. This, and not SALT in isolation, is the principal problem facing us."

In his testimony, Dr. Kissinger assumed blame for having contributed to the present strategic ambivalence. "After an exhausting negotiation in July 1974, I gave an answer to a question at a press conference which I have come to regret: 'What in the name of God is strategic superiority? What is the significance of it . . . at these levels of numbers? What do you do with it?' My statement reflected fatigue and exasperation, not analysis. . . . If we opt out of the race unilaterally, we will probably be faced eventually with a younger group of Soviet leaders who will figure out what can be done with strategic superiority."

Dr. Kissinger showed similar contrition when he said that "as one of the architects of SALT, I am conscience-bound to point out that—against all previous hopes—the SALT process does not seem to have slowed down Soviet strategic competition, and in some sense may have accelerated it. . . . The Administration of the early 1970s of which I was a member sought to use SALT to demonstrate their commitment to easing tensions and thereby restore a public consensus behind a strong national defense; to some extent we succeeded. But we will not draw the appropriate conclusions if we do not also admit that SALT may have had perverse effect on the willingness of some in the Congress, key opinion makers, and even Administration officials to face fully the relentless Soviet military buildup."

SALT II, Dr. Kissinger said, includes "beneficial aspects," but "does not reduce the Soviet first-strike capability against our land-based forces, or improve our ability to survive a first strike. It does not diminish the Soviet residual capability to destroy civilian targets in the United States. And it does not enhance—indeed it may slightly inhibit—the possibility for the United States to catch up in the capacity of our strategic forces to attack military targets."

Dr. Kissinger singled out SALT II's Protocol, in effect until the end of 1981, for special criticism: "The

provisions of the Protocol with respect to cruise missiles, especially, restrict exclusively American programs; they affect not a single Soviet program. They amount to a unilateral renunciation of an American capability. The Protocol also for the first time limits American weapons relevant primarily to the theater nuclear balance—thus affecting important interests of our allies—in return at best for restrictions relevant primarily to the United States. This is something we have heretofore consistently refused to do. . . . It is a dangerous precedent."

Dr. Kissinger capped a detailed review of recent acts of direct and indirect Soviet aggression and political subversion by pointing out that "some argue that SALT is necessary lest we risk a return to the cold war. This is a curious argument. Whatever label we give to recent Soviet conduct—whether 'cold war' or opportunism—it must be ended if there are to be any prospects for East-West coexistence and cooperation."

In extension of this argument, the former Secretary of State weighed in firmly on the side of "linkage"—in Washington jargon the concept that Soviet behavior must be assessed and responded to in sum rather than in a compartmentalized fashion: "To separate US-Soviet relations into discrete compartments runs the risk of encouraging Soviet leaders to believe that they can use East-West cooperation in one area as a safety valve while striving for unilateral advantage elsewhere. The Administration, imagining that linkage was a personal idiosyncrasy of previous administrations, decided to 'abolish' it." And Dr. Kissinger added disapprovingly: "SALT was pursued for its own sake, unaffected by Cuban troops in Ethiopia and East German auxiliaries in Mozambique; by Communist coups in Afghanistan and South Yemen; or by Soviet Friendship Treaties such as the one with Vietnam that was the prelude to the occupation of Cambodia."

The imperative, according to Dr. Kissinger, is the "broad recognition that in an interdependent world the actions of the major nuclear powers are inevitably related and have consequences beyond the issue or region immediately concerned."

Allied, especially NATO, endorsement of the treaty, Dr. Kissinger suggests, should be seen in the context of "pervasive ambivalence" stemming from worries about the military imbalance on the European continent and the recognition that the allies see their security eroding "as our strategic superiority ebbs—but they fear there is not enough domestic support for a really significant defense effort, especially when American attitudes on that score are so ambiguous. They do not want to be perceived as an obstacle to SALT II, but they are highly uneasy about the inevitable SALT III, in which some limitation of theater-based nuclear weapons has already been placed on the agenda."

The former Secretary of State couched his recommendation that the Senate provide its advice and consent to ratification with a series of caveats. For one, approval should be delayed until "after the Administration has submitted and the Congress has authorized and begun appropriating a supplemental defense budget that will begin rectifying some of the shortcomings [in US strategic weapons programs] that I have identified. . . . If the Administration is unable to put forward such a program to this session of Congress, I recommend that the

Senate delay its advice and consent until a new military program has been submitted to and authorized by the next session of Congress.”

He pointed out that “assurances that the Executive Branch intends to proceed with individual weapon systems like the MX are not enough, either for the reality of our danger or to reverse the political and technological trends. . . . If the consideration of defense programs takes place after SALT is ratified, the debate over the proposed defense programs may stifle remedial actions or delay them beyond relevance—all the more so as the Administration seems to have a far from settled view about the need for a strengthened defense. . . . After ratification, Soviet propaganda pressures can be expected to multiply, particularly against any MX basing system that ensures survivability.”

The concrete results of Dr. Kissinger’s testimony were recommendations that appear to have found a wide echo in the Senate and elsewhere. Ratification, he urged, should be made contingent on the following conditions:

First, the treaty must be coupled with a defense program based on “an obligatory understanding between the Congress and the President which overcomes on an urgent basis the grave peril posed by the current military balance.”

Second, it should be accompanied by amendments that, while not requiring renegotiation, will clear up ambiguities of the treaty, define the status of the Protocol, the meaning of noncircumvention (the prohibition against transferring to allies technologies and weapons subject to SALT), and set guidelines for follow-on negotiations.

Finally, SALT should be accompanied by a “vigorous expression” of the Senate’s view of the linkage between this treaty and Soviet global conduct.

Dr. Kissinger counseled specifically against limiting US theater weapons such as cruise missiles if there are no matching limitations on Soviet weapons—such as the SS-20 MIRVed missile—performing comparable missions. Also, “the Senate should specify that as part of SALT III, the United States be entitled to *any* weapon system permitted to the Soviets in the new agreement unless the Soviets agree to some compensation by giving up a weapon system of equivalent characteristics allowed to us.”

Attached to the Senate’s instrument of advice and consent, Dr. Kissinger recommended, should be formal declarations that the absence of Soviet political restraint will “jeopardize” continuation of SALT; that the Administration be required to report annually on Soviet compliance with global standards of conduct; that the Senate vote every two years its judgment on Soviet compliance, and in case the judgment is negative, on whether or not SALT negotiations should continue.

Lastly, Dr. Kissinger importuned the Senate to take another look at the SALT process: “The fact that I have participated in the process—and must share some of the responsibility—entitles me to warn against continuing it by rote. I urge that its long-term implications be carefully considered. Never in the postwar period has there been more disagreement and intellectual confusion about the requirements of strategic stability and the implications of arms control.”

Words like these are hard to ignore. ■

“. . . the turmoil caused by radical forces and terrorist organizations sponsored by Moscow’s friends, mark ours as a time of upheaval. . . . If present trends continue, we face the chilling prospect of a world sliding gradually out of control, with our relative military power declining, with our economic lifeline vulnerable to blackmail, with hostile forces growing more rapidly than our ability to deal with them, and with fewer and fewer nations friendly to us surviving.”

The Federal Aviation Administration has projected a huge increase in the nation's air traffic in the years to come. Its research and development arm—the National Aviation Facilities Experimental Center near Atlantic City, New Jersey—is currently testing the equipment and techniques to handle that upsurge. Here is a bird's-eye view of a unique facility . . .

NAFEC: Today's R&D for Tomorrow's Air Safety

BY WILLIAM P. SCHLITZ, ASSISTANT MANAGING EDITOR

THERE is the inbound and out-bound international air traffic. There are the commercial transports servicing the major population centers. And the puddle-jumping commuter airliners linking the smaller cities. There are the corporate aircraft and air freighters. There is the multitude of general aviation aircraft. And increasing numbers of helicopters. And the armada of military planes.

Each day, many thousands of aircraft occupy airspace over the United States. Ponder this: The airlines *alone* in 1978 flew some 226.8 billion passenger-miles. If that weren't enough, controlled air traffic in the US is expected to grow by a staggering 200 percent in the next twenty years, barring some cataclysmic upheaval in the economy.

What's to keep the National Airspace System from being saturated, overwhelmed by sheer numbers?

In the past two decades, as air traffic has mushroomed, the National Airspace System has evolved to contend with it, and a major effort is under way to continue that process.

Controlling civil air traffic in general—and its safety in particular—is the responsibility of the Federal Aviation Administration. FAA's strong right arm in developing the equipment and techniques to meet tomorrow's air traffic control needs is the National Aviation Facilities Experimental Center (NAFEC), located near Atlantic City, N. J. (*see box*).

As a research and development facility, NAFEC is unique. At any given time it has some 200 projects





NAFEC Facts

The National Aviation Facilities Experimental Center is located on a 5,000-acre airport complex ten miles northwest of Atlantic City, N. J., itself the scene of several historical aviation "firsts." (The term "airport" was coined at nearby Bader Field with the initiation of the US's first air passenger service; the city claims the origins of the US space program with the first flight of a manned rocket glider from the resort's famous Steel Pier in 1931.)

The test center's airport, called the NAFEC/Atlantic City Airport, is one of three—along with Washington's National and Dulles International—owned and operated by the US Department of Transportation's Federal Aviation Administration. Its 10,000-foot runway—unlike Bader Field in Atlantic City—is capable of handling jetliner traffic, which is expected to have an important economic impact now that the city is open to casino gambling operations and is experiencing somewhat of a renaissance since its heyday in the 1930s.

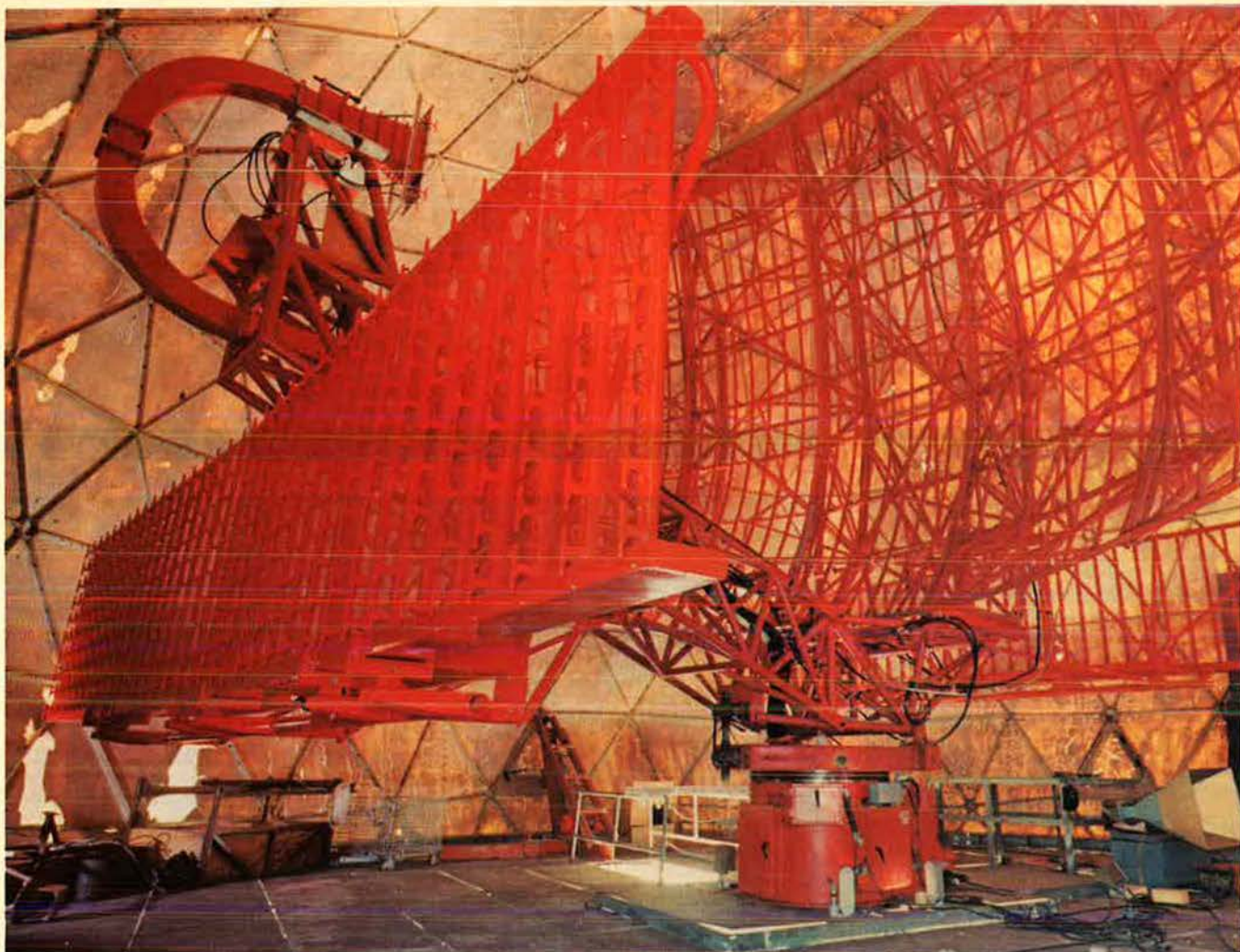
Located on the site of a former naval air station, NAFEC was founded in 1958. Its facilities are lodged in a sprawl of thirty-six "temporary" structures built in World War II, to be replaced by a new \$50 million Technical and Administrative Headquarters building scheduled for completion in 1980. The new building will house more than \$100 million worth of advanced computers and other electronic equipment to further NAFEC's work of developing and testing new techniques, procedures, and automation to increase the safety and efficiency of air traffic control.

At NAFEC are some 1,500 FAA employees in 150 occupational specialties ranging from test pilots and air traffic controllers to ordnance experts and mathematicians. The annual payroll is some \$40 million, and this year procurements will total about \$35 million.

NAFEC's FAA mission is to advance aviation safety through research, test, and evaluation in six major areas of responsibility: air traffic control, approach and landing systems, communications, navigation, aircraft, and airports. This entails long-range development of new systems and modification of existing equipment and procedures. NAFEC also undertakes projects for the Department of Transportation, the National Transportation Safety Board, state aviation departments, and the military services, particularly the Air Force.

At NAFEC are also an FAA Flight Inspection Field Office, whose fleet of seven aircraft continually checks navigation aids and airport lighting in eastern geographical areas; other FAA personnel; an office of the National Weather Service; and NJANG's 177th Fighter Interceptor Group.

Currently under construction is NAFEC's new \$50 million Technical and Administration Headquarters building, slated for completion next year. In the background, the NAFEC/Atlantic City Airport, unique in that it is one of only three in the US operated by FAA.



Back-to-back "en route" radar antenna in operation at Elwood, N. J., in conjunction with the DABS test program.

in progress that are representative of its blanket approach—limited by the usual budgetary restraints—to air traffic control and safety.

In microcosm, the functioning of the nation's air traffic control system can be demonstrated by the airport-to-airport flight of a single jetliner, and entails essentially three phases: The airliner, operating under instrument flight rules (meaning it must file a flight plan and abide by FAA air traffic control procedures), departs an airport, adhering to the instructions of an ATC operator in the airport's tower. Next, at a certain point it is "handed off" to the en route traffic control centers—there are twenty sited around the country—along its flight path. These track the airliner's progress by radar and issue instructions (weather avoidance, etc.) when necessary. Finally, it is then handed off for landing instructions to a tower operator at the airport terminal at which it will land.

Multiply this by the thousands of such aircraft flowing in and out of air terminals each day. The system that has evolved to handle all this traffic maintains, in ATC jargon, aircraft "separations"—that is, prevents collisions. Over the years, the safety record in this effort has been excellent. In the close to 30,000,000 IFR flights since 1971, there have been just three airliner collisions involving fatalities, or one in *ten million* flights. Each year, though, reported near-collisions have increased and now number in the hundreds. And as air traffic density grows, so will the risk of actual collisions.

"Discrete" Identification

As the nation's ATC system has evolved, into it has been integrated computers to automate much of the work of the radar/console/operator combination. Currently being field-tested is a promising new computerized system that could

greatly improve the capacity, accuracy, and reliability of aircraft control and safety.

Being tested and evaluated by NAFEC is the Discrete Address Beacon System (DABS) that consists of computerized ground equipment working in harness with a special transponder (for transmit/respond) to provide an automatic data link for the exchange of information between aircraft and air traffic controller—data currently transmitted by radio in a time- and effort-consuming process.

In dense air traffic under the system now in operation, controllers are sometimes confused when aircraft in close proximity "garble" (overlap) their signatures on a radar screen. The DABS transponder, on the other hand, emits its own "discrete" call sign, and thus a controller can pick a specific aircraft out of the many blips that may be on his scope.

Through the data link, aircraft

automatically receive traffic warnings and emergency collision avoidance commands, if need be. Also appearing on the DABS cockpit display—again automatically—is information on wind shear and other weather conditions, minimum safe altitude warnings, and airport advisory information. As it is now, this essential data is relayed to the aircraft by the controller.

Built by Texas Instruments Inc., Dallas, under contract to NAFEC, DABS has been designed for compatibility with the present Air Traffic Control Radar Beacon System and other aircraft transponders now in use so that it can be gradually integrated into the system at a minimum cost to users.

NAFEC officials estimate that DABS implementation throughout the US would require as many as 300 ground facilities costing about \$1 million each. The transponders aboard commercial aircraft would run about \$12,000, with simplified versions for private aircraft at about \$2,500.

NAFEC is hoping to have operational DABS ground facilities at forty of the nation's airports by 1984.

"One interesting aspect of DABS and its data link to be revealed in field tests," commented NAFEC Director Joseph M. Del Balzo, "will be pilot reactions to it. With the big reduction in radio chatter between air and ground—radio contact reassuring to aircrews—there is bound to be some initial uneasiness."

Eventually, NAFEC engineers hope to link DABS ground units into a nationwide net of terminal and en route automated traffic control systems with unprecedented capabilities.

Landing System Update

In the late 1960s, it became increasingly apparent that the Instrument Landing System, the international standard for civil landing systems since 1949, lacked the capabilities that the projected growth in worldwide civil aviation would require. For one thing, ILS provides but a single, narrow straight-in flight path to the runway, which in times of heavy traffic and bad weather means stacked-up holding patterns. The rigid ILS

flight path also means that options are limited in approach deviations demanded by terrain and noise abatement requirements, for example. In short, the system is too inflexible. (The military, for various reasons, has relied on the Ground Controlled Approach [GCA] landing system, afflicted with some of the same drawbacks.)

What followed was years of research and development of landing system technology in the US and abroad until April 1978, when members of the International Civil Aviation Organization (ICAO) selected the US/Australian-developed Time Reference Scanning Beam Microwave Landing System (MLS for short) as the international standard.

The effectiveness of the new system had been demonstrated to the prospective international users by a team of NAFEC employees, including pilots, electronic engineers and electronic technicians, and air traffic controllers among others, which had traveled more than 60,000 miles to eight countries on five continents. During this odyssey, 300 demonstrations of four MLS versions had been flown, in a broad range of airport environments and weather extremes.

Because of its "volumetric" coverage, that is, the large funnel of airspace MLS can sweep, aircraft have a broad choice of flight paths and can even make curved approaches, thus greatly increasing the number of planes accommodated. For noise abatement, aircraft can be kept at higher altitudes over populated areas and brought in on steeper glide slopes. Higher-frequency MLS signals also are not troubled with the reflection interference of ILS VHF/UHF beams, permitting simultaneous operation of parallel runways spaced closer together. In many cases, this can lead to expanded airport capacity without expanding airport areas.

Bendix Corp. and Texas Instruments have under development a number of MLS configurations to meet civil and military needs, including a version for small airports, a portable version for tactical military use, and a model designed for aircraft carriers. The Air Force anticipates it will need 200 units of the system to replace its GCA equipment.

MLS units are currently being tested at Washington National Airport and at NAFEC, among other places around the country.

Control Center Modernization

With ATC and landing system improvements on the threshold, NAFEC has also on track a program to update the "command posts" of air traffic control—the terminal towers, terminal radar approach control facilities (TRACON), and en route control centers.

Just as the rest of aviation is confronted with the challenges of change, so are these control centers, whose displays have to be modified to reflect the new technology. At airports, this tower "architecture" also means that a tower may have to be repositioned to remain effective at an airport undergoing rapid expansion. Tower interiors can quickly become obsolete; the tower in Tampa, Fla., was just five years old in 1978 when growth and changes in air traffic flow and airport expansion dictated modernization.

NAFEC's ATC Applications Branch will accept a control facility design assignment at the behest of any FAA region or FAA Headquarters. Interior rehabilitations are done at NAFEC using plywood, foam plastics, and other materials in mockup fashion, with the actual installation of electronic equipment in some cases.

Because many Systems Test Branch designers are former air traffic controllers aware of new developments, they are ahead of ATC personnel in the field and thus can anticipate advances in equipment.

The modernization of ATC control facilities and their console work spaces have one objective: to minimize the burden on the air traffic controller by assuring simplicity of operation and functional reliability.

One recent NAFEC redesign project was the modernization of the Crisis Control Center at FAA Headquarters in Washington, which comes into play in the disruption of normal ATC procedures, as in the aftermath of an earthquake or skyjacking.

Airborne Collision Avoidance

The morning of September 25,

1978, was sunny and clear—perfect flying weather—at San Diego's Lindbergh Field. A Boeing 727 jetliner was on its final landing approach when the tower controller noticed that its blip on his radarscope was closing fast with that of a Cessna 172 lightplane practicing instrument landing approaches at the airport. Both planes were repeatedly alerted to the danger, but when the airliner indicated that he had the Cessna in sight and all was well the tower cleared him for landing. Seconds later the two planes collided, killing 144 people.

The investigation that followed determined that the tower operator and the airliner pilot shared the fault to some degree, and that the airliner pilot probably had in sight an aircraft other than the Cessna 172.

Whatever the verdict, the question was raised: Could an electronic warning device in either of the aircraft have prevented the collision?

Such devices are feasible and are being developed. NAFEC is currently testing Beacon Collision Avoidance Systems (BCAS), which would track nearby aircraft and issue commands—whether to climb, descend, or turn—when danger was imminent. Another system, Automatic Traffic Advisory and Resolution Service (ATARS), under NAFEC evaluation would be ground-based and issue automatic warnings.

Tragedy on Tenerife

On March 22, 1977, on Tenerife in the Canary Islands, two Boeing 747 jetliners collided on the runway in the worst disaster in aviation history; more than 570 lives were lost. The subsequent investigation turned up evidence linking the tragedy to tower instructions misunderstood by the captain of one aircraft who thought he had been given permission for takeoff.

To safeguard against such potentially deadly errors, NAFEC personnel have devised the prototype Visual Confirmation of Voice Takeoff Clearance (VICON), a system currently under test. In simplified form, once a tower controller has given verbal permission for takeoff, he activates, via a button on his control panel, clusters of pulsing green lights spaced along

the runway—verifying unmistakably voice clearance. The pilot then begins his takeoff roll.

Wind shear—or violent changes in wind direction at ground level caused by rapidly moving weather fronts—has been tagged as another killer. The hazard is to planes on takeoff or final approach that may not have adequate altitude to recover from sudden, major wind shifts. One NAFEC investigator lists wind shear as a possible factor in twenty-five large-aircraft accidents since 1964, the worst being the crash of an Eastern Air Lines aircraft at John F. Kennedy International Airport in June 1975 that killed 115.

To counter this danger, NAFEC has developed the Low-Level Wind Shear Alert System (LLWSAS) now being tested at seven airports and scheduled for installation at sixty others over the next three years.

LLWSAS is composed of a number of wind sensors placed strategically around the perimeter of an airport. These feed wind-condition data into a computer that triggers sound alarms and a flashing alarm on the control tower console if a predetermined danger threshold has been exceeded. Alerted by the tower, pilots have various options, such as adjusting engine power settings or aborting an approach. NAFEC technicians visualize advance systems that will eliminate the tower involvement altogether and warn pilots of wind-shear dangers directly.

Controlling the Choppers

But in its role of developing systems to make aviation safer, NAFEC doesn't simply react to specific types of disaster. Many of its programs are tailored to deal with the future and its growing complexities and problems.

For example, FAA traffic specialists estimate that the number of helicopters operating under instrument flight rules in the National Airspace System could increase to 2,400 during the next decade. This helicopter activity would translate into millions of additional flights annually, more than a tenfold increase over IFR helicopter flights today. During a recent twelve-month period, about 200 helicopters

servicing oil rigs in the Gulf of Mexico alone transported more than 2,500,000 passengers.

Besides an expected surge in flights to new oil rigs in the Atlantic, corporate and general use of helicopters over the US is expected to escalate dramatically. Helicopter flying characteristics are already presenting problems for traffic controllers. For one example, because helicopters prefer to fly at low altitudes to avoid icing and mixing with fixed-wing aircraft, they often fall below radar coverage.

Integrating helicopter traffic into a system designed to contend with fast, high-flying, fixed-wing aircraft will constitute a massive undertaking, involving revision of ATC procedures in communications, navigation, and air route structures, often in high-density overland airspace and in all weather.

Solving the unique set of navigation and communications problems associated with helicopter service to offshore rigs, some sited as much as 200 miles out in the Atlantic, is currently under way. NAFEC pilots in specially equipped helicopters have flown a series of test flights out over the Atlantic to gather data and establish the reliability and suitability of navigation and other equipment for helicopter overwater flights.

Crash and Aftermath

While NAFEC has been investigating post-crash aircraft fires and their highly lethal side effects for some time, the dimensions of the problem can be sharply underlined by two actual incidents. In the collision of the two 747s on the fog-obscured runway on Tenerife mentioned previously, fire and fire-generated toxic gases accounted for most of the victims, not the impact itself. Again, in the crash-landing of a Brazilian 707 in July 1973 at Paris-Orly, the 116 deaths were caused by smoke and poisonous gas asphyxiation, not the crash or the subsequent fire.

In fact, according to Wayne D. Howell, chief of NAFEC's Fire Safety Branch, "up to forty percent of the people killed in 'survivable' airplane accidents die as a result of toxic gases, smoke, or fire rather than impact injuries."

Under a long-range program,

NAFEC engineers are conducting a series of full-scale fire tests to simulate under controlled conditions what actually happens inside an aircraft fuselage during various types of fire. They are using as their "laboratory" the fuselage of a surplus USAF C-133 configured closely to the current generation of wide-body jetliners. Instrumented to record heat buildup and smoke and gas concentrations, this realistic test-bed should produce data helpful in setting new standards for materials used in cabin interior fittings, dependable emergency lighting, better evacuation techniques, and perhaps even internal extinguisher spray systems.

The Douglas C-133 fuselage, covered with insulation material to assure its reuse in fire tests, is scheduled to be housed in what will be the second largest enclosed test labo-



This dramatic photo at a NAFEC "burn site" underscores the organization's long-term commitment to aircraft and passenger safety. The second largest enclosed test laboratory for fire research in the US is being constructed at NAFEC.



Visual data gathered in a series of wake vortex turbulence tests employing this "smoke tower" was helpful in establishing safe landing separation standards. Wake turbulence had been deemed the culprit in a number of crashes.

ratory for fire research in the US, now under construction at NAFEC. The current C-133 "burn site" is in the open and can be used only when optimum weather conditions prevail. Enclosed in the new facility, which is the height of a five-story building, simulated post-crash fires can be conducted at any time.

The fire test lab's ceiling is designed to withstand repeated flame temperatures up to 2,000° F. Adjacent to the burn bay will be an operations wing, containing instrumentation areas and such recording apparatus as video cameras that will film through observation windows.

Post-Crash Rescue

In conjunction with the Air Force, NAFEC has under study a number of methods for the internal and external suppression of post-crash fires, including crash/fire/rescue vehicles that could quickly plug hoses into external aircraft connections to flood blazes with foam and/or water.

In aircraft post-crash fires, on average, heat buildup reaches intolerable—lethal—levels within minutes. Related to this, NAFEC is developing quick-reaction equipment such as specialized hose nozzles tipped with shotgun-shell-like devices to punch through the fuselage's skin and liner to inject extinguishing agents.

Also under study for civil airports

and Air Force bases nationwide is a calculation of the optimum number of fire rescue vehicles needed at each facility, depending on a complex formula based on the types and numbers of aircraft using the airport or air base. Significant savings of taxpayer dollars could result from this work. According to NAFEC's George Geyer, who is conducting the study, eighty-three percent of the cost of crash/fire/rescue services equipment at the nation's civil airports is paid by the Federal Aviation Administration, and a single major crash/foam vehicle costs more than \$200,000. (The Air Force has equally large sums tied up in such equipment, including maintenance and crew costs.) And while the FAA emphasis is mainly on preventing aircraft accidents, fire rescue apparatus must be available to combat fires and save lives.

In another important development to curtail fires following crash-landings, NAFEC has simulated at a burn site the mist-like plume that forms when fuel tanks rupture and fuel spews out during otherwise survivable crashes. On ignition in an actual crash, the result is a devastating fireball that consumes the aircraft and its occupants. NAFEC is successfully experimenting with additives to jet fuel that restrict the misting tendency of the fuel when released into the open, thereby avoiding the explosively combustible mist.

As a sign of the times, and in the interests of airport and aircraft safety, NAFEC is also experimenting with various types of bomb-detection devices that locate explosives hidden in, say, luggage or left in coin lockers. To contain explosive devices discovered aboard aircraft in flight, a series of test detonations has been conducted aboard a Boeing 707 fuselage to assess how to best ensure passenger safety and aircraft structural integrity.

NAFEC engineers are ingenious in arriving at methods to derive test data. When wake vortex—the air turbulence left in the wake of aircraft—was declared the culprit in a number of crashes of aircraft following close behind in landings, the engineers rigged a tower 140 feet high. From six positions along it, different colored smoke was emitted. When wind conditions were

NAFEC's Corps of Test Pilots

A wry and friendly bunch, NAFEC's corps of fourteen test pilots have logged more than 250,000 hours of flight time among them. These are not test pilots in the traditional sense of putting aircraft through their paces to demonstrate structural integrity. The aircraft manufacturers do that.

While most have been with NAFEC since its inception in 1958 and have grown long of tooth—the youngest, Al Bazer, is fifty-one—they are not a handful of oldsters yearning for the bygone days of the open cockpit and almost ready for the boneyard.

Rather, they are pilot/technicians in the vanguard of a unique form of technological progress, the leading edge in actual flight tests of a wide variety of advanced systems designed to increase air safety.

True, sixty-six-year-old supervisor M. K. "Dutch" Osterhout has fond memories of barnstorming in the Rio Grande Valley in the '30s, and Bernie Hughes, fifty-seven, is among those who flew military aircraft in World War II. While gray at the temples, they are justifiably proud of the day-to-day contributions they are making to aerial safety.

They find their flying tasks varied and satisfying. Like most pilots, they are subjected to the boredom of "routine" missions, such as acting as passive "target" aircraft in the calibration of radarscopes, for example. But then it might be off to the North Atlantic to check out new Omega navigation equipment or to Africa to demonstrate a prototype landing system.

The aircraft they fly are varied, too, ranging from a Convair 880 turbojet and a Boeing 727 turbofan to assorted piston and turboprop aircraft and a Sikorsky CH-53 helicopter—usually instrumented to perform specialized tasks. In fact, say the pilots, the aircraft spend more time being fitted for their unique assignments than in maintenance.

Then there is the glory of belonging to an elite group, as pilot Al Bazer discovered recently when he was permitted—in an unprecedented exception—to penetrate White House airspace in the test of a new landing system at Washington's National Airport.

right and the smoke trailed out horizontally, aircraft were flown through it and the vortex effect was filmed. From this and other sensor system data, safe landing separation standards were established.

Air Traffic Simulation

In anticipation of intensifying air traffic in coming years, NAFEC is using its extensive ATC simulation capability to duplicate for specific airports the flow rates expected for them. With environmental restrictions putting the damper on the construction of additional airports, and noise reduction rules and wake vortex separation standards applying limits to airport traffic capacity, new methods must be found to do more with less.

Taking the operational data for, say, Chicago's O'Hare, and creating a computer-simulated traffic model, ways can be uncovered to smooth out flow rates and ease bottlenecks. Similarly, simulation runs can be conducted using different runway configurations for arrivals and departures, variations in ATC procedures, and improved capabilities such as the construction

of new runways and new taxiways.

In the actual case of O'Hare, simulation studies suggested an additional runway could reduce delays in the airport's traffic by forty percent.

And while air traffic controller candidates are trained in the basics at the FAA Academy in Oklahoma City, Okla., NAFEC's Simulation and Analysis Division uses its ATC simulation capability to reinforce the training of controllers destined for such hot-spot, high-density areas as New York's Common IFR Room, which handles all air traffic in and out of the three major airports and a dozen satellite fields. "We can give these developmental controllers more training in two weeks than they'd get on the job in a year," says Albert A. Lupinetti, assistant chief of the Systems Simulation and Analysis Division. The simulators can duplicate part, all, or more than the actual traffic the controllers will see on their scopes, including any number of emergencies.

Earlier this year, FAA announced "sweeping-and-comprehensive" changes in the US's air control system (see *March issue*, p.

29) following the collision of two aircraft over San Diego in September 1978. And just recently, FAA made public a plan, expedited by the crash, to revamp satellite airfields to encourage their use by small planes and so relieve congestion at metropolitan airports (see p. 26).

Following the San Diego collision and others in the past, including that of the Coast Guard cutter *Cuyahoga* and an Argentine freighter in Chesapeake Bay last October, NAFEC's unique binocular camera, operated by technician Anthony Barile, was used in a reenactment to determine the sequence of events and visibility during the final moments prior to the collision. The camera, manufactured in the 1950s to establish minimum cockpit visibility stan-

dards for use in the design and certification of aircraft, is one of a kind in aviation. It provides panoramic visibility photographs. A procurement order for an advanced-technology version is being drawn up.

NAFEC has also devoted extensive resources to general-aviation safety. Projects have involved everything from seat-belt restraints to the feasibility of crash-resistant fuel tanks for light aircraft.

Over the past several decades, statistics show, weather has been cited as the most frequent cause of fatal general-aviation accidents. Fifty-two percent of the pilots in these crashes had only between eighty-five and 135 hours total flying time.

Under a NAFEC three-year contract awarded to Embry-Riddle

Aeronautical University, Daytona Beach, Fla., training procedures will be developed or revised to reduce weather-related crashes, including the possibility of increased use of simulators and beefed-up instrument training required for the basic private pilot license.

In a broader study, all data available from government and private sources pertaining to general-aviation accidents is to be collected and analyzed—a way to gauge the dimensions of general-aviation requirements in flying safety of the future.

This is a bird's-eye view of NAFEC. It can best be summed up as a place where advanced technology is being used to build a safer and more efficient air transportation system—"today for tomorrow." ■



At Washington's National Airport, a NAFEC aircraft checks out effectiveness of the new Microwave Landing System.

Unequalled...



Tornado – the Western World's most advanced multi-role combat aircraft (with Aeritalia and MBB).



Harrier – the world's first operational V/STOL combat aircraft.



Hawk – the most advanced now generation ground attack/trainer aircraft in production today.



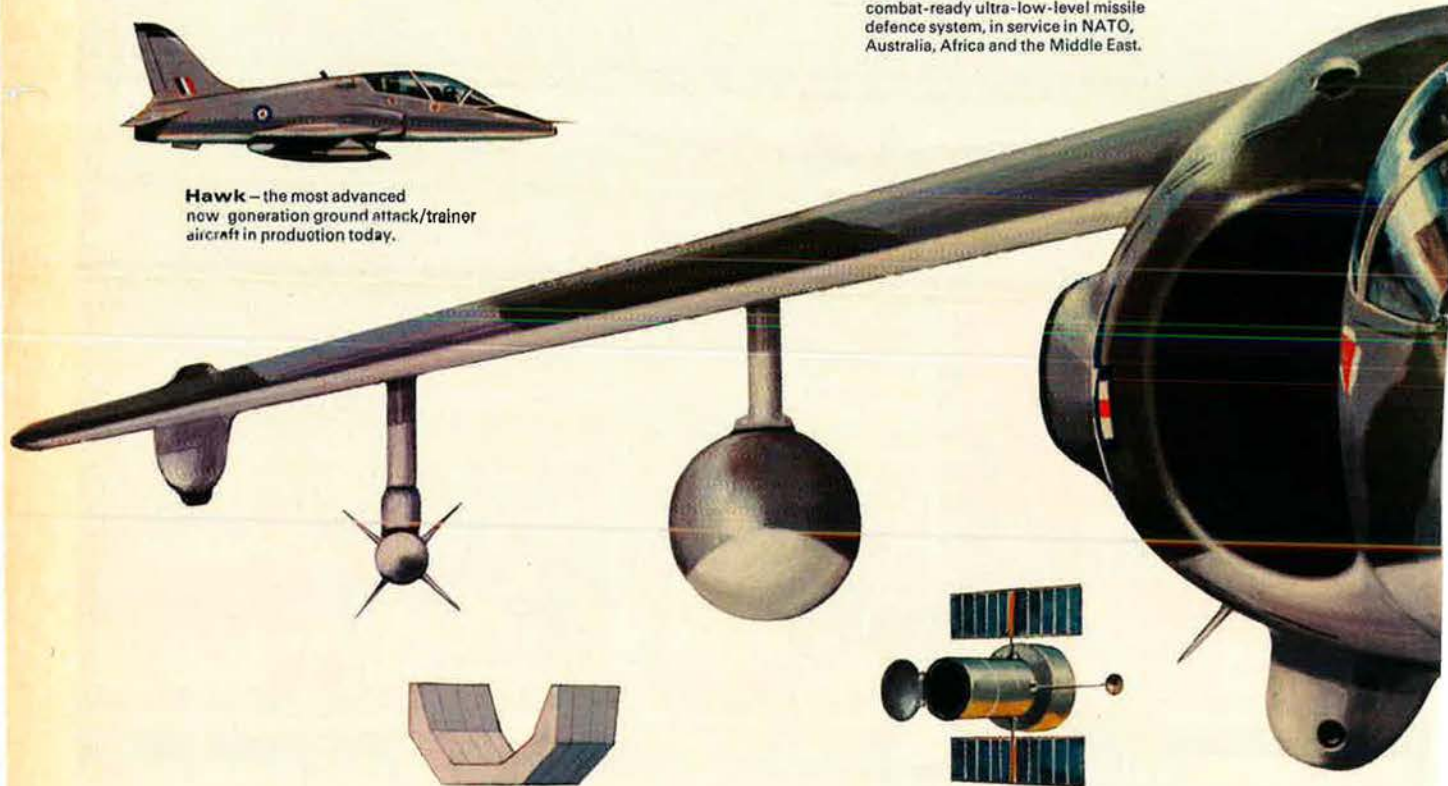
Sky Flash – the Western World's most advanced radar-guided, all-weather, air-to-air missile, based on the Raytheon Sparrow.



Seawolf – the Western World's first shipborne point-defence system with proven anti-missile capability, now in Royal Navy service.



Rapier – the Western World's first combat-ready ultra-low-level missile defence system, in service in NATO, Australia, Africa and the Middle East.



Spacelab Pallets – designed and built by British Aerospace as a member of the 9-nation European Spacelab consortium.



Space Telescope – to be powered by solar arrays designed and built for the NASA/ESA programme by British Aerospace.

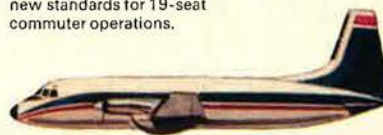
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Technological leadership from V/STOL combat operations to scheduled passenger services at twice the speed of sound



Jetstream 31 – fast, pressurised propjet whose large cabin sets new standards for 19-seat commuter operations.



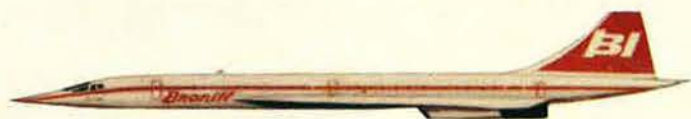
HS 748 - 2B – new 50-seat commuter development of the rugged propjet which has proved itself one of the world's most versatile transports.



BAC One-Eleven – twinjet airliner which, in 15 years of US service, has averaged more than 10 flights per aircraft per day.



British Aerospace 146 – powered by US-built fanjets – will bring ultra-quiet, wide-body services to commuter and feeder routes from 1982.



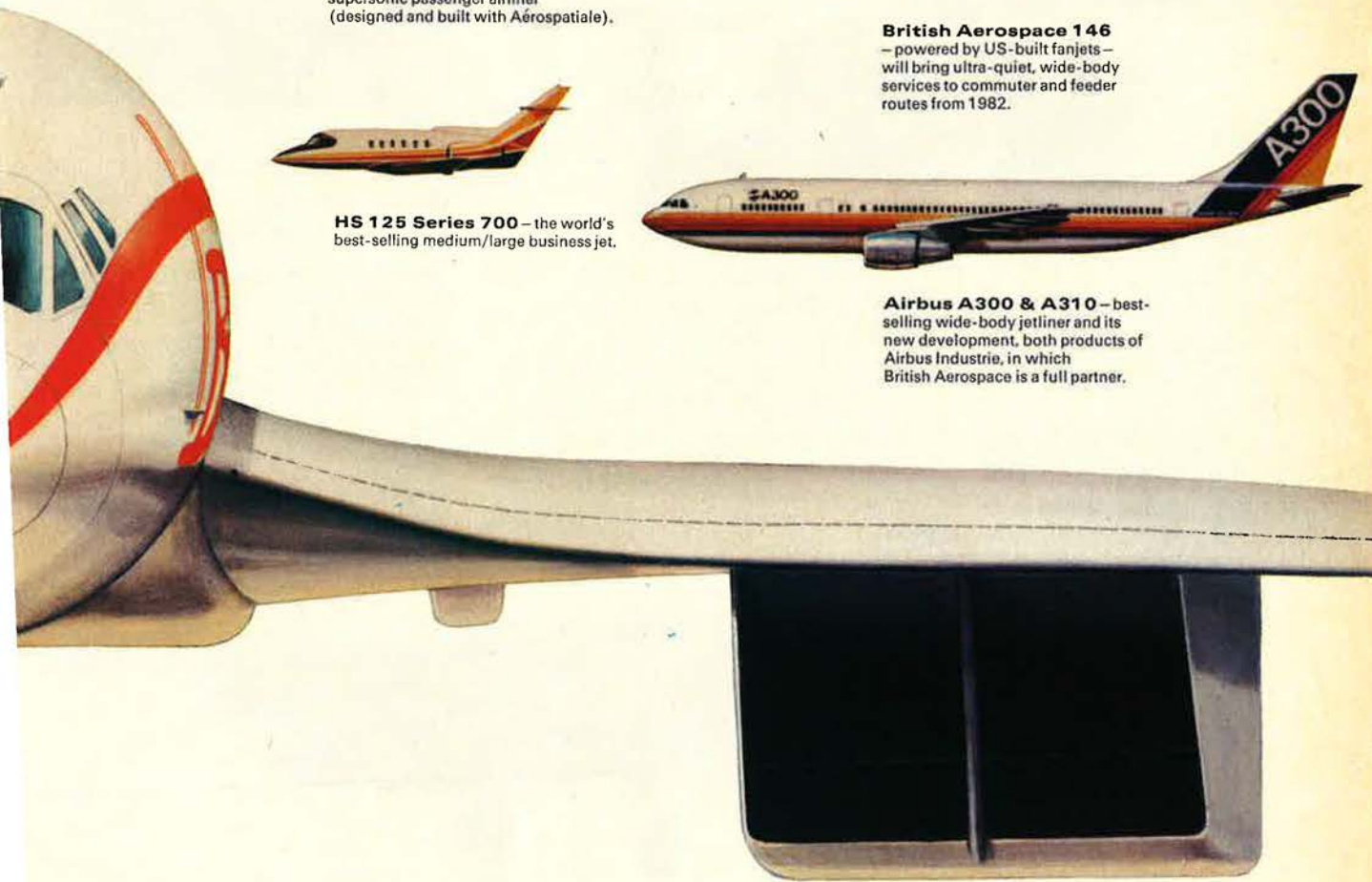
Concorde – the world's first supersonic passenger airliner (designed and built with Aérospatiale).



HS 125 Series 700 – the world's best-selling medium/large business jet.



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The Dynamic Role of Air Force Doctrine

BY MAJ. GENE E. TOWNSEND, USAF, CONTRIBUTING EDITOR

“In the development of superior air leadership, the education process cannot treat air doctrine as a set of abstract principles to be learned by rote like mathematical formulas and dutifully filed away for future reference. Air Doctrine is made up not of abstractions, but of dynamic living truths forged in the heat of combat and tested in the crucible of war.”

—Gen. Thomas D. White (AFM 1-1)

TO SOME, the term “Air Force doctrine” may conjure up an image of ancient truths or inflexible rhetoric. Actually, just the opposite is true. Air Force doctrine is neither ancient nor inflexible. Indeed, it is by nature dynamic—so much so that the Air Force has an Air Staff division working full time reviewing, evaluating, and updating doctrine. The Doctrine and Concepts Division is assigned under the Deputy Chief of Staff for Operations, Plans and Readiness. It produced the current version of Air Force Manual (AFM) 1-1, “Functions and Basic Doctrine of the United States Air Force,” distributed this June. This manual is the capstone document and reference authority for all Air Force doctrine.

In the Foreword to AFM 1-1, Air Force Chief of Staff Gen. Lew Allen, Jr., states: “Although the Air Force is now barely more than 30 years old, our ideas on the uses of airpower have been developing for more than 60 years—since before World War I. During these 60 years, our doctrine has grown from advocating limited observation and ‘dogfight’ roles to prescribing strategic, tactical, and mobility air operations throughout the world and in space.

“Growth and change in the size, shape, and strength of our aerospace forces have gradually led to reasoned change in doctrine—based on the experience and ideas of dedicated leaders in the world of airpower. Generals Billy Mitchell, Carl “Tooey” Spaatz, Curtis LeMay, and William “Spike” Momyer are only a few of the long line of strategists and planners who helped to articulate change at each stage. . . .”

Understanding air doctrine is basic to understanding how Air Force policy is formulated and aerospace power applied. Far from being formulated in a vacuum, it is

constrained and shaped by issues such as national objectives and strategy, arms control measures, technology, and political and budgetary matters. Doctrine builds on lessons learned from the past and relates them to the present and future.

While lecturing to cadets at the US Air Force Academy a few years ago, I. B. Holley, Jr., Professor of History at Duke University, said: “Doctrine is the point of departure for virtually every activity in the air arm. Basic doctrine defines the roles and missions of the service, the scope and potential capabilities of its weapon systems. Doctrine lies behind the decision as to what weapons will be developed and gives guidance as to the relative importance of several competing roles or weapon systems when the time arrives to apportion the invariably inadequate supply of dollars.”

Categories of Doctrine Defined

US military doctrine is rather loosely defined. It can be a dominant theme in defense policy such as “flexible response,” a specific operating principle such as “counterforce,” a general principle of war such as “unity of effort,” or a specific battlefield tactic. Military doctrine is a body of theory that prescribes the methods for employing armed forces within the constraints of the military/political environment. It can be viewed from two levels.

At the national or grand-strategy level, military doctrine is concerned with coordinating the separate contributions of the armed services with the diplomatic, economic, and other nonmilitary instruments of policy. At a lower level, each armed service is primarily responsible for the doctrine governing its own forces. However, the United States has no formal “grand strategy” as does the Soviet Union. There, military doctrine is formed at the highest government levels by the political and military leadership. It is a single element of their grand strategy that weaves all the instruments of national power (political, economic, psychosocial, scientific-technological, military) into one coherent policy. This policy has the official imprimatur of the Communist Party.

The Air Force divides doctrine into four categories: basic, operational, joint, and combined.

Basic doctrine is the foundation from which other categories are developed. It contains fundamental ideas of airpower that have slowly evolved through the years. According to AFM 1-1, basic doctrine examines knowledge gained through this experience and outlines principles for the successful use of aerospace power. To expand on the responsibilities and employment of the US Air Force, additional categories of doctrine are developed using basic doctrine as a foundation. It is published in the AFM-1 series.

Operational doctrine, the manual notes, consists of the rules for organizing, directing, and employing aerospace forces when conducting mobility, tactical, and strategic operations. It describes specific missions and tasks and spells out functions dealing with personnel, intelligence, research and development, legal, communications, physical security, inspection, and logistics. Operational doctrine is published in the AFM-2 series.

Normally, the Joint Staff prepares doctrine supporting joint operations. However, doctrine and procedures for joint operations are sometimes developed as a cooperative effort among the individual services and implemented through the appropriate service chief of staff.

Doctrine for combined operations establishes principles, organization, and procedures agreed upon among allied forces. It supports defense treaties, agreements, or organizations, and promotes compatible arrangements for employing armed forces in combined operations.

Within these broad categories, there are some forty separate publications focusing on doctrine and more than fifteen others involving some aspect of doctrine.

How Air Force Doctrine Is Developed

The Directorate of Plans's Doctrine and Concepts Division is responsible for the overall control, direction, and management of Air Force doctrine. It is the single Air Force point of contact for all doctrine, including joint and combined. The division draws upon the expertise of other Air Staff agencies, major commands, and separate operating agencies when preparing and coordinating doctrine. Contact with the scientific and academic community, as for example through the Air Force Research Associate Program, also provides valuable inputs to the division.

Air Force experts view doctrine from two primary perspectives—historical and systemic.

In the historical approach, doctrine evolves from an idea, which is formulated into a concept, then developed into doctrine. Some doctrines evolve into the highest military precept—a principle of war. The historical approach begins when observers see an action, or results of an action, repeated time after time. To take a simple example, it was often noticed in the early days of aerial combat that in air-to-air attacks out of the sun, or from a rear-area blind spot, opponents were placed at a disadvantage. Concepts then formed about attacking from out of the sun or a deep-six position. This was then formulated into doctrine: maneuver to approach an opponent so he cannot observe your aircraft. This doctrinal statement supports a principle of war dating back thousands of years: surprise results from attacking an enemy at a time and place where he is neither prepared nor expecting an attack.

The second perspective from which Air Force doctrine is viewed—the systems approach—examines events in an environmental context. This gives doctrine a living, dynamic quality. Where the historical approach builds on lessons learned from the past, the systems approach draws from current situations—the environment—and looks ahead to the future. In the systems approach, doctrine is shaped by internal and external pressures. External sources come from the military/political environment

“For centuries, successful national military strategies have been based on principles of war learned in equally as many centuries of military experience. Those lessons came hard; and at great cost in lives and gold, and in national power. . . . [These] principles of war . . . have been successful for more than 2,500 years. We ignore these lessons at our peril.”

—Gen. Curtis LeMay (AFM 1-1)

and resulting threat perceptions, the relative distribution of military forces, military technology, and foreign military doctrines and policy. Internal sources that shape and constrain doctrine include historical precedents, weapons availability, leadership preferences, and organizational processes.

A primary responsibility of the Doctrine and Concepts Division is to review Air Force publications and policy statements to ensure their accurate reflection of current doctrine. The division also reviews for conformance to existing doctrine elements of the weapons acquisition process such as mission element need statements and program objective memoranda, joint actions such as JCS papers, and combined matters including NATO policy proposals.

Doctrinal statements are promulgated by the division, not only through the doctrine manuals discussed earlier, but also through other publications designed to inform the Air Force about doctrinal issues and to provide a forum for discussion.

The division is also responsible for representing the United States in international negotiations when developing combined air doctrine and concepts. For example, the Doctrine and Concepts Division provides the US representative to the NATO Tactical Air Working Party, the group responsible for developing tactical air doctrine in Europe.

The Evolution of Air Force Doctrine

Mankind dreamed of flying for millennia before Orville Wright lifted his twelve-horsepower plane off the sands of Kill Devil Hill near Kitty Hawk, N. C. That event caused a few to speculate on the military potential of powered flight. An Aeronautical Division, established as part of the Army Signal Corps, was created in August 1907 to oversee all matters pertaining to military ballooning, air machines, and "all kindred subjects." A few months later, the Wright brothers were awarded a contract to build the first American military airplane.

The question was—to do what, and how?

As the capabilities of aircraft improved, so did the early concepts of how to employ airpower. In 1917, Gen. Billy Mitchell defined the principal role of the "Air Service" as helping other arms accomplish their missions. He divided aviation into two classes—tactical and strategic. Mitchell was joined by other theorists including Giulio Douhet of Italy and Sir Hugh M. Trenchard of Britain in believing that airpower would be the dominant military force of the future. They also agreed that the air arm should be organized into a separate service.

Professor Holley notes that the critical turning point for air doctrine in this country fell sometime in the late twenties when the Air Corps Tactical School was transferred from Langley Field, Va., to Maxwell Field in Montgomery, Ala. "What emerged at Maxwell was an improved and highly creative institution. There, in the decade from 1931 to 1941, a small but able and dedicated faculty, in conjunction with a succession of some enthusiastic, if atypical, students, hammered out the doctrinal guidelines for the modern Air Force," he said. For one thing, the school forecast an independent air arm, equipped and trained for both independent and joint op-

erations, an important conceptual change for employing air forces.

Progress in developing a formal doctrine was slow. For a variety of reasons, World Wars I, II, and the Korean conflict were to come and go before the nation had a codified air doctrine. Robert F. Futrell, in his massive two-volume history entitled *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force*, published in 1971 by the Aerospace Studies Institute at the Air University, writes:

"Unlike the United States Navy—which appeared to operate in accordance with a seemingly complete set of seapower principles recorded by Admiral Alfred Thayer Mahan—or the United States Army—which drew its principles from generations of American and foreign military scholars—an Air Force officer speaking in 1955 could only conclude that 'the Air Force as a service does not have a set of ideas against which it is operating, at least not a complete set of ideas.'"

Another interesting observation of Futrell's is the large degree to which an oral, rather than written, tradition affected the development of air doctrine.

That is not to imply that the nation's early use of airpower was ineffective or the concepts developed by its military planners lacked depth. The history of World War II and Korea in particular shows otherwise.

World War II produced the first sustained use of strategic airpower and significant refinement of tactics. Following Germany's surrender, Air Marshal Hermann Göring said it was the "size, skill, and methods of Allied air forces that wrecked Germany." American airpower also devastated military targets throughout the Pacific theater, finally causing Japan to surrender. The successful application of airpower during the Korean War led the Commander of the Eighth Army, Maj. Gen. Walton H. Walker, to say, "I will gladly lay it on the table—if it had not been for air support . . . we would not have been able to stay in Korea."

However, even a casual review of Air Force history will reveal the slow progress in formalizing the nation's air doctrine. Why?

Some scholars point to the rapidity with which technology unfolded, making extremely unstable the environment in which air doctrine is produced. For thousands of years, war was limited to land and sea. Although technological advances also benefited these forces, the airplane added a whole new dimension, a new medium, for warfare. In less than seventy years, airpower experienced its own technological "future shock," moving from the frail aircraft first flown by the Wright brothers, to the awesome jet and rocket vehicles of today. Doctrinal implications of this rapid advance can be readily shown.

Although balloons had long been used in warfare for surveillance, the camera used in combination with the airplane gave special importance to the concept known as aerial reconnaissance. Doctrines supporting pursuit aviation and close air support were enhanced by the invention of a machine gun that could fire through a propeller. The jet engine allowed new concepts to be applied across the entire spectrum of airpower, in particular strategic air warfare and airlift. The rocket motor,

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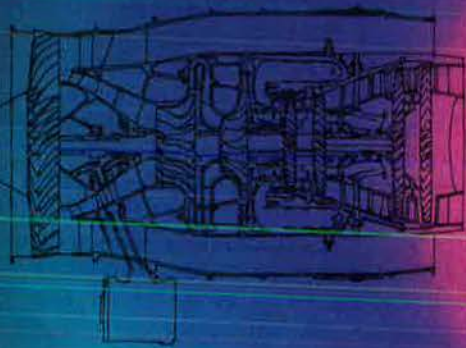
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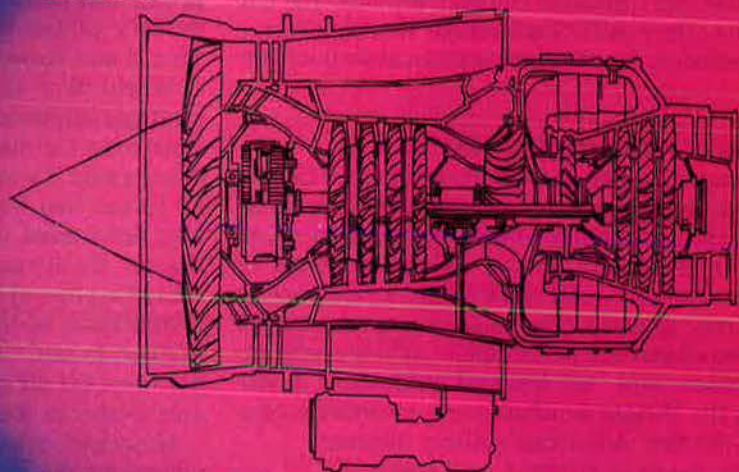
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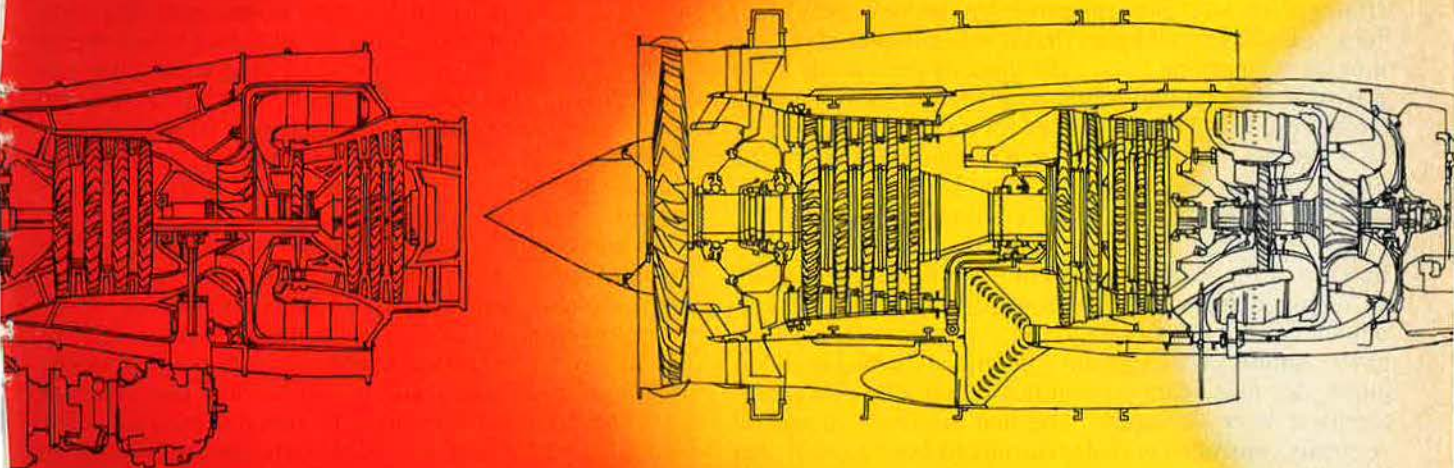
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coupled with extremely accurate guidance systems, gave credibility and space-age realism to concepts such as countervalue and counterforce. In short, some believe that technology advanced so quickly that it was difficult to keep air doctrine current.

Another reason air doctrine developed slowly was organizational. The debate over whether or not to establish the air arm as a separate service simmered for years before coming to a boil following World War II. Although the nation's air forces grew both in importance and sophistication between the two world wars, it was difficult to obtain a consensus on what to do with the "Air Corps." Some national and military leaders believed that airpower should continue to be relegated as a combat function in support of, and controlled by, the Army. Others advocated a separate, coequal air service with the authority and equipment to carry out both independent and joint operations.

During the years leading up to the war, numerous staff studies and plans for employing airpower were prepared. One, AWPD-1, "Munitions Requirements of the Army Air Forces," completed in 1941, was the first major strategic air war plan prepared by the new Army Air Forces staff. Futrell notes that it was completed in only nine days, marking "... the apex of prewar air force doctrinal thought and a blueprint for the air war which would follow." The plan called for a sustained air offensive against Germany and other regions held by the enemy. It also required the AAF to be prepared to support a possible invasion of the continent.

In 1943, another milestone for air doctrine was the publication of the War Department's Field Manual 100-20, "Command and Employment of Air Power." The manual stated that the flexibility of airpower is its greatest asset. Almost predicting the outcome of the National Security Act four years later, it noted that land power and airpower were "coequal" and that airpower should be centrally controlled with decentralized execution. It also described the mission and composition of a strategic air force, a tactical air force, an air defense command, and an air service command. A few years later, most of the national and military leaders would support the creation of a separate air force.

But, even after the Air Force was formally created by the National Security Act of 1947, and its functions clearly delineated, it still was several years before the first manual of basic Air Force doctrine appeared.

Postwar Statements of Doctrine

The first official Air Force statement of doctrine, AFM 1-2, "USAF Basic Doctrine," published in 1953, drew primarily on the experiences of World War II and Korea. It stressed the importance of the principles of war and stated that air forces are the decisive instrument in dealing with the enemy's war-making capacity. The manual listed three primary functions of air forces—defense of the homeland, control of the air, and the ability to attack the enemy's heartland.

A year later, the manual was revised, emphasizing the Air Force role in deterring foreign aggression. In 1955, a revision explained the role of airpower in peace, cold

war, limited war, and total war. It stated that air forces are an entity and their employment must be under centralized control throughout the spectrum of international conflict, and that airpower relies on the total resources of a nation.

Technological influences found their way into the 1959 revision. The term "aerospace" was introduced and the nation's aerospace forces defined as "air systems, ballistic missiles, and space vehicle systems." Aerospace was defined as an operationally indivisible medium consisting of the total expanse beyond the earth's surface.

In the early 1960s, according to the current edition of AFM 1-1, the Soviet Union shifted strategy and began supporting subversion and insurgency in Africa, Latin America, and Southeast Asia counter to US interests. These subversive activities coupled with other tensions created by the Soviets over the Berlin Wall and Cuban missile crises caused the United States to make a sharp turn away from earlier doctrines of massive retaliation.

The next version of basic doctrine appeared in 1964, reflecting Air Force perceptions of the changing geopolitical environment. It introduced the concept of flexible response, reemphasized deterrence, and stated that total victory may not be attainable due to the changing strategic nuclear balance. Rapid technological gains and the deployment of space and missile systems were noted to have enhanced doctrinal concepts of deterrence. However, this revision failed to note that the Soviet Union was closing the technology and military power gap between it and the United States.

As the current manual points out, "uncertainty" of US national policy in the mid- to late-sixties hampered doctrinal development, and the next revision took seven years to complete. During this time, aerospace doctrine was improvised to reflect changes in national philosophy on counterinsurgency and use of tactical and strategic forces. Additional pressures to modify doctrine arose from the Middle East War of 1967, the Soviet invasion of Czechoslovakia, and increasing threats of international terrorism. The 1971 revision incorporated these changing situations, recognizing the growth of Soviet strategic and tactical forces and the trend to strategic parity.

The revision of 1975 described the Total Force Concept and emphasized the principles of war.

Probably the best-written, most thought-provoking, and useful version of AFM 1-1 is the current edition. It contains less esoteric doctrinal language, making the text much more readable. Charts and diagrams show how one aspect of doctrine affects another. Discussion of space operations and personnel programs is expanded considerably. Sprinkled throughout the manual are pithy quotations from past aerospace leaders.

Air Force Doctrine and the Future

Any attempt to define the future direction of Air Force doctrine raises more questions than it answers. However, it is a good bet that operations in space, economic realities, scientific-technological advances, and political considerations will continue to influence Air Force doctrine.

Since about 1959, the United States has invested heav-

“National safety would be endangered by an Air Force whose doctrines and techniques are tied solely on the equipment and process of the moment. Present equipment is but a step in progress, and any Air Force which does not keep its doctrines ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security.”

—Gen. H. H. “Hap” Arnold (AFM 1-1)

ily in space programs. These efforts, largely devoted to scientific study and research, are yielding systems important to the nation's defense. Reconnaissance and communication satellites will play an important role in verifying Soviet compliance with the Strategic Arms Limitation Treaty. Used in conjunction with air- and ground-based systems, these satellites are forging new concepts of “fusing” the areas of command control communications and intelligence information. In a few years, additional effort will be given to space exploration and manufacturing. As the nation pushes further, and more resources are invested in space, the need for space defense will become imperative. “Aerospace” extends from the earth's surface to infinity. To date, the Air Force has operated mostly below 100,000 feet, but in the future it will have to extend its operations beyond that level. That will require new concepts of warfare and doctrine. Secretary of the Air Force Hans Mark stated in the August AIR FORCE Magazine, “. . . whether one adopts a pessimistic or an optimistic view, operations in space will be the central feature of our strategic posture.”

Doctrine experts view another challenge as how to make technology the slave and not the master. The Air Force needs technology to increase efficiency by reducing deficits through time savings, weapons accuracy, or a combination of the two. In the same article, Secretary Mark wrote, “Technology is dynamic by definition. We must be sure our strategy and doctrine are also dynamic and consistent with our own technological capability as well as the capability of our adversaries.”

Regarding economic constraints, operational and maintenance funds provide the money for readiness. Conservation is essential for the Air Force to meet its mission requirements within the current budget. If personnel, fixed installation, and maintenance costs rise too high, funds for military exercises, flying hours, and other training necessary for keeping a fighting edge will be reduced. These economic constraints require the Air Force to review its doctrine of force employment from the perspective of good leadership and management to obtain maximum defense readiness for the dollar.

National and international political considerations will also weigh heavily on Air Force doctrine. In a speech before the Texas State convention of the Air Force Association last June, Gen. Lew Allen, Jr., Air Force Chief of Staff, said: “The US absolutely cannot permit the Soviets to attain strategic superiority. The protection of our national interests depends on our maintaining a credible deterrent posture based upon our essential equivalence in strategic nuclear capabilities. Our strategic forces must be, in fact, and seen to be, at least equal to those of the Soviets. Without such parity, we would run the unacceptable risks of encouraging greater Soviet adventurism and tempting them to exploit their superior military posture as a means of political intimidation.”

Retired Gen. Robert J. Dixon, former Commander of the Tactical Air Command, put it this way in AFM 1-1: “Only change is certain; doctrine must enhance the management of change in strategy and tactics.” ■

'Don't Start Anything'

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

WHAT with one thing and another, these are gloomy days. For the first time ever, at least in any of our memories, we are facing threats to our way of life and even, if we continue on our present course, our very existence. Clearly, it is difficult to be jolly. It is, after all, only thirty-four years since we were on top of the world.

It was, for instance, just thirty-six years ago this month that a small and battered formation of B-17s was closing in on the Schweinfurt ball-bearing plant. As a result of a little shifting around earlier in the day, we in the 91st found ourselves leading the attack. Anxious for all the company we could attract, I suggested to a flight of three survivors from another group that they make their bomb run with us. "The 306th will make its own run" was the reply, in the best tradition of anyone's military.

It was only thirty-odd years ago that we, unsophisticated and ingenuous, thought we could do anything. Like Hub Zemke's 56th Fighter Group that proclaimed a fighter-kill quota to be reached by Sadie Hawkins Day. Dogpatch was not widely known in that England of 1944, but the Brits had no trouble identifying with the contest.

By contrast, these are knit-browed and earnest times. The generals who march up the hill to Congress are serious and studious men, and we can be grateful they are, for these, we have agreed, are serious times. Still, it would be fun to have a Rosy O'Donnell around as a contrast to all those wrinkled foreheads. Gen. Emmett O'Donnell, who led the first B-29 raid on Tokyo, was himself a serious man, mind you, and one who knew his business, but he also had an irreverent streak, along with a marvelous gift for telling a story.

There was the time, for example, at one of Secretary of Defense Charlie Wilson's great Quantico revival meet-

ings, an assemblage of all the mighty—and near-mighty—civilian and military brass to discuss the defense budget and other weighty matters. The affair went on for three days, and each day one of the services provided entertainment to lighten the otherwise forbidding agenda. The Navy came through with a splendid choral group, the Army with band music, and the Marines put on a musical extravaganza one evening that rivaled *South Pacific*. That left the last bit of show business up to the Air Force, which had somehow forgotten to provide for this important exercise in interservice competition. The solution was Rosy O'Donnell, who, with ten minutes or so to reflect on his routine, laid them in the aisles.

All of which calls to mind one of Rosy's stories, which has an allegorical ring to it, one that seems peculiarly appropriate for the uncertain period we are presently passing through.

In his early years as a second lieutenant, O'Donnell and his great friend and Academy classmate Blondy Saunders were detailed as football coaches at West Point, an assignment that led them, for one reason or another, to Detroit one weekend. Now, Detroit in those days had a certain reputation as the headquarters of the feared Purple Gang, a fact that inspired some of the local sporting gentry into an elaborate practical joke on Rosy and Blondy, who, despite their bemusing nicknames, were a couple of well-muscled football players.

Not to drag it out, they were taken to a bar populated by characters in tight-fitting suits, black shirts, white neckties, and smoking long cigars. There was something ominous even about the bartender, who pocketed Rosy's twenty dollar bill—a lot of money in those days—without offering to make change. "Don't start anything," whispered the escort, implying that passive behavior might be the key to survival. Furthermore, an abrupt departure

would also be provocative. Just drink, pay up without expecting change, and don't start anything. It went on awhile, as those things do, and then Rosy and Blondy were let in on the joke. The evening ended with laughter and happy memories. Nonetheless, the story is an allegory for our times, happy ending excluded, perhaps.

"Don't start anything" is the advice we hear all around us these days. Never mind our national interests in Southern Africa, don't start anything. Keep quiet about Soviet activities in the Horn of Africa, just don't start anything. Let the USSR have a global strategy, say the voices. It will eventually fail. Our best plan is just not to start anything. And so we busy ourselves with improving our situation in the NATO Central Region, where the Soviets have no logical reason to start anything, and we, by the very nature of NATO's defensive strategy, have guaranteed we will not.

That is not to say we ought to go around looking for trouble, but there are—there have been—some troubles in recent years that we have just ducked. There seems little doubt now as to Soviet aspirations in the Middle East and the Horn of Africa. When Iran came apart, we lost a friend on one side of the Strait of Hormuz. The other side is still in the hands of a little-known friend, Oman, one of the few Arab states to support the Camp David agreement. Despite his firm pro-Western stand, the Sultan of Oman is not without his worries, as he sees Soviet penetration into South Yemen, Afghanistan, and Ethiopia. According to a report in the *Wall Street Journal*, he is concerned that the United States might be losing its nerve.

It cannot be true that we will lie doggo until the USSR has us by the oil jugular. That does not mean we have to start something, either. It just means we have to be visible, and clearly up to it if need be, wherever our interests are threatened. ■



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RUSSIA'S GROWING MINORITIES PROBLEM

The Armed Forces of the Soviet Union, and its economic and political structures, have been dominated largely by Great Russians, who make up a steadily shrinking percentage of the USSR's population, as Slavic birthrates decline while those of the Central Asian and Transcaucasus Republics are on the rise. This poses a variety of potential problems for the Kremlin.

BY HARRIET FAST SCOTT

A NATION'S military stature depends, in large measure, on its military manpower. Although numbers are important, so are education, cohesiveness, morale, cultural background, and related factors.

Military service is compulsory for all young men in the USSR; hence, the Soviet Armed Forces are composed of people from the many nationalities within the Soviet Union. This cultural and linguistic diversity, coupled with almost equally diverse demographic factors relevant to the various ethnic groups, has had, and will continue to have, an impact on Soviet military and economic planning. For example, pronounced fluctuations in the size of the Soviet Armed Forces since 1948 are at least in part a reflection of recent demographic trends.

A revised "Law of Universal Military Service" was issued by the Kremlin in 1967. It reduced the age of entry into military service from nineteen to eighteen, and the length of service from three years to two (for sea-going elements of the Navy and Border Guards, service was reduced from four years to three).

The change in length of military service was not a sudden decision. The size of the Soviet Armed Forces has had its ups and downs since the end of World War II when it stood at 11,365,000 men. Only about 6,000,000 were what the Soviets call "active army" or combat troops. The remainder were in supply, communications, trans-

portation, training, and other rear-area services. By 1948, according to official Soviet reports, the Armed Forces were reduced to 2,874,000. However, a buildup rapidly followed, and by 1955 the force had increased to 5,763,000. Soviet strategists have said that this expansion was necessary to keep a balance in the "correlation of forces." The United States was superior in nuclear weapons; therefore, the Soviets had to be stronger in conventional forces.

Between 1955 and 1958, the Soviet Armed Forces were reduced by 2,140,000 because, by 1958, a nuclear balance was being achieved as a result of Soviet success in developing and producing nuclear-armed rockets. In January 1960, Nikita Khrushchev announced that the strength of the Soviet Armed Forces stood at 3,623,000. Further, he said that military manpower would be reduced by another 1,200,000 without detriment to combat capability. With the formation of new rocket troop units, the number of missiles in a nation's operational inventory, not the number of divisions, would be the determining factor in war. Other Soviet spokesmen later stressed that nuclear-armed missiles had brought about a revolution in military affairs.

One of Khrushchev's reasons for reducing military manpower was not detected in the West for several years. He may have been influenced more by the 1959 Soviet census and

the demographic trend it revealed than by purely military considerations. In 1961, he unveiled a grandiose twenty-year program of economic development aimed at surpassing the United States by 1980. This would require trained manpower.

The number of nineteen-year-olds, the young men subject to three or four years of military service, peaked in 1958 at about 2,400,000. By 1962, the number had plunged to barely more than 1,000,000. It bottomed out in 1963 at 970,000, increasing to slightly more than 1,000,000 the following year. This dramatic decline in the number of young men reaching induction age was the result of a low birthrate during World War II, or "the Great Patriotic War," as the Soviets call it.

Even with this demographic problem, Khrushchev never cut the size of the Armed Forces as promised. A serious split between the Soviet Union and China in the 1960s gave him cause to worry about the Far Eastern and Central Asian borders. In the West, in an attempt to prop up the East German Communist regime, he ordered construction of the Berlin Wall. A year later, in 1962, he tried to install missiles in Cuba.

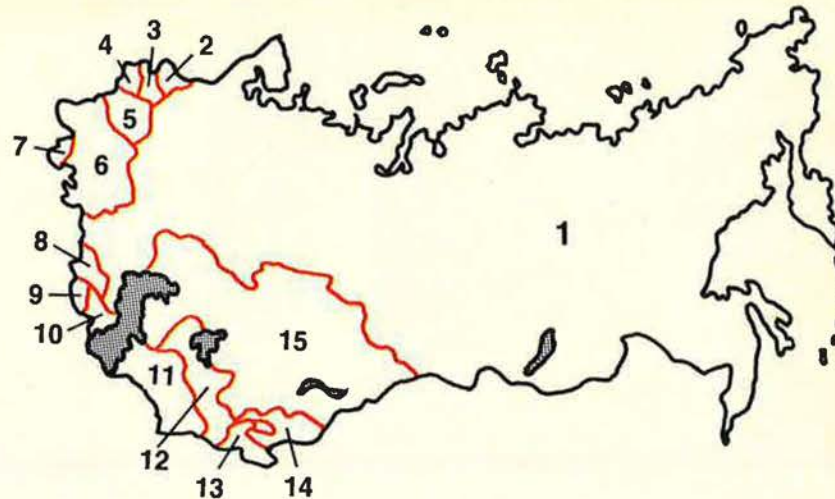
By 1968, the Soviet military manpower picture had changed again. There were more than 2,000,000 young men turning nineteen each year and their number could be seen increasing annually until 1980. Military planners now were faced with an embarrassment of riches. Even allowing for deferments, compulsory service of three or four years would mean a military force of well over 6,000,000 men, including officers. There were only two choices: either cut back the number of men called up each year, or reduce the time spent in uniform. In his book, *Military Strategy*, Marshal V. D. Sokolovskiy notes that if the size of the Armed Forces is to remain constant, a greater percentage of men can be trained, and then kept in the reserves, if the training period is shortened. The solution was to reduce the time in service, not the number of men trained.

A second problem arose in the early '60s. Soviet youth finishing school at seventeen or eighteen

could barely be trained to work in a factory or on a *kolkhoz* farm before being called up for military duty. After finishing school and before starting military service, many understandably pursued a Russian version of goofing off. Plant managers grumbled that they could not reach the Party's economic goals because they were too busy trying to train young people just out of school only to lose them for three years when they were called up for military service. The manpower pinch that hit the Armed Forces in 1963 hit the job market three years later when they were discharged. There simply were not enough young workers to fulfill the economic plan.

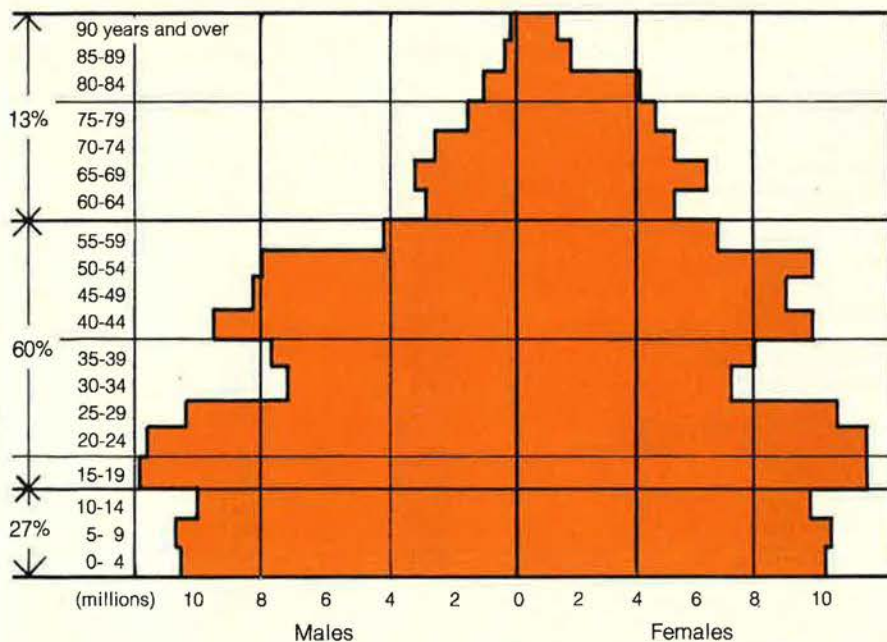
The manpower problem could be solved by reducing both the period of service and the age of induction by one year. Beginning in 1967, young men went into service at age eighteen, almost immediately after finishing school, and were out by age twenty. Also by 1968, the eighteen-year-old callups who were born after the wartime and early postwar years of deprivation were much more capable physically than had been the nineteen-year-olds a few years previously. The service helped to instill good work habits, gave most of them skills that could

THE UNION OF SOVIET SOCIALIST REPUBLICS



NAME	AREA (in 1,000 km ²)	CAPITAL
1. Russian Fed. SSR	17,075.4	Moscow
2. Estonian SSR	45.1	Tallinn
3. Latvian SSR	63.7	Riga
4. Lithuanian SSR	65.2	Vilnius
5. Belorussian SSR	207.6	Minsk
6. Ukrainian SSR	601.0	Kiev
7. Moldavian SSR	33.7	Kishinëv
8. Georgian SSR	69.7	Tbilisi
9. Armenian SSR	29.8	Yerevan
10. Azerbaydzhan SSR	86.6	Baku
11. Turkmen SSR	488.0	Ashkhabad
12. Uzbek SSR	408.9	Tashkent
13. Tadzhik SSR	143.0	Dushanbe
14. Kirgiz SSR	198.5	Frunze
15. Kazakh SSR	2,756.0	Alma-Ata

Figure 1: Estimated Age Pyramid of the Population of the Soviet Union at the Beginning of 1979



be used in civilian life, and matured them. Party Secretary Leonid Brezhnev stated that these two years were not simply for military training; they also were a period of "ideological hardening."

Long-Term Demographic Problems

The Soviet census of 1959 was the first to be published in the postwar period. One had been taken in 1950, but Stalin wanted to keep secret his manpower weakness. The Soviets now admit that their population was only 178,500,000 in 1950, a drop of 15,500,000 from 1940. The Soviet Union did not match its pre-war population until 1955.

The Kremlin leaders also waited many years before detailing their war losses. They finally revealed that approximately 10,000,000 men were killed or died of wounds, and another 10,000,000 civilians lost their lives. The age pyramid (Figure 1) shows the excess of females over

Figure 2. Comparison of Population, 1940 and 1979

	1940	1979	percent increase
USSR (as a whole)	194,077,000	262,442,000	35
Russian Fed. SSR	110,098,000	137,552,000	25
Ukrainian SSR	41,340,000	49,757,000	20
Belorussian SSR	9,046,000	9,559,000	6
Uzbek SSR	6,551,000	15,391,000	135
Kazakh SSR	6,148,000	14,685,000	138
Azerbaydzhan SSR	3,274,000	6,028,000	84
Georgian SSR	3,612,000	5,016,000	38
Moldavian SSR	2,468,000	3,948,000	60
Tadzhik SSR	1,525,000	3,801,000	150
Kirgiz SSR	1,528,000	3,529,000	131
Lithuanian SSR	2,925,000	3,399,000	16
Armenian SSR	1,320,000	3,031,000	130
Turkmen SSR	1,302,000	2,759,000	112
Latvian SSR	1,886,000	2,521,000	34
Estonian SSR	1,054,000	1,466,000	39

males ages fifty and up. The consequences of World War I, the Civil War, and World War II can be seen in the lows for the sixty-to-sixty-four and thirty-five-to-thirty-nine age groups. This ripple effect will continue to affect generations yet unborn. The excess of females over males (ten to 7.7 in 1950; ten to 8.7 in 1979) will not be eliminated until the end of this century.

Another demographic factor may give Moscow planners major problems. The population in Central Asian and Transcaucasian Republics of the USSR is increasing at a rate much faster than in the traditional Slavic areas of the country—the Russian Soviet Federated Socialist Republic (RSFSR), the Ukraine, and Belorussia. Although there has been a substantial increase in the population of the USSR as a whole, the rate of growth has varied by republic and even within some areas of republics. Soviet 1979 census figures, when compared to 1940 figures (Figure 2), indicate the extent of this change.

Current birthrates are an indication of how rapidly this population change is likely to continue. The Tadzhik Republic leads the Soviet Union with a birthrate of 37.1 per 1,000 population. The Uzbek and Turkmen Republics are second and third with 34.5 and 34.4 respectively. In contrast, the Slavic areas have a birthrate of only fifteen per 1,000 population (Figure 3).

The 129,000,000 Great Russians, largest of the approximately 100 nationalities of the Soviet Union, are declining steadily as a percent-

age of the total population. (The internal passports that are issued to Soviet citizens at age sixteen show the individual's nationality, based on his parentage and unrelated to the republic in which he may live.) In 1970, the Great Russians comprised about fifty-three percent of the USSR's population, but by the year 2000 they will be a minority, when compared to the combined population of the other ethnic groups. The next largest groups are the Ukrainians, numbering 41,000,000 or seventeen percent of the total, and the Belorussians with 9,000,000, or about four percent. The Uzbeks, largest of the non-Slavic nationalities, slightly out-

numbered the Belorussians in 1970.

The Transcaucasian Republics of Azerbaydzhan, Armenia, and Georgia also have high birthrates, although not as high as Central Asia (Figure 3). In other words, if one were to take 1,000 Soviet citizens in proportion to their numbers of the total population, it is estimated (since the 1979 census figures have not been completely published as yet) that there would now be 520 Russians, 164 Ukrainians, and thirty-seven Belorussians for a total of 721 Slavic nationalities; and forty-six Uzbeks, twenty-five Kazakhs, eleven Tadzhiks, seven each Turkmen and Kirgiz, making a total of ninety-six from Central Asia. Another twenty would be Azerbaydzhanis, seventeen Armenians, and thirteen Georgians, for a total of fifty from the Transcaucasus area. Twenty-one would come from the Baltic nationalities—Estonians, Latvians, and Lithuanians—that were annexed by the Soviet Union during World War II. Other nationalities would constitute the remaining 112 of the hypothetical 1,000, the largest being eleven Moldavians, ten Jews, and twenty-five Tatars.

Cultural and Linguistic Diversity

Slavic birthrates have declined for a variety of reasons. They are, for example, the most urbanized of the ethnic groups. Housing has been

Figure 3. Birthrate per 1,000 Population by Union Republic

	1940	1970	1975
USSR (as a whole)	31.2	17.4	18.1
WESTERN USSR:			
RSFSR	33.0	14.6	15.7
Ukrainian SSR	27.3	15.2	15.1
Belorussian SSR	26.8	16.2	15.7
Moldavian SSR	26.6	19.4	20.7
BALTIC REPUBLICS:			
Estonian SSR	16.1	15.8	14.9
Latvian SSR	19.3	14.5	14.0
Lithuanian SSR	23.0	14.5	14.0
TRANSCAUCASIAN REPUBLICS:			
Azerbaydzhan SSR	29.4	29.2	25.1
Georgian SSR	27.4	19.2	18.2
Armenian SSR	41.2	22.1	22.4
CENTRAL ASIAN REPUBLICS:			
Uzbek SSR	33.8	33.6	34.5
Kirgiz SSR	33.0	30.5	30.4
Tadzhik SSR	30.6	34.8	37.1
Turkmen SSR	36.9	35.2	34.4
Kazakh SSR*	40.8	23.4	24.1

*Kazakh SSR, because of large migrations into the virgin lands, is now predominantly Russian and is not considered a Central Asian Republic. The birthrate of the remaining Kazakhs is quite high and keeps the republic rate high, though not as high as neighboring Uzbekistan, for instance.

behind demand, and young married couples often face years of living either with in-laws or in a single room without kitchen or bath. Wives are expected to work, and short maternity leaves are the rule. While most married couples plan a family, a single child, or at the most two, is the pattern. The Baltic Republics are much the same, although they have a larger percentage of older people which brings down the birthrate per thousand.

Lumping the Slavic nationalities together does not signify that there are no strong antagonisms among them. Their languages are different, for example, even though they have little difficulty understanding each other. The 1970 census showed that only thirty-six percent of the Ukrainians and forty-nine percent of the Belorussians claimed to speak Russian fluently. A recent emigré, being interviewed on television after landing at Kennedy International Airport in New York, corrected the reporter who called him a Russian. "I am a Ukrainian," he said very firmly, "not a Russian."

There is even less in common between Great Russians and Central Asians who have a Turkic or Iranian cultural background and are still predominantly rural. Children are considered an asset on the *kolkhozes*. The climate is mild, without the long winters characteristic of most of the country. There is a strong family tradition with youthful marriages.

According to the 1970 census, less than twenty percent of Central Asians claimed to have a good command of the Russian language. In the Transcaucasian Republics, only thirty percent of the Armenians, twenty percent of the Georgians, and sixteen percent of the Azerbaydzhanis are fluent in Russian. It should be noted, however, that fluency was judged purely on the basis of the response given the census taker.

A higher percentage of young people may have learned Russian, however. In 1964, the Supreme Soviet directed the non-Russian-speaking republics to improve the teaching of Russian to prepare youths for military service. Those who had already finished school and were expected to be called up for service were to study Russian in

classes at their place of employment.

During World War II, the Soviet leadership was concerned about the loyalty of many minority groups. Party Secretary Nikita Khrushchev, in his secret speech to the 20th Party Congress in 1956, lifted the lid slightly to disclose what had happened during the war years:

Thus, already at the end of 1943, when there occurred a permanent breakthrough at the fronts of the Great Patriotic War benefiting the Soviet Union, a decision was taken and executed concerning the deportation of all the Karachai from the lands on which they lived. In the same period, at the end of December 1943, the same lot befell the whole population of the Autonomous Kalmyk Republic. In March 1944 all the Chechen and Ingush peoples were deported and the Chechen and Ingush Autonomous Republic was liquidated. In April 1944, all Balkars were deported to faraway places from the territory of the Kabardino-Balkar Autonomous Republic and the Republic itself was renamed the Autonomous Kabardin Republic. The Ukrainians avoided meeting this fate only because there were too many of them and there was no place to which to deport them. Otherwise, Stalin would have deported them also.

At the same time, Hitler's invasion of western Soviet territory resulted in moving many factories to Central Asia, along with a great many workers. The Russian population in Kazakhstan became so large that the Kazakhs are now a minority in their own republic, which is no longer considered part of Central Asia. In the 1950s, the Kazakhstan area became the site of test ranges and other facilities for the Soviet missile and space programs. Trouble with China in the 1960s increased the military significance of the region still further, and in 1969 the Central Asian Military District was established with headquarters at Alma-Ata, capital of Kazakhstan.

Minorities and the Armed Forces

Higher military schools, which accept *kursants* (cadets) at ages seventeen to twenty-two for four- or five-year courses, are located throughout Central Asia. For

example, Tashkent has a higher combined arms school and a higher tank command school; a higher military automotive command school is located at Samarkand. Entrance requirements for higher military schools are strict, and candidates are required to have a thorough knowledge of the Russian language. There are similar higher military schools in the Transcaucasian republics. The Russian language requirement makes it difficult for a non-Slavic speaking youth to become a regular officer.

By far the majority of the senior Soviet officers are Slavs, primarily Great Russians. There have been a few token generals and marshals from among the Soviet minorities, usually from Georgia or Armenia. There is an effort to recruit the minorities, however, with the most prestigious of the Ground Forces schools—the Moscow Combined Arms School—boasting of the many nationalities among its cadets. Several minority officers have excelled in flying and some have become famous test pilots. Reaching a high command position, however, is another matter.

The lack of minority generals can also be traced to the policy followed from 1917 through World War II of having formations of national units. In the Civil War there were Ukrainian divisions, Belorussian formations, Latvian, Estonian, and Bashkir regiments and divisions. These were disbanded after the war. In World War II, cavalry divisions were formed from some of the minority groups in which men were noted for their horsemanship. There were also Georgian, Turkestan, Armenian, and Azerbaydzhan mountain rifle divisions. In the middle of the 1950s, the concept of national units was replaced by carefully integrated units comprised of all nationalities. But there was no place for senior minority officers, with limited professional backgrounds, in these new units.

In the early days of Soviet rule, non-Russian political and military leaders had played key roles. Stalin himself was a Georgian and many other Party leaders during the 1920s and 1930s, such as Ordzhonikidze, Mikoyan, and Beria, were non-Russians. Frunze, Triandafillov, Uborevich, Alksnis, and Trotskiy—

all major military leaders in the 1920s—were from minority nationalities. In an effort to portray the Soviet Union as a contented multinational state, Soviet leaders have gone to some lengths to glorify war heroes of the various national origins. Local museums display the uniforms of dead heroes, and statues are erected to remind the youth of their glory.

However, during World War II, nine out of ten recipients of the highest Soviet decoration, "Hero of the Soviet Union," were Slavs—Russians, Ukrainians, or Belorussians—although these nationalities made up only three-quarters of the Soviet population at that time.

Impact of the Changing Demographic Structure

By 1984, an estimated one-third of the youth entering the work force and the Soviet Armed Forces will be from non-Slavic areas, primarily Central Asia and the Transcaucasus. The age-group structure shown in Figure 4 will have a considerable impact in the future. In 1970, less than thirty percent of the population of the USSR was under fourteen years of age, but in Central Asia forty-one percent to forty-six percent was in this age group. For the Soviet Union as a whole the fifteen to fifty-nine age group, considered the labor pool, made up about sixty percent of the population. But in Central Asia the labor pool was about the same size as the group under fourteen.

It may be difficult for the Soviet leadership to expand the industrial and agricultural base in these regions to provide jobs for the flood of young people who will be entering the labor pool. Agricultural land is limited, and poor irrigation methods in the past have resulted in leaching thousands of acres. Years of expensive desalinization will be needed before these lands will become productive, if ever. The Transcaucasus areas will have as much difficulty in expanding agriculture and industrial facilities as Central Asia.

In Siberia and the Far East there are many areas to which Kremlin planners would like to move more people. Despite the inducements offered by the Party, from higher pay to extended vacations, few

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people are willing to establish permanent residence in these regions. The population surplus that will soon exist in Central Asia and the Transcaucasus probably would have no greater desire to live in these harsh climatic areas than do the Slavic groups in the Western part of the USSR.

The changing demographic structure may lead to significant political problems. Many of the people in Central Asia and the Transcaucasus are Moslems. To what degree the Soviet leadership has succeeded in turning the young Moslems away from their religion and way of life is not known. Many of the Moslem nationalities were badly treated throughout the 1930s, and during World War II. With this background of smouldering resentment, a major Moslem revival on the southern borders of the USSR could have an effect on the loyalty of Moslem peoples in the Soviet Union.

With respect to the Armed Forces, the years beginning in 1982 and lasting for the following decade will find the entire Soviet military manpower structure undergoing a

drastic change. Of the eighteen-year-olds now eligible for compulsory military service, one out of five is a non-Slav. By 1984, every third Soviet soldier will be a non-Slav. The situation will not begin to change until the year 2000. After the turn of the century there may be a brief period of reversal as the children of the peak years of 1976 and 1978 marry and have children. It is possible, however, that birthrates among some of the non-Slavic nationalities may decline as they become more urbanized.

Another possible problem for the Kremlin may be generated by its support of national-liberation movements and wars. Soviet writing, from the Party Secretary's speeches, the Congresses, and daily newspapers, stress Soviet encouragement of national-liberation struggles in distant areas as a sacred duty of the Soviet people. Today, the Soviet Union remains the world's largest colonial power. If national-liberation movements are good for groups outside of the USSR, why are they not also good for the nationalities that have been absorbed by the USSR? ■

Figure 4: Age-Group Structure (1970 Census)

	UNDER 14	15-59	OVER 60
USSR (as a whole)	29.0%	59.2%	11.8%
WESTERN USSR:			
RSFSR	26.5	61.6	11.9
Ukrainian SSR	24.9	61.2	13.9
Belorussian SSR	29.0	57.9	13.1
Moldavian SSR	32.2	58.1	9.7
BALTIC REPUBLICS:			
Estonian SSR	22.1	61.1	16.8
Latvian SSR	21.6	61.1	17.3
Lithuanian SSR	27.0	58.0	15.0
TRANSCAUCASIAN REPUBLICS:			
Azerbaijdzhan SSR	44.1	47.9	8.0
Georgian SSR	30.6	57.5	11.9
Armenian SSR	39.2	52.5	8.3
CENTRAL ASIAN REPUBLICS:			
Uzbek SSR	45.1	46.2	8.7
Kirgiz SSR	41.7	49.4	8.9
Tadzhik SSR	46.6	45.9	7.5
Turkmen SSR	44.9	47.9	7.2
Kazakh SSR	37.5	54.2	8.3

The Air Force is engaged in a comprehensive program of energy conservation, paralleling a national search for alternate energy sources—including sources of jet fuel—in which USAF is an important participant. The question is whether new fuels can be available in time to prevent a decline in force readiness.

CONSERVING ENERGY AND COMBAT READINESS

BY BONNER DAY,
SENIOR EDITOR

THE Air Force, one of the world's biggest users of petroleum, has made dramatic strides to cut back on its use of energy since the 1973 oil embargo.

But the prospect of a shrinking petroleum supply worldwide, along with rising fuel prices, is causing Air Force leaders concern about the continued availability of aircraft fuel. During a war, the Air Force would depend upon a special war reserve of jet fuel, which is now being maintained, to keep its warplanes in operation. Operational aircraft would also expect to benefit from rationing in the nonmilitary sector of the economy.

But in peacetime, the Air Force requirement for fuel competes with other users, and not always successfully. As a result, Air Force leaders say one of the service's greatest challenges ahead is to satisfy national energy conservation goals without reducing combat readiness.

Already flying hours for training have been reduced. Average hours per month for pilots are down by as much as thirty percent for some weapon systems, compared to pre-1973 oil embargo flying rates.

The key is an alternative to petroleum fuel that is reasonable in cost and not subject to the whims and turbulence of the international marketplace. Preliminary Air Force studies point to oil shale as the quickest and cheapest answer. This source could conceivably provide fuel for the Air Force for the rest of the century. To encourage private development of shale-oil refineries, the Air Force has developed a program in which it would serve as a



This F-15 simulator is one of many types used by the Air Force. Substituting simulator time for flying hours to the maximum extent compatible with safety and combat readiness is expected to save \$120 million in fuel costs in FY '79.

guaranteed customer. The program now is being reviewed by the Department of Energy.

The Air Force is a major customer for energy. Fifty percent of the energy purchased by the Defense Department, the equivalent of some 250,000,000 barrels of oil a year, is used by the Air Force. And fifty-six percent of Defense Department petroleum purchases are for the Air Force.

Most of this energy is in the form of fuel for Air Force aircraft. Within the Air Force, ninety-one percent of the 95,000,000 barrels of petroleum purchased a year is consumed as aviation fuel. Of the rest, some seven percent is for heating and other support of bases, stations, and other installations, and two percent is for gasoline to power automobiles, trucks, and other vehicles.

The OPEC Embargo

As long as the availability of fuel was assured at low prices, Air Force consumption rates were not considered a subject of concern.

But in 1967 the consumption of petroleum in the United States equaled domestic production capability. Since then, dependence on imported oil has steadily increased, making availability of fuel for military vehicles as well as civilian use less reliable. The rapid rise in foreign oil prices since the 1973 embargo by the Organization of Petroleum Exporting Countries (OPEC) exacerbated the problem.

The embargo forced the Air Force to implement drastic short-term efforts to protect supplies and retain combat-readiness.

Emergency actions that year

saved 9,000,000 barrels, or about seven percent of the previous total Air Force consumption.

After the embargo was lifted, the Department of Defense set a goal of fifteen percent less energy consumption in Fiscal Year 1974 and 1975 than in 1973. This goal was surpassed. The Air Force consumed twenty-eight percent less energy in FY '74, and twenty-nine percent less in 1975.

From Fiscal Year 1973 to 1978, the Air Force reduced fuel consumption thirty-five percent. A major factor in the reduction was a cut in flying hours, from 4,900,000 hours a year before the embargo, to 3,200,000 hours a year in 1978.

But during the same period, fuel costs increased more than 120 percent, despite the dramatic reduction of fuel consumption. In 1973, jet fuel cost eleven cents a gallon. In 1979, the cost is forty-four cents a gallon, and some energy experts project the cost will rise to fifty-five cents a gallon in 1980. In just the six-month period that ended July 1979, there has been a fifty-seven percent increase in the average OPEC price.

The fuel savings the Air Force has achieved, though overwhelmed by OPEC price increases, have been significant. But the savings did not come easy. They have been the result of a comprehensive program, directed by top Air Force officials, but also taking advantage of initiatives at local bases, designed to conserve energy and to ensure fuel for Air Force aircraft through the year 2000.

Flying Procedures

New and more efficient procedures have been implemented in

The Air Force plans to install a computer-based fuel-control system on its KC-135, C-141, C-5, and B-52 aircraft. Tests indicate a better than four percent fuel saving, which could add up to many millions of gallons of jet fuel saved each year.

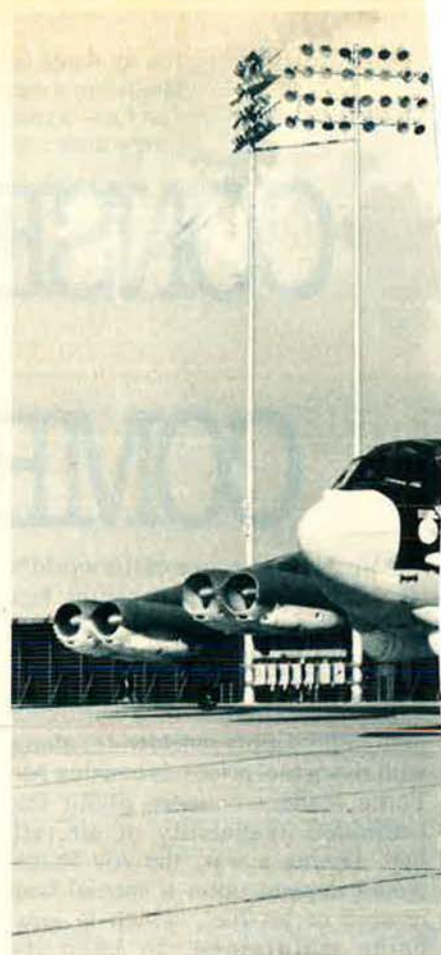
ground operations at airfields. Shorter paths have been instituted for planes taxiing for takeoffs. Recovering aircraft now taxi to parking spots on one engine. Pilots have been directed to reduce engine idle time to a minimum. Takeoff and landing procedures are under continual review in an effort to cut unnecessary fuel consumption.

In flight, pilots have been directed to reduce the use of afterburners, and to avoid wasteful flying maneuvers.

Air Force engineers are reviewing the aerodynamics of aircraft in the inventory and adding or taking off vortex generators to reduce drag and to improve the airflow across wing and tail surfaces. After preliminary studies, the C-141 has been designated for modification of vortex generators.

New engines are being considered for the KC-135 to increase the thrust, decrease noise, and cut fuel consumption.

The Air Force has developed a fuel-control system that uses on-board computers to help pilots fly aircraft in the most fuel-efficient mode, taking into consideration speed, altitude, and other factors. A pilot program calls for C-141, KC-135, and B-52 aircraft to be used in a test of the system through 1981. After testing, the system is expected to be installed on these three airplanes, as well as the C-5. Preliminary studies show fuel savings of three to seven percent are possible



ble using the computer system.

A new training procedure, "Flight Hour Program Planning," has been adopted to shift the emphasis for training from flying a certain number of hours to completing specific achievements. This has resulted in a cut in the number of flight hours required for various areas of flight training.

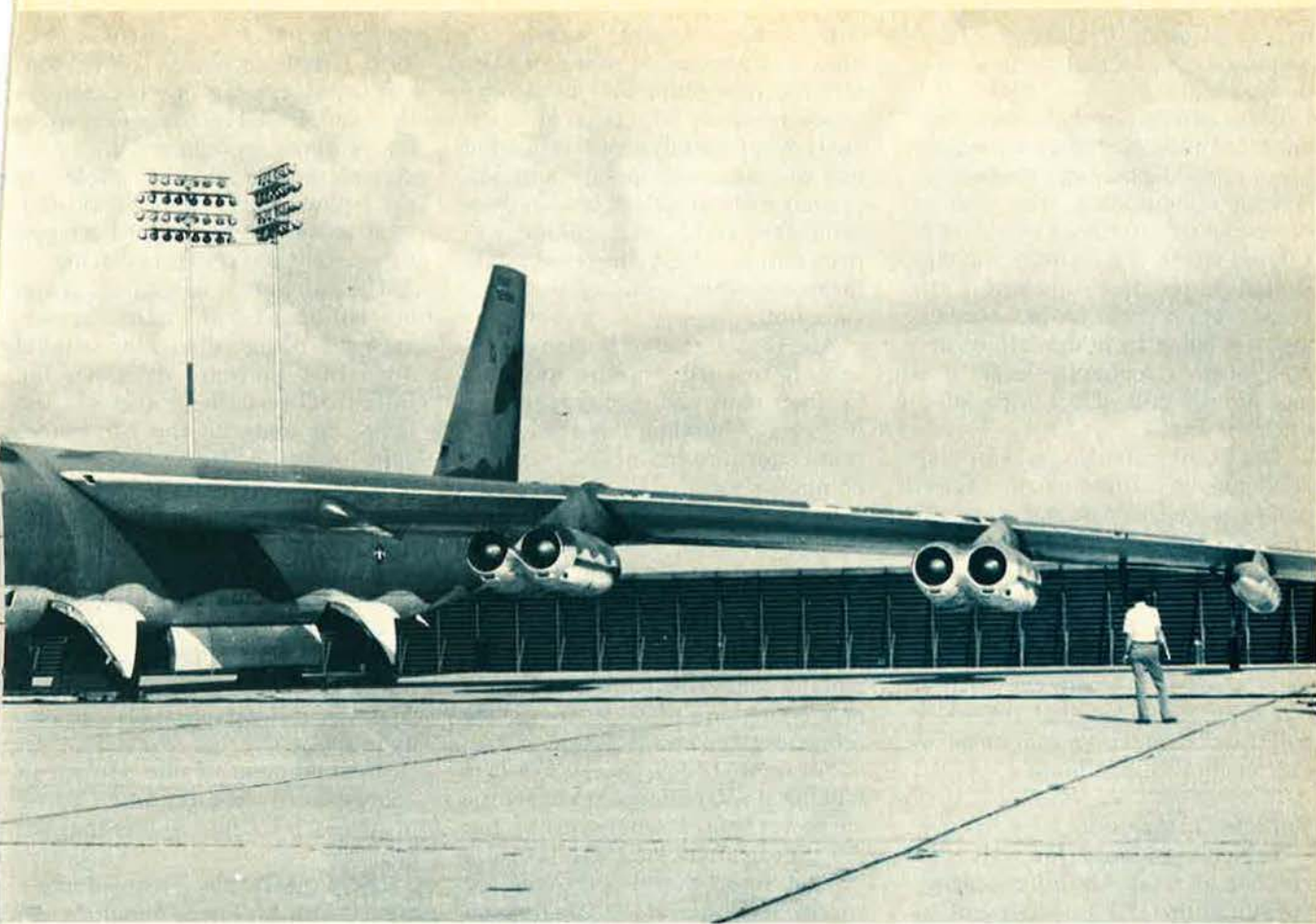
Squadron commanders have been directed to combine training flights with operational flights wherever possible. Though exact savings are difficult to calculate, it is estimated that several thousand flight hours are being saved annually with this step.

Flight simulators have been emphasized in training. The dramatic decrease in training flying hours is credited in large part to the increased use of simulators, and further savings are expected as simulators for new planes, including the A-10, E-3A, F-15, and F-16, are added to the inventory. In FY '79, it is estimated that 230,000 flying hours will be saved through simulators alone. This is the equivalent of 6,000,000 barrels of oil, or

ESTIMATED AVAILABLE WORLD ENERGY RESOURCES

(In equivalents of billions of barrels of oil)

	CRUDE OIL		SHALE OIL		COAL	
United States	31	5.0-3.9%	964	75.7%	862	26.7%
Soviet Union	78	12.6-9.8%	24	1.9%	595	18.5%
Western Europe	24	3.9-3.0%	18	1.4%	552	17.1%
Eastern Europe	3	0.5-0.4%	—	—	360	11.2%
China	20	3.2-2.5%	154	12.1%	418	13.0%
Other Asia	372	60.3-46.7%	1	0.1%	96	3.0%
Africa	61	9.9-7.6%	11	0.9%	74	2.3%
Australia,						
New Zealand	2	0.3-0.3%	1	0.1%	226	7.0%
Canada	6	0.9-0.7%	100	7.8%	40	1.2%
Mexico	20-200	3.2-25.1%	—	—	—	—
	617-797 billion		1,273 billion		3,223 billion	



\$120 million at current oil prices.

The Air Force also has reduced support aircraft flight hours by phasing out aircraft, including inefficient propeller planes. Support flying hours also have declined. Since the consolidation of support aircraft under a single manager, the Military Airlift Command, it has been easier to pool passengers and schedule flights for maximum efficiency.

Facility Fuel Savings

Support activities at bases, stations, and other installations account for about twenty-eight percent of the Air Force's total energy use, and seven percent of the Air Force's consumption of petroleum. The Air Force has been directed to cut energy consumption for support facilities by twenty percent from the base year of 1975 to 1985.

To ensure maximum energy conservation, each command was directed to develop a facility energy plan for FY '76 through FY '85. The aim of these plans is to find better ways to monitor conservation programs.

To cut lighting costs, much base lighting is being converted to mercury vapor lights, particularly on roads and ramps of airfields. Preliminary studies show that these lights use only twenty-five percent as much electricity as conventional lighting.

Bases also have been cutting back on the number of lights that are being used, in some cases by just unscrewing every other bulb in office corridors and along base streets. Base authorities have been monitoring this program to determine whether or not darkened hallways and unlit streets have resulted in any increase in crime. As yet no rise in crime rates has been reported.

A surprisingly significant source of fuel savings has been a program of increasing the frequency of base power plant inspections. Cleaner plants and immediate replacement of worn parts have improved efficiency for notable savings in fuel consumption. Emergency generators, formerly operated once a month, now are tested once every six months.

A special Department of Defense program, called the Energy Conservation Investment Program (ECIP), was developed in FY '76 to provide funds for energy conservation projects.

A key part of the program is the use of computer-based Energy Monitoring and Control Systems (EMCS). During peak power use periods, heavy power users in the industrial side of bases are cut back. This forces bases to schedule power use evenly around the clock. Air Force officials say the computers are programmed to cut off non-essential equipment during peak periods without causing inconvenience or loss of comfort to power users.

Computer control of power plants was tested in a model program at Luke AFB, Ariz. Some twenty-four air bases, including Luke, now have their power plants under computer control, with many major Air Force installations scheduled for eventual installation of EMS.

Some Air Force bases have infrared cameras so that heat loss can be spotted and eliminated by install-

ing additional insulation, storm windows, solar screening, and window coatings.

Base authorities have been encouraged to save energy by repairing or replacing heating, ventilation, and air conditioning. The cost of these capital improvements is considered worth the resulting savings in fuel. In practice, this part of the conservation program has accelerated spending from operations and maintenance accounts. Exact savings are difficult, if not impossible, to determine.

The ECIP plan also calls for consolidating base functions into fewer buildings and scheduling work cycles for optimum building energy use. The consolidation of forces since 1973 has helped to accelerate this program. The ECIP is not cheap, but Air Force leaders have determined it is worth the cost. It has been estimated that the ECIP will save \$22 million a year on an investment of \$125 million.

Vehicle Operations

Vehicles account for only one percent of total Air Force energy consumption and two percent of petroleum consumption. But the size of the Air Force's equipment is such that vehicle fuel is still a significant part of the nation's vehicular fuel use. Through reduced speed limits, car pooling, tighter control of vehicles, and less idling of standing vehicles, the consumption of fuel for vehicles decreased forty percent from 1973 to 1978.

Further savings in fuel are expected as present Air Force vehicles are replaced by newer, more economical models. Vehicles purchased by the Air Force must average 31.5 miles per gallon by 1985. This goal represents an increase of four miles per gallon over the federal standard set for the auto industry.

The Air Force, following a testing period, is also converting to compact pickup trucks as a replacement for the half-ton trucks that have been the standard in the past.

Research and Development

The Air Force has an extensive research and development effort under way to find new methods of reducing energy consumption in both air and ground operations.

One study examines throttle settings and navigation routing to determine maximum fuel economy. Other research targets include the analysis of aerodynamic drag, the use of advanced metals and improved structural designs to reduce aircraft weight, and engine improvements that increase performance while reducing fuel consumption.

Air Force research also is directed toward making support facilities more energy efficient. One program, "Building Load and System Thermodynamics," uses a computer to predict energy consumption and to examine the effects of modifications in buildings on the conservation of energy.

Other research programs include examining waste-heat recovery systems; burning alternate fuels, including coal; using waste lubricants and contaminated fuel; and using refuse-derived energy.

For remote sites, the Air Force is looking at solar energy as an electrical power source. On August 15, the Air Force dedicated the world's largest operational photovoltaic energy generator at the Mt. Laguna Air Force Station, located east of San Diego, Calif. The solar energy system provides sixty kilowatts of power, or eight percent of the electrical needs of the radar station during daylight hours.

The Air Force is looking at wind as an energy source at Francis E. Warren AFB, Wyo. Air Force scientists at the base have been testing a twenty-five-kilowatt wind machine.

At Hill AFB, Utah, the Defense and Energy Departments have assigned energy experts to conduct research on geothermal energy. The project envisions underground heat eventually being used to heat a warehouse on the base, and is expected to serve as a model for further applications of the earth's underground heat.

Coal gasification is being explored by Air Force scientists, in cooperation with the Department of Energy, in a program at Minot AFB, N. D. The coal project is designed to produce gas from coal to heat base facilities without violating environmental standards.

In a third effort with the Department of Energy, the Air Force has

designated McClellan AFB, Calif., as a public showcase to demonstrate energy-saving techniques that can be used by the general public. Various techniques are being considered for display, including solar photovoltaic cells, wind machines, and computerized energy-monitoring and control systems.

The Air Force, having made significant progress in energy conservation, is being called upon to build upon that success. By 1985, the Defense Department has set the following goals for the Air Force, with 1975 as the base year:

- A twenty percent reduction in the use of energy by existing facilities.
- A forty-five percent reduction in the use of energy in new facilities.
- A minimum of ten percent of energy needs of facilities to be from nonpetroleum sources, such as coal, refuse-derived fuels, or biomass fuels.
- A minimum of one percent of energy needs for facilities to be provided by solar or geothermal heat.

These goals place considerable pressure on Air Force scientists and engineers to assist the Department of Energy, which is the primary government agency responsible for energy programs.

To meet the objectives set for the Air Force, it is estimated that \$1.6 billion will have to be spent between 1975 and 1985. The bulk will be for coal conversion programs, \$422 million, and solar and geothermal programs, \$487 million. The Energy Conservation Investment Program is expected to cost some \$525 million during the same period.

Shale Oil

A breakthrough in shale-oil refining, however, could turn Air Force planning upside down. Preliminary studies indicate that, for the Air Force at least, shale oil may be the answer to many of its energy problems, particularly the problem of keeping its force of aircraft flying.

Because of the unique nature of jet aircraft, Air Force officials see no alternative to hydrocarbon fuels for the foreseeable future.

A special Defense Department panel, the Shale Oil Task Group, has determined that of all the alternate fuels studied, only fuel from

coal or oil shale provides an acceptable combustion/volume ratio.

Other fuels, such as liquid hydrogen, various alcohols, and ammonia, do not produce sufficient energy per gallon to be practical for high-performance jet engines. Nuclear power plants have been studied but technology has not yet opened the way for their use in aircraft.

The task group also concluded that fuel from oil shale, rather than coal, would probably be cheaper to produce, under current technology, for the rest of the century. Much of the task force's work was based on studies by the Air Force Aero Propulsion Laboratory at Wright-Patterson AFB, Ohio.

The Navy did some preliminary research on shale oil before the Department of Energy was created. In the Navy studies, 10,000 barrels of shale oil were refined and then used for a T-39 jet demonstration flight. Defense officials are still analyzing the results of the test. The Navy role in shale oil research has since been transferred to the Department of Energy.

The Air Force has prepared a detailed research and development program for the use of oil refined from shale deposits as jet fuel, and is waiting for the Department of Energy to provide the fuel through

its contracts with private industry.

One Air Force proposal would guarantee a limited market for shale oil, to encourage private energy corporations to go beyond present model-scale refineries. Whether this program is approved, however, is uncertain, though it is part of the energy package the Department of Energy currently has under study.

It is, in fact, uncertainty about policies of the Department of Energy that has been a major cause for private firms to delay commitments toward the development of oil shale. Energy industry officials say that the US could be producing from 200,000 to 2,000,000 barrels of oil a day by the early 1990s, but that it would mean investments of \$1 billion or more for each production plant.

Such a program would go a long way toward resolving America's energy problems. Today, US oil consumption is 17,000,000 barrels a day, and 8,000,000 barrels of that are imported.

A Defense Department study determined that the US has three-fourths of the world's available shale oil, the equivalent of more than 900 billion barrels. Former Air Force Secretary John C. Stetson says there may be as much as 2 trillion barrels of shale oil in the Rocky Mountains.

The richest reserves, deposits averaging more than twenty gallons of oil per ton of rock, are thought to be in the Green River Formation that covers thousands of square miles in Colorado, Utah, and Wyoming. There are estimates that from eighty billion to several hundred billion barrels can be recovered from this field alone.

Compare this with the 100 billion barrels of petroleum that have been recovered in the US to date and the potential value of the shale oil field is readily apparent.

What potential shale producers are waiting for is a firm federal commitment to a shale program that provides price or production guarantees, or offers tax credits. Among other Administration proposals, Congress is considering a \$3 tax credit for each barrel of shale oil produced.

It is estimated that a barrel of shale oil would cost about \$25 in 1979 dollars. The current OPEC price for petroleum runs about \$20 a barrel.

With a tax credit to plug the gap between petroleum and shale oil prices, oil executives predict there would be a rush to begin commercial shale-oil production.

There are at least six major companies waiting for the go-ahead: Union Oil Co. of California; Colony Development Operation; Occidental Petroleum and Tenneco Inc.; a partnership of Gulf Oil and Standard Oil of Indiana; Superior Oil Co.; and the group of companies operating the Paraho Development Corp.

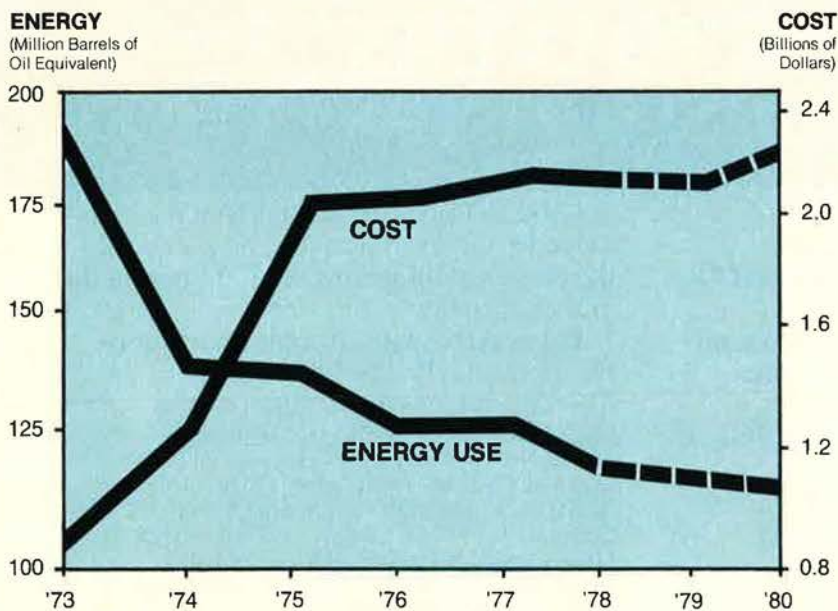
Most of the companies are considering surface retort refining. The Occidental-Tenneco and Gulf organizations are *in situ* projects, in which oil is extracted from the rock under ground.

But time is running out.

The question now being debated within the Air Force is whether or not new fuels can be brought on stream in time to prevent a serious decline in the readiness of its forces.

While private industry waits to see what the Carter Administration's energy plan means in regulations and other red tape—as well as incentives—the cost and availability of jet fuel is placing increasing pressure on the Air Force and its training and operational missions. ■

AIR FORCE ENERGY USE & COST



FY '73 to FY '75 Consumption Reduced 29%
 FY '75 to FY '78 Consumption Reduced 8%



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OCTOBER 1979



Aérospatiale's AS35 design study for a new third-level transport

AÉROSPATIALE
SOCIÉTÉ NATIONALE INDUSTRIELLE
AÉROSPATIALE; Head Office: 37 boulevard de
Montmorency, 75781 Paris Cédex 16, France

With production of both the Corvette and the N 62/Frégate now ended, Aérospatiale has joined the growing list of European manufacturers that are studying the market for next-generation light transport aircraft. Preliminary details of one of its major current concepts, the AS35, were announced at the 1979 Paris Air Show.

AÉROSPATIALE AS35

Market studies have indicated the need for a relatively small short-haul transport with 30 to 40 seats.

to replace the 15/20-seat turboprop aircraft now used by third-level operators. The AS35 has been projected to meet this requirement, with the capability of design 'stretch' to 50 seats as traffic increases.

Aérospatiale believes that, by taking advantage of modern technology, the AS35 would be able to offer a 20-50% improvement in fuel consumption per seat by comparison with current aircraft, making possible a reduction of 10-20% in cost per seat-mile. Noise and pollution levels would be low, and a feature of the configuration is the ease with which the rear fuselage can be modified to produce an all-cargo version with capability to airdrop bulky freight or parachute troops.

The AS35 is intended to meet FAR Pt 25 require-

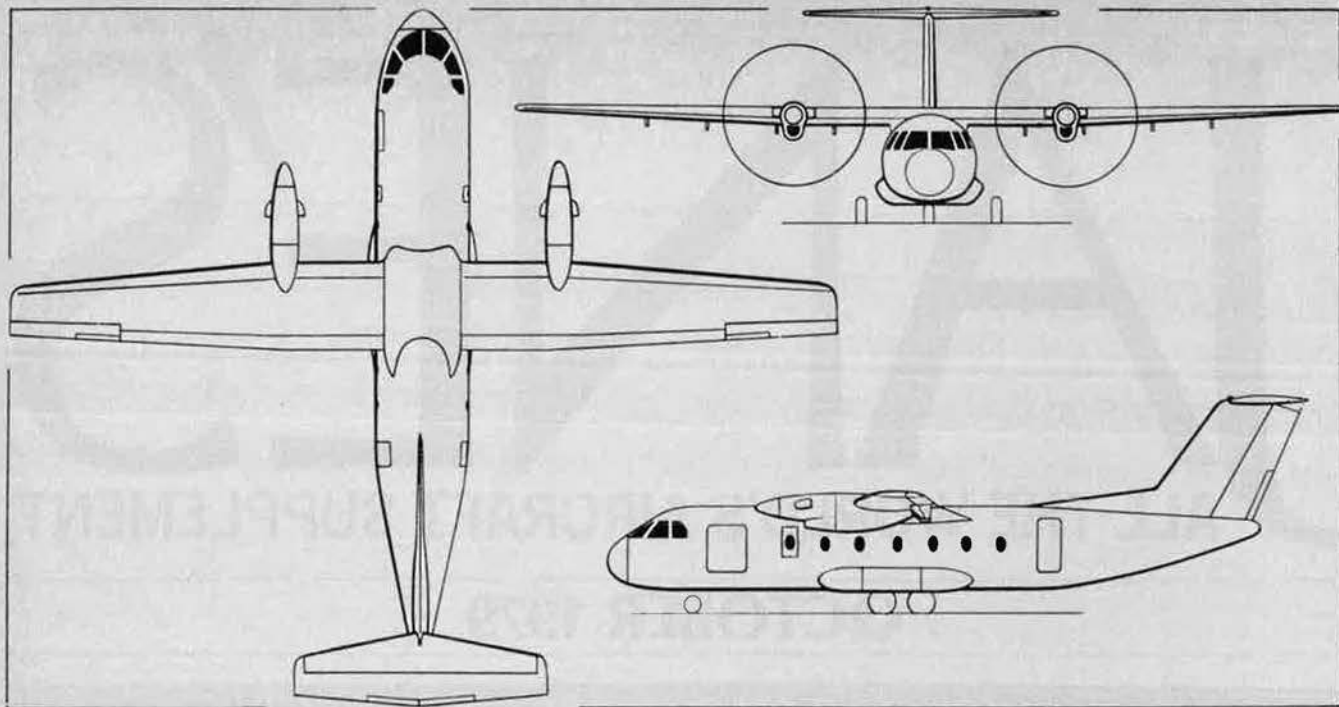
ments. Aérospatiale would like to develop it as a collaborative project with other manufacturers, and believes that production aircraft could be in service within four years of programme launch.

The following information should be regarded as provisional. No dimensions or precise specification data are yet defined.

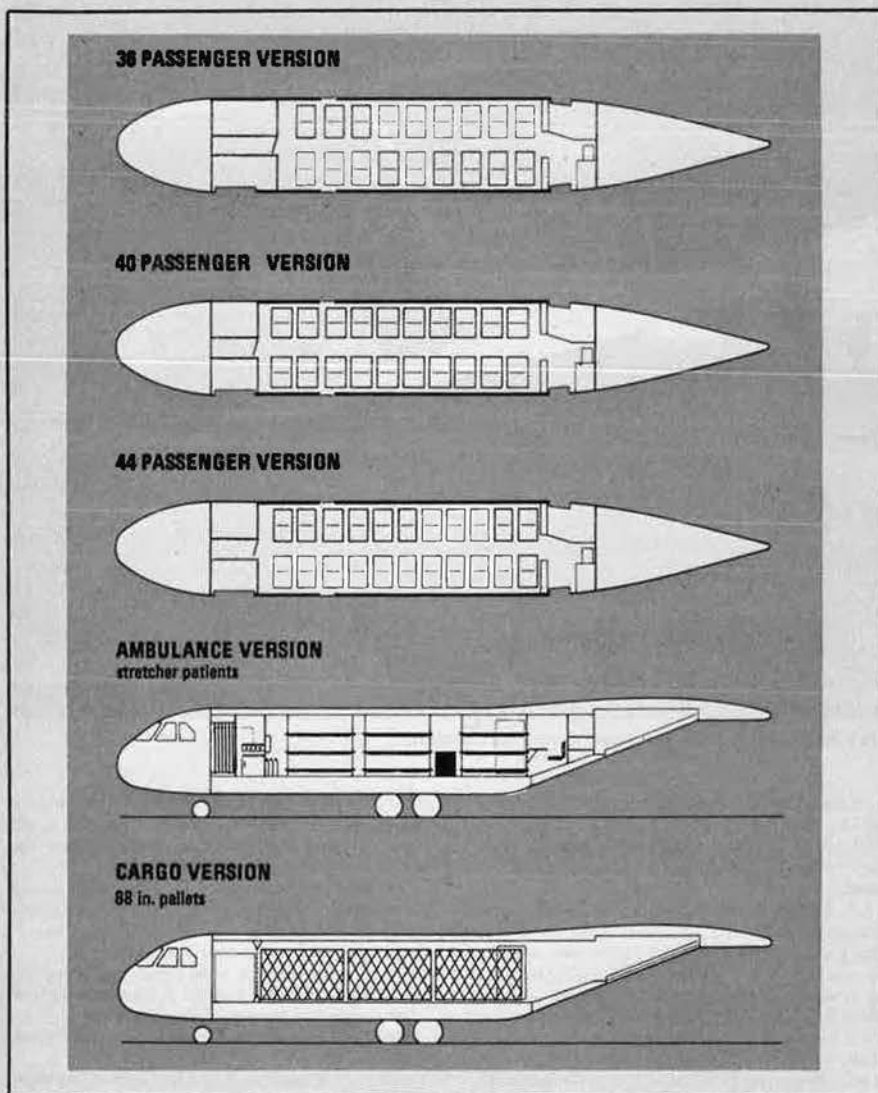
TYPE: Twin-turboprop short-haul transport.

WINGS: Cantilever high-wing monoplane, comprising a constant-chord centre-section and tapered outer panels. Dihedral on outer panels only. Ailerons and flaps along entire trailing-edge. Trim tab in each aileron.

FUSELAGE: Structure of constant section throughout main cabin. Conical rear fuselage of passenger versions would be replaced on ambu-



Aérospatiale AS35, as currently envisaged with two Turboméca Makila turboprop engines (*Pilot Press*)



Five of the alternative cabin configurations projected for the AS35

lance and cargo versions by a wider, more up-swept rear fuselage and beaver-tail, with lower surface made up of loading ramp and doors.

TAIL UNIT: Cantilever T tail with sweptback vertical surfaces, horn-balanced elevator, and large dorsal fin. Tabs in rudder and elevator.

LANDING GEAR: Retractable tricycle type. Single nosewheel. Each main gear comprises two wheels in tandem, which retract into a fairing built on to the bottom of the fuselage.

POWER PLANT: Two turboprop engines in 1,120–1,490 kW (1,500–2,000 shp) class. Engines under consideration in 1979 included the Turboméca Makila of 1,423 kW (1,908 shp).

ACCOMMODATION: Crew of two, and 36, 40, or 44 passengers in four-abreast seating, with centre aisle. Wardrobe, galley, toilet, and baggage compartment, in pairs, at front and back of cabin. Doors at front and rear of passenger cabin on port side. Service door on starboard side, opposite rear door. Emergency exit at front of cabin on each side. Ambulance version accommodates 18 stretcher patients, in three tiers of three on each side of cabin, with seat at rear for attendant.

WEIGHTS (approx):

Payload 3,500–4,500 kg (7,715–9,920 lb)
Max T-O weight 15,000 kg (33,070 lb)

PERFORMANCE (typical, estimated):

Normal cruising speed 250 knots (460 km/h; 287 mph)

T-O run 1,000 m (3,280 ft)

Range with max payload more than 800 nm (1,480 km; 920 miles)

ANTONOV

OLEG KONSTANTINOVICH ANTONOV: USSR

This description of the An-72 includes much new and amended information obtained during a lengthy interview with Mr Oleg Antonov on board one of the prototypes (CCCP-83966) at the 1979 Paris Air Show.

ANTONOV An-72 NATO reporting name: Coaler

Two prototypes of this experimental twin-turboprop STOL transport had been built by mid-1979, with a third airframe nearing completion for static testing. First photographs of one of these aircraft (CCCP-19774) were released by the Soviet

mass news agency shortly after its reported first flight on 22 December 1977. By the time of this year's Paris Air Show the two An-72s had logged a total of just over 1,000 hours in about 300 flights, and were described by Mr Antonov as "progressing faster than the An-28", which is itself entering production at Mielec in Poland.

The An-72 is being evaluated as a STOL replacement for the An-26 twin-turboprop transports flown by Aeroflot and other airlines, and is able to operate from unprepared airfields or from surfaces covered with ice or snow. The military potential of a transport able to utilise natural landing areas in undeveloped countries, or even small fields in Europe, is obvious. In particular, the An-72 might be an ideal aircraft with which to support operations by the new generation of V/STOL combat aircraft that will follow the Yak-36. Its low-pressure tyres and bogie landing gear are well suited to such tasks, and the high-set engines avoid problems caused by foreign object ingestion.

As on the Boeing YC-14, which has a similar engine arrangement, the efflux is ejected over the upper surface of the wing and down over the very large multi-slotted flaps. By taking advantage of the so-called 'Coanda effect', which causes the airflow to 'attach to' the extended flaps, a considerable increase in lift can be achieved.

Mr Antonov anticipates few changes to the design if a decision is taken to put the An-72 into series production. However, he is not convinced that so small a transport has much to gain from complications such as the deflector doors at the rear of the engine nacelles which 'spread' the exhaust flow for optimum effectiveness during take-off and landing.

Particular care has been taken to ensure easy handling of the An-72 in the air, and the designer commented that the aircraft had proved outstanding in this respect. Its Doppler-based automatic navigation system, linked to an onboard computer, is preprogrammed before take-off on a push-button panel to the right of the large cockpit map display. Failure warning panels above the windscreen display red lights for critical failures, yellow for non-critical failures, to minimise the time that needs to be spent on monitoring instruments and equipment.

TYPE: Twin-turboprop light STOL transport.
WINGS: Cantilever high-wing monoplane, with approx 25° sweepback on leading-edges and straight trailing-edges. Short constant-chord centre-section, without dihedral or anhedral. Approx 10° anhedral on outer panels. Wing upper-surface blowing requires engines to be mounted above and forward of wings, to exhaust over upper surface. Hydraulically-actuated full-span leading-edge flaps outboard of nacelles. Wide-span trailing-edge flaps, double-slotted inboard in exhaust efflux, triple-slotted on outer panels. Normal T-O flap setting 25-30°; max deflection 60°. Five-section spoilers forward of flaps on each side; some sections opened automatically on

touchdown by sensors actuated by weight on main landing gear. Conventional ailerons outboard of flaps, with tab in port aileron.

FUSELAGE: Conventional all-metal semi-monocoque structure of circular cross-section. Under-side of upswept rear fuselage made up of two outward-hinged clamshell doors and downward-opening ramp-door.

TAIL UNIT: Cantilever all-metal T tail, with wide-chord sweptback vertical surfaces. Double-hinged rudder, with tab in lower portion of two-section aft panel. Tailplane leading-edge sweep slightly greater than that of wings, with straight trailing-edge on horn-balanced elevators. Two tabs in each elevator. Tapered fairing forward of fin/tailplane junction. Two large outward-canted ventral fins, probably associated with airprop testing from open ramp, on CCCP-19774; not fitted on CCCP-83966 when shown in Paris.

LANDING GEAR: Retractable tricycle type. Twin wheels on rearward-retracting steerable nose unit. Each main unit comprises two trailing-arm legs in tandem, retracting inward through 90° so that wheels lie horizontally in bottom of large fairings, outside fuselage pressure cell. Low-pressure tyres, size 720 x 310 on nosewheels, 1050 x 400 on main wheels.

POWER PLANT: Two Lotarev D-36 high bypass ratio turbofan engines, each rated at 63.74 kN (14,330 lb st).

ACCOMMODATION: Pilot and co-pilot/navigator side by side on very roomy flight deck. Optional flight engineer's seat, at rear on starboard side, slides forward on tracks to position between and slightly aft of pilots, to give access to controls on central console. Main cabin designed primarily for freight, but with folding seats for 32 passengers along side walls and provision for carrying 24 casualties and attendant in ambulance configuration. Large downward-hinged rear ramp-door for loading trucks and tracked vehicles. As on An-26, ramp-door can slide forward under fuselage to facilitate direct loading from a truck on to cabin floor, or for airdropping of freight. Winch, capacity 2,500 kg (5,510 lb), assists loading of containers up to 1.90 x 2.44 x 1.46 m (6 ft 3 in x 8 ft x 4 ft 9½ in) in size, pallets 1.90 x 2.42 x 1.46 m (6 ft 3 in x 7 ft 11 in x 4 ft 9½ in) in size, and other bulky items. Provision for building roller conveyors into floor. Main crew and passenger door at front of cabin on port side. Small emergency exit and servicing door at rear of cabin on starboard side.

SYSTEM: Air-conditioning system provides comfortable environment to altitude of 10,000 m (32,800 ft), and can also be used to refrigerate main cabin when perishable goods are carried.

AVIONICS AND EQUIPMENT: Large radome over navigation/weather radar in nose. Doppler-based automatic navigation system, with map display on flight deck.

DIMENSIONS, EXTERNAL:

Wing span 25.83 m (84 ft 9 in)
 Length overall 26.576 m (87 ft 2¼ in)
 Height overall 8.235 m (27 ft 0¼ in)

DIMENSIONS, INTERNAL:

Main cabin: Length 9.00 m (29 ft 6¼ in)
 Width at floor level 2.10 m (6 ft 10¾ in)
 Height 2.20 m (7 ft 2½ in)

WEIGHTS:

Max payload 7,500 kg (16,535 lb)
 Max T-O weight:
 from 1,000 m (3,280 ft) runway 26,500 kg (58,420 lb)
 from 1,200 m (3,935 ft) runway 30,500 kg (67,240 lb)

PERFORMANCE:

Max cruising speed 388 knots (720 km/h; 447 mph)
 T-O speed with light load 81 knots (150 km/h; 94 mph)
 T-O speed with heavier load 92 knots (170 km/h; 106 mph)
 Max operating height 11,000 m (36,100 ft)
 Normal operating height 8,000-10,000 m (26,250-32,800 ft)
 Range with max fuel, 30 min reserves 1,725 nm (3,200 km; 1,985 miles)
 Range with max payload, 30 min reserves 540 nm (1,000 km; 620 miles)

EMBRAER

EMPRESA BRASILEIRA DE AERONÁUTICA SA: Head Office and Works: Av Brig Faria Lima No. 2170, Caixa Postal 343, 12200 São José dos Campos, São Paulo State, Brazil

EMBRAER EMB-312

Brazilian Air Force designation: T-27

On 6 December 1978, EMBRAER received a contract from the Departamento de Pesquisas e Desenvolvimento (Department of Research and Development) of the Brazilian Air Force to develop and construct a new basic trainer for that service. Bearing the manufacturer's designation EMB-312 and the Brazilian Air Force designation T-27, it is expected to fly for the first time in August or September 1980. The initial contract is understood to cover one flying prototype and one static test airframe; a Ministry of Aeronautics source has said that about 100 production aircraft are expected to be ordered.

Characteristics of the EMB-312 will include high manoeuvrability, short take-off and landing, the ability to operate from unprepared runways, and a high degree of stability. Designed to meet the requirements of FAR Pt 23 Appendix A, it will be built using such modern techniques as integral machining by numerical control machinery, chemical milling, and metal-to-metal bonding.



Second prototype Antonov An-72 experimental twin-turboprop light STOL transport, on display at the Paris Air Show (J.M.G. Gradidge)

TYPE: Tandem two-seat basic trainer.

WINGS: Cantilever low-wing monoplane. Wing section NACA 632A-415 at centreline, NACA 63A-212 at tip. Dihedral 5° 30' at 30% chord. Incidence 1° 23' at centreline. Geometric twist 2° 12'. Sweepback 0° 43' 26" at quarter-chord. All-metal structure, with single-slotted trailing-edge flaps and constant-chord ailerons. No tabs.

FUSELAGE: Conventional all-metal semi-monocoque structure.

TAIL UNIT: Cantilever all-metal structure, with sweptback fin and balanced rudder. Non-swept horizontal surfaces, with trim tab in port elevator.

LANDING GEAR: Retractable tricycle type, with single wheel and oleo-pneumatic shock-absorber on each unit. Nose unit retracts rearward, main units inward into wings.

POWER PLANT: One 559 kW (750 shp) Pratt & Whitney Aircraft of Canada PT6A-25C turbo-prop engine, derated to 436 kW (585 shp) and driving a Hartzell three-blade constant-speed propeller. Max internal fuel capacity 727 litres (160 Imp gallons). Fuel system allows for up to 35 s of inverted flight.

ACCOMMODATION: Ejection seats for two persons in tandem under one-piece moulded canopy. Rear seat elevated. Baggage compartment in rear fuselage.

ARMAMENT: Provision for two ordnance attachment points under each wing, each stressed for a max load of 150 kg (330 lb). Typical loads, on MA-4A-22 pylons, include two MS10-21/22-10A machine-gun pods, each with 350 rds; four 25 lb MK-76 bombs; four 250 lb MK-81 general-purpose bombs; or four LM-37/7A or LM-70/7 launchers, each with nine rockets. Provision for RFR-01 fixed-reflex gunsight.

DIMENSIONS, EXTERNAL:

Wing span	11.09 m (36 ft 4½ in)
Wing chord at root	2.30 m (7 ft 6½ in)
Wing chord at tip	1.05 m (3 ft 5¼ in)
Wing mean aerodynamic chord	1.82 m (5 ft 11½ in)
Wing aspect ratio	6.44
Length overall	10.15 m (33 ft 3½ in)
Height overall	3.40 m (11 ft 1¾ in)
Fuselage: Max width	0.92 m (3 ft 0¼ in)
Tailplane span	4.30 m (14 ft 1¼ in)
Wheel track	3.66 m (12 ft 0 in)
Wheelbase	3.07 m (10 ft 0¾ in)
Propeller ground clearance (static)	0.25 m (9¾ in)

DIMENSIONS, INTERNAL:

Cockpits: Combined length	2.80 m (9 ft 2¼ in)
Max height	1.38 m (4 ft 6¼ in)
Max width	0.80 m (2 ft 7½ in)
Baggage compartment:	
Floor loading	650 kg/m² (133 lb/sq ft)
Volume	0.17 m³ (6.0 cu ft)

AREAS:

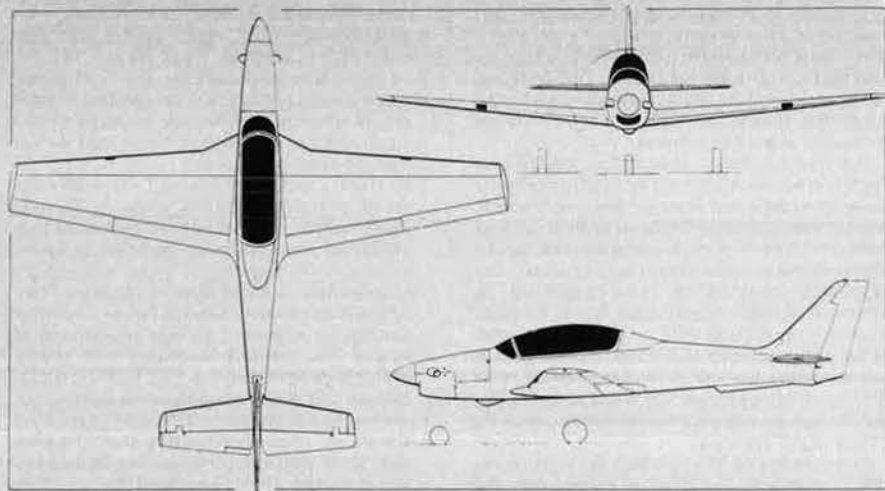
Wings, gross	19.00 m² (204.5 sq ft)
Ailerons (total)	1.75 m² (18.84 sq ft)
Trailing-edge flaps (total)	2.61 m² (28.09 sq ft)

WEIGHTS AND LOADINGS:

Weight empty	to be defined
Max internal fuel load	566 kg (1,247 lb)
Typical T-O weights with external load:	
four MK-76 bombs	2,179 kg (4,803 lb)
four LM-37/7A rocket launchers	2,222 kg (4,898 lb)
two machine-gun pods	2,288 kg (5,044 lb)
four MK-81 bombs or four LM-70/7 rocket launchers, reduced internal fuel	2,350 kg (5,180 lb)
Max T-O and landing weight	2,350 kg (5,180 lb)
Max wing loading	124.2 kg/m² (25.4 lb/sq ft)
Max power loading	5.39 kg/kW (8.86 lb/shp)

PERFORMANCE (estimated, 'clean' aircraft at max T-O weight, ISA, except where indicated):

Never-exceed speed	324 knots (600 km/h; 373 mph)
Max level speed at 4,000 m (13,125 ft)	247 knots (457 km/h; 284 mph)
Stalling speed, flaps up	75 knots (139 km/h; 86.5 mph)
Stalling speed, flaps down	67 knots (124 km/h; 77 mph)
Max rate of climb at S/L	648 m (2,125 ft)/min



EMBRAER EMB-312 tandem two-seat basic trainer, under development for the Brazilian Air Force as the T-27 (Pilot Press)

Service ceiling, A UW of 2,100 kg (4,629 lb)	9,940 m (32,600 ft)
T-O run at S/L	290 m (952 ft)
T-O to 15 m (50 ft)	510 m (1,674 ft)
Landing from 15 m (50 ft), A UW of 2,100 kg (4,629 lb)	505 m (1,657 ft)
Landing run at S/L, A UW of 2,100 kg (4,629 lb)	240 m (788 ft)
Range at long-range cruising speed at 4,570 m (15,000 ft), 30 min reserves	1,140 nm (2,112 km; 1,312 miles)
g limits (Aerobatic)	+ 6.0/- 3.0

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SOCIÉTÉ NATIONALE INDUSTRIELLE AÉROSPATIALE, Head Office: 37 boulevard de Montmorency, 75781 Paris Cédex 16, France

AÉROSPATIALE AS 332 SUPER PUMA

Design of this derivative of the SA 330 Puma was started in 1974, and the programme received a formal 'go-ahead' from the French government in June 1975. As a first stage, Aérospatiale retrofitted a Puma airframe with two Turboméca Makila turboshaft engines and an uprated transmission. This experimental helicopter, designated AS 331, flew for the first time on 5 September 1977. It was followed, on 13 September 1978, by the first flight of the prototype AS 332 Super Puma, embodying more extensive changes to provide increased payload and performance, simplified maintenance, reduced cabin noise level, reduced vulnerability to hostile fire in combat areas, and better crew survivability in a crash. Original plans to fit a 'fenestron' ducted tail rotor were dropped after evaluation of a 'fenestron' on the SA 330Z testbed (see 1976-77 *Jane's*, page 812) indicated no worthwhile performance gains.

Externally evident airframe changes compared with the SA 330 Puma include a lengthened nose; increased wheelbase and wheel track; a new landing gear with a single wheel on each of the main units, which offer an optional 'kneeling' capability to reduce overall dimensions for shipboard stowage; and an added ventral fin. The main and tail rotor blades have a new and more efficient profile.

There are two basic versions of the Super Puma: AS 332B. Military version. AS 332C. Civil version.

Each sub-type will be offered in standard form, accommodating up to 20 troops/17 civilian passengers, or with the cabin lengthened by 0.76 m (2 ft 6 in) to provide four more seats and two additional windows. All variants will offer all-weather flight capability, including operation in forecast icing conditions.

DGAC and FAA certification of the Super Puma is planned for late 1980, with deliveries beginning in 1981. To facilitate integration of the aircraft into existing fleets of Pumas (notably in French Army

service), Aérospatiale hopes to launch a programme under which SA 330 Pumas will be retrofitted with the engines, some dynamic components, and the composite-blade tail rotor of the Super Puma.

TYPE: Twin-turbine multi-role helicopter.

ROTOR SYSTEM: Four-blade main rotor, with a fully-articulated hub and integral rotor brake. Each drag hinge is fitted with an elastomeric frequency adaptor. The blade cuffs, equipped with horns, are connected by link-rods to the swashplate, which is actuated by three hydraulic twin-cylinder servo-control units. Each of the moulded blades is made up of a glassfibre roving spar and a composite glass and carbon fibre fabric skin, with Moltiprene filler. The leading-edge is covered with a titanium protective section. Attachment of the blades to their sleeve by means of two pins enables them to be folded back quickly by manual methods. The five-blade tail rotor has flapping hinges only, and is located on the starboard side of the tailboom. The rotors may be equipped with a de-icing system similar to that certificated for the Puma.

ROTOR DRIVE: Mechanical shaft and gear drive. Modular main gearbox is fitted with two torque meters and has two separate lubrication circuits. It is mounted on top of the cabin behind the engines, has two separate inputs from the engines and five reduction stages. The first stage drives, from each engine, an intermediate shaft directly driving the alternator and indirectly driving the two hydraulic pumps, with a further shaft drive to the ventilation fan. At the second stage the action of the two units becomes synchronised on a single main driveshaft by means of freewheeling spur gears. If one or both engines are stopped, this enables the drive gears to be rotated by the remaining turbine or the autorotating rotor, thus maintaining drive to the ancillary systems when the engines are stopped. Drive to the tail rotor is via shafting and an intermediate angle gearbox, terminating at a right-angle tail rotor gearbox. Turbine output 23,840 rpm, main rotor shaft 265 rpm. Tail rotor shaft 1,278 rpm. The hydraulically-controlled rotor brake, installed on the main gearbox, permits stopping of the rotor 15 s after engine shutdown.

FUSELAGE: Conventional all-metal semi-monocoque structure, embodying anti-crash features. Local use of titanium alloy under engine installation, which is outside the main fuselage shell. Monocoque tailboom supports the tail rotor on the starboard side and a horizontal stabiliser with fixed leading-edge slat on the port side. Optional folding tailboom for aircraft that will serve on ships such as frigates.

LANDING GEAR: Retractable tricycle type, of Messier-Hispano-Bugatti high energy-absorbing design. All units retract rearward hydraulically, main wheels into fairings on sides of fuselage. Dual-chamber oleo-pneumatic shock-absorbers.



Let L-410UVP twin-turboprop light transport, which is to be built at the rate of about 100 a year for Aeroflot (J.M.G. Gradidge)

27 turboprop engines, flew for the first time on 16 April 1969. Three additional PT6A-engined prototypes were completed subsequently; the second of these was later test-flown with Hartzell four-blade propellers in a successful attempt to reduce aircraft vibration and cabin noise levels.

By the end of 1978 about 140 Turbolets had been built, about 30 of these being L-410As with PT6A engines, the remainder having Czechoslovak power plants.

Since the beginning of 1979 the standard production model has been the 'stretched' and improved L-410UVP. This is being manufactured in large numbers, and will become standard Aeroflot equipment on Soviet internal feederline services, in company with the PZL-Mielec (Antonov) An-28. Stringent Aeroflot requirements included the ability to operate in temperatures ranging from -50°C to $+45^{\circ}\text{C}$; systems were required to be survivable in temperatures as low as -60°C .

Production of the L-410UVP is planned to reach about 100 a year, most of them for Aeroflot.

The following versions of the L-410 have been announced:

L-410A. Initial passenger/cargo production version, powered by 533 kW (715 ehp) Pratt & Whitney Aircraft of Canada PT6A-27 engines. Entered service with Czechoslovak operator Slov-Air in late 1971. Total of 31 built. Described in 1978-79 and earlier editions of *Jane's*.

L-410AF. Aerial photography/survey version, generally similar to L-410A but with larger, wider, and extensively glazed nose compartment. One exported to Hungary in 1974. Other details in 1978-79 and earlier editions of *Jane's*.

L-410M. Similar to L-410A, but with Motorlet M 601 A engines and seats for up to 17 passengers. First flown 1973; first production example delivered 1976. Total of 110 built. Superseded in 1979 by L-410UVP. Full description in 1978-79 *Jane's*.

L-410UVP. Standard production version from beginning of 1979, prototype having first flown in 1977. Changes include increased wing span and area; lengthened fuselage; enlarged vertical tail surfaces; dihedral tailplane; improved cockpit systems and additions to standard instrumentation; introduction of spoilers, automatic pitch trim, automatic propeller feathering, and anti-skid system for main landing gear units; fabric-covered elevators and rudder; and later-model M 601 engines and V 508

propellers. Basic version is for passenger transportation, but cabin can be converted easily to all-cargo, aeromedical, parachutist, or firefighting configuration; aircraft can also be equipped for aerial photography or calibration of ground navigation aids. The L-410UVP can operate from grass, sand, and gravel strips as well as from paved runways, and in snow and ice conditions.

The following description applies to the L-410UVP:

TYPE: Twin-turboprop general-purpose light transport.

WINGS: Cantilever high-wing monoplane. Wing section NACA 63A418 at root, NACA 63A412 at tip. Dihedral $1^{\circ}45'$. Incidence 2° at root, $-0^{\circ}30'$ at tip. No sweepback at front spar. Conventional all-metal two-spar torsion-box structure, attached to fuselage by four-point mountings. Chemically machined skin with longitudinal reinforcement. Hydraulically actuated double-slotted metal flaps, with both slots variable. Spoiler forward of each flap. All-metal ailerons, forward of which are 'pop-up' pitch trim surfaces that come into operation automatically during single-engine operation and decrease the lift on the side of the running engine. Kléber-Colombes pneumatic de-icing of leading-edges.

FUSELAGE: Conventional all-metal semi-monocoque spot-welded and riveted structure, built in three main portions.

TAIL UNIT: Conventional cantilever structure, of all-metal construction except for elevators and rudder, which are fabric-covered. Sweptback vertical tail surfaces, with small dorsal fin and ventral fin. One-piece tailplane, with 7° dihedral from roots, mounted part-way up fin. Balance tab in rudder and each elevator. Kléber-Colombes pneumatic de-icing of leading-edges.

LANDING GEAR: Retractable tricycle type, with single wheel on each unit. Hydraulic retraction, nosewheel forward, main wheels inward to lie flat in fairing on each side of fuselage. Technometra Radotin oleo-pneumatic shock-absorbers. Non-braking nosewheel, with servo-assisted steering, fitted with 548×221 mm (9.00-6) tubeless tyre, pressure 2.74 bars (39.8 lb/sq in). Main wheels fitted with 718×306 mm (12.50-10) tubeless tyres, pressure 3.14 bars (45.5 lb/sq in). All wheels manufactured by Moravan Otrokovice, tyres by Rudy Rijen, Gottwaldow. Moravan Otrokovice

hydraulic disc brakes, parking brake, and anti-skid units on main wheels. Metal ski landing gear, with plastics undersurface, optional.

POWER PLANT: Two 544 kW (730 ehp) Walter M 601 B turboprop engines, each driving an Avia V 508 B three-blade reversible-pitch fully-feathering metal propeller. De-icing for propeller blades (electrical) and lower intakes; anti-icing flaps inside each nacelle. Six (optionally eight) bag-type fuel tanks in wings, with total capacity (eight tanks) of 1,300 litres (286 Imp gallons). Four refuelling points above wings, with provision for two extra points when all eight tanks are fitted. Usable oil capacity 5.6 litres (1.25 Imp gallons) per engine.

ACCOMMODATION: Crew of one or two on flight deck. Dual controls standard. Standard accommodation in main cabin for 15 passengers, with pairs of adjustable seats on starboard side of aisle and single seats opposite, all at 76 cm (30 in) pitch. Baggage compartment (at rear, accessible from cabin), toilet, and wardrobe standard in this version. Cabin heated by engine bleed air. Alternative layouts include all-cargo; ambulance, accommodating six stretchers, five sitting patients, and a medical attendant; accommodation for 14 parachutists and a despatcher/instructor; firefighting configuration, carrying 12 firefighters and a pilot/observer. All-cargo version has protective floor covering, crash nets on each side of cabin, and tie-down provisions; floor is at truck-bed height. Aircraft can also be equipped for aerial photography or for calibration of ground navigation aids. Double upward-opening doors aft on port side, with stowable steps; right hand door serves as passenger entrance and exit. Both doors open for cargo loading, and can be removed for paratroop training missions. Downward-opening crew door, forward on starboard side, serves also as emergency exit.

SYSTEMS: No APU, air-conditioning, or pressurisation systems. Duplicated hydraulic systems, No. 1 system actuating landing gear, flaps, spoilers, automatic pitch trim surfaces, main-wheel brakes, nosewheel steering, and windscreen wipers. No. 2 system for emergency landing gear extension, flap actuation, and parking brake. Electrical system includes AC power from three three-phase 36V 400Hz rotary inverters and two single-phase 115V 400Hz inverters, guaranteeing

against a loss of power for essential instruments; DC power from two 5.6kW generators and two 25Ah batteries.

AVIONICS AND EQUIPMENT: Standard instrumentation provides for flight in IMC conditions, with all basic instruments duplicated and three artificial horizons. Communications include two VHF with a range of 65 nm (120 km; 75 miles) at 1,000 m (3,280 ft) altitude, and crew intercom. Standard navigation instruments include artificial horizons (three); barometric altimeters, airspeed indicators, rate of climb indicators, turn indicators, RMIs, gyro-compasses, ILS, and ARK-15M ADF with range of 97 nm (180 km; 112 miles) at 1,000 m (3,280 ft) altitude (two of each); and radio altimeter with ground proximity warning, ASI with stall warning, magnetic compass, GMK-IGE VOR, and ILS with marker beacon (one of each). Cockpit, instrument, and passenger cabin lights, navigation lights, three landing lights in nose (each with two levels of light intensity), crew and cabin fire extinguishers, windscreen wipers, and alcohol spray for windscreen and wiper de-icing, are also standard.

DIMENSIONS, EXTERNAL:

Wing span	19.488 m (63 ft 11¼ in)
Wing chord at root	2.534 m (8 ft 3¾ in)
Length overall	14.467 m (47 ft 5½ in)
Height overall	5.829 m (19 ft 1½ in)
Wheel track	3.65 m (11 ft 11½ in)
Propeller diameter	2.50 m (8 ft 2½ in)
Passenger/cargo door (port, aft):	
Height	1.30 m (4 ft 3¼ in)
Width overall	1.25 m (4 ft 1¼ in)
Width (passenger door only)	
Height to sill	0.75 m (2 ft 5½ in)
Height to sill	0.80 m (2 ft 7½ in)
Crew door/emergency exit door (stbd, fwd):	
Height	1.05 m (3 ft 5¼ in)
Width	0.66 m (2 ft 2 in)
Height to sill	0.80 m (2 ft 7½ in)

DIMENSIONS, INTERNAL:

Cabin, excl flight deck:	
Length	6.25 m (20 ft 6 in)
Max width	1.92 m (6 ft 3½ in)
Max height	1.658 m (5 ft 5¼ in)
Floor area	9.69 m ² (104.3 sq ft)
Volume	17.86 m ³ (630.7 cu ft)
Baggage compartment volume (rear)	0.77 m ³ (27.2 cu ft)

WEIGHTS:

Basic weight empty	3,700 kg (8,157 lb)
Max fuel	1,000 kg (2,205 lb)
Max payload	1,310 kg (2,888 lb)
Max T-O weight	5,700 kg (12,566 lb)
Max landing weight	5,500 kg (12,125 lb)

PERFORMANCE (at max T-O weight, ISA):

Max cruising speed	197 knots (365 km/h; 227 mph)
Econ cruising speed	162 knots (300 km/h; 186 mph)
Service ceiling, one engine out	
tested	2,850 m (9,350 ft)
estimated	3,810 m (12,500 ft)
T-O run	400 m (1,312 ft)
Landing run	250 m (820 ft)
Max range at max cruising speed at 3,000 m (9,850 ft), 30 min reserves	561 nm (1,040 km; 646 miles)

laboration with Aerosport, he introduced a number of modifications into the new Scamp B version, and the first example made its initial flight on 27 May 1977.

This was the basic aircraft, in which the major changes included a slight increase in wing span, the provision of ailerons on the lower as well as the upper wings, and a different power plant. No agricultural equipment was installed at that time; this was designed subsequently by Sr Tedesco, and consists primarily of an underfuselage glassfibre chemical tank, wind-driven pressure pump, spraybars, and nozzles. The entire installation weighs only 17 kg (38 lb). A T-type hydraulic valve system forces the ultra-low-volume liquid chemical into the spraybars at a pressure of 5.52 bars (80 lb/sq in), and it is discharged through the nozzles at 4.14 bars (60 lb/sq in). The tank is fitted with a quick-release trapdoor, and the entire chemical load can be jettisoned in 2 s in an emergency. If required for cross-country journeys, the tank can be used to carry auxiliary fuel instead of chemicals.

The Scamp B is now being produced by Agricopteros by the assembly of kits supplied by Aerosport. **TYPE:** Single-seat Restricted category (export) agricultural light aircraft.

WINGS: Braced biplane structure, with V-type interplane strut each side. Flying and landing wires of streamline section. Single 5 × 12.5 cm (2 × 5 in) extruded section of 6063-T3 light alloy tubing forms a pylon to support the centre-section of the upper wing. Wing section NACA 23012. Dihedral 3° on lower wings only. All-metal light alloy tubular front and main spars. Light alloy plain ailerons, with piano hinge at upper surface, on upper and lower wings. Lower ailerons actuated by slaved push/pull tube connected to upper pair. No flaps or tabs.

FUSELAGE: All-metal light alloy semi-monocoque structure.

TAIL UNIT: Braced T-tail of light alloy construction. Single bracing strut each side. Fixed-incidence tailplane. Ground-adjustable trim tab on rudder.

LANDING GEAR: Non-retractable tricycle type. Cantilever spring main-gear struts of light alloy. Wheel fairing optional for each unit.

POWER PLANT: One 74.5 kW (100 hp) Revmaster 2,100 cc modified Volkswagen engine, driving an Aerial 56-38 two-blade fixed-pitch wooden propeller. Fuel tank in fuselage nose, aft of firewall, capacity 30.3 litres (6.7 Imp gallons). Refuelling point on fuselage upper surface, forward of windscreen.

ACCOMMODATION: Single seat in open cockpit.

EQUIPMENT: Underfuselage tank for ultra-low-

volume chemical, capacity 59.8 litres (13.2 Imp gallons).

DIMENSIONS, EXTERNAL:

Wing span	5.94 m (19 ft 6 in)
Wing chord, constant	0.91 m (3 ft 0 in)
Wing area, gross	10.82 m ² (116.5 sq ft)
Length overall	4.37 m (14 ft 4 in)
Height overall	1.73 m (5 ft 8 in)
Tailplane span	1.98 m (6 ft 6 in)
Wheel track	1.52 m (5 ft 0 in)
Wheelbase	1.22 m (4 ft 0 in)
Propeller diameter	1.42 m (4 ft 8 in)

WEIGHTS:

Weight empty	259 kg (572 lb)
Normal T-O weight	360 kg (795 lb)
Max T-O weight with chemicals	428 kg (945 lb)

PERFORMANCE:

Never-exceed speed	100 knots (185 km/h; 115 mph)
Max level speed	82 knots (153 km/h; 95 mph)
Cruising speed	76 knots (140 km/h; 87 mph)
Max manoeuvring speed	
72 knots (134 km/h; 83 mph)	
Stalling speed	43.5 knots (81 km/h; 50 mph)
Service ceiling:	
tested	2,590 m (8,500 ft)
estimated	3,810 m (12,500 ft)
T-O run	122 m (400 ft)
Landing run	152 m (500 ft)
Range at cruising speed	
130 nm (241 km; 150 miles)	
Max range with auxiliary fuel in underfuselage tank	477 nm (885 km; 550 miles)
Max endurance with auxiliary fuel in underfuselage tank	6 h 45 min
Swath width	8.5 m (28 ft)

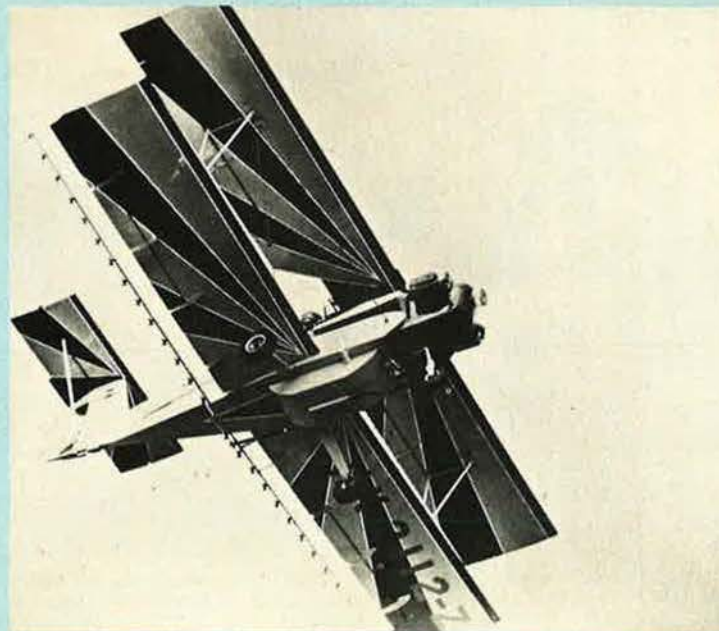
CAPRONI VIZZOLA

CAPRONI VIZZOLA COSTRUZIONI AERONAUTICHE SpA; Head Office: Via Durini 24, 20122 Milan, Italy

CAPRONI VIZZOLA C22J

The C22J is a two-seat lightweight training aircraft, developed by Caproni Vizzola as a private venture. Its configuration bears a close resemblance to that of the company's A-21J Calif jet-powered sailplane: construction is largely of metal, with the forward fuselage skin, some fairings, and other unstressed areas of glassfibre.

Intended primarily for student pilot screening, basic, and proficiency training, the C22J is also suitable for ECM evaluation, ground and air navaid calibration, ecological survey, and high-speed



Agricopteros Scamp Model B cropsprayer, based on a US homebuilt biplane

AGRICOPTEROS

AGRICOPTEROS LTDA; Address: Cali, Colombia

This company, which undertakes crop-spraying operations in Colombia, is assembling kits of a modified agricultural version of the Aerosport Scamp (see under USA in the Homebuilt Aircraft section of the current edition of *Jane's*).

AGRICOPTEROS (AEROSPORT) SCAMP MODEL B

Following a visit to the USA in 1976, Eng Maximo Tedesco, the President of Agricopteros Ltda, ordered two kits of the Aerosport Scamp homebuilt biplane, with a view to the possible adaptation of this aircraft for agricultural duties. In col-

liaison. It can be converted easily for photographic survey duties, or as an RPV.

A prototype was nearing completion in June 1979; first flight was scheduled to take place before the end of 1979.

TYPE: Two-seat basic training aircraft.

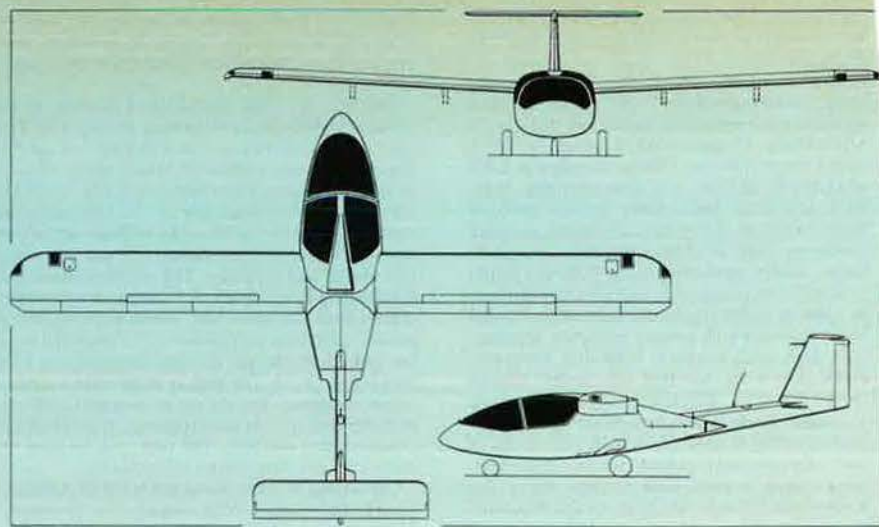
WINGS: Cantilever shoulder-wing monoplane. Constant-chord wings, of Wortmann FX-67K-170 laminar-flow section. Single-spar structure, with aluminium alloy skin. Electrically-actuated trailing-edge flaps can be set in any position throughout their full range of movement, to ensure optimum setting for T-O, landing, low- or high-speed flight. Flaps operate in conjunction with the opening of the airbrakes/spoilers, of which there is one in the upper surface of each wing, forward of the flap. Airbrakes are opened manually, but move with the flaps to provide balanced control. Ailerons are aerodynamically balanced, and can be operated differentially and drooped to provide additional flap area. All movable surfaces are of extruded aluminium alloy, and are operated by push/pull rods. No tabs.

FUSELAGE: Tadpole-shaped structure, designed as a laminar lifting body. Primary load-bearing structure is of light alloy, forward portion having a moulded glassfibre skin. NACA-type flush engine air inlet on top of fuselage, aft of cockpits. Tailboom is of light alloy, with undersurface skin of glassfibre.

TAIL UNIT: Cantilever T tail, tailplane being of all-metal semi-monocoque construction. Full-span balanced elevator is a chemically milled extrusion, and is fitted with electrically actuated spring trim. All-metal two-spar semi-monocoque fin, bolted to tailboom. All control surfaces operated by push/pull rods. No tabs. Rudder pedals adjustable in flight.

LANDING GEAR: Retractable tricycle type, actuated electrically with manual backup. Cantilever spring steel main legs. Independent hydraulic brakes on main wheels. Steerable nosewheel, linked to rudder pedals. Safety lock for up and down positions. Electrical warning system.

POWER PLANT: Two KHD T 317 turbojet engines, each rated at 1.08 kN (242.5 lb st), mounted side by side in fuselage aft of cockpits. Production version may be fitted with Microturbo TRS 18 turbojets. Integral fuel tank in each wing, combined capacity 250 litres (55 Imp gallons). Fuel system incorporates fuselage collector tank



Three-view drawing of the Caproni Vizzola C22J basic jet trainer, scheduled to fly before the end of this year (*Pilot Press*)

which permits up to 30 s of inverted flight. Provision for two underwing auxiliary fuel tanks, each of 112 litres (24.5 Imp gallons) capacity.

ACCOMMODATION: Seats for two persons side by side under jettisonable canopy which is hinged at rear and opens upward. Seats are semi-supine. Dual flying controls. Single instrument panel and centre console, eliminating need for dual instruments and avionics. Rearview mirror for each occupant.

SYSTEMS: Hydraulic system for main-wheel brakes only. No pneumatic system. Electrical system is 28V DC, incorporating a starter/generator and a 24V 18Ah lead-acid battery. Cockpit ventilation and defrosting by heat exchangers on jetpipes. Demand-type low-pressure oxygen system for each occupant.

AVIONICS AND EQUIPMENT: Avionics bay in top of fuselage, aft of cockpits. Navigation, landing, and anti-collision lights standard.

ARMAMENT: Provision for two or four standard NATO underwing pylons, for a wide range of stores (max external load 200 kg; 440 lb) for gun-

ner/weapon training, photographic reconnaissance, and target-towing missions. Typical loads include one auxiliary fuel tank and one three-camera pod; two auxiliary fuel tanks; two 7.62 mm gun pods and 500 rds of ammunition; two Simprex AL-18-50 pods with eighteen 2 in rockets; four SAMP EU70 50 kg general-purpose bombs; four Mk 70 11 kg or M38-A2 50 kg practice bombs; or two Dornier DATS 150 kg towed targets.

DIMENSIONS, EXTERNAL:

Wing span	10.00 m (32 ft 9 3/4 in)
Wing area, gross	8.75 m ² (94.18 sq ft)
Wing aspect ratio	11.42
Length overall	6.188 m (20 ft 3 1/2 in)
Height overall	1.88 m (6 ft 2 in)

WEIGHTS AND LOADINGS:

Weight empty	510 kg (1,124 lb)
Max T-O weight:	
'clean'	900 kg (1,984 lb)
with external stores	1,100 kg (2,425 lb)
Max wing loading:	
'clean'	102.8 kg/m ² (21.06 lb/sq ft)
with external stores	125.7 kg/m ² (25.76 lb/sq ft)

PERFORMANCE (estimated, at max 'clean' T-O weight):

Max permissible diving speed	377 knots (700 km/h; 435 mph) EAS
Max level speed at 2,500 m (8,200 ft)	286 knots (530 km/h; 329 mph)
Max cruising speed:	
at S/L	251 knots (465 km/h; 289 mph)
at 5,000 m (16,400 ft)	254 knots (470 km/h; 292 mph)
Max design manoeuvring speed	218 knots (405 km/h; 252 mph) EAS
Max design speed with airbrakes fully deployed	178 knots (330 km/h; 205 mph) EAS
Econ cruising speed at 3,000 m (9,845 ft)	162 knots (300 km/h; 186 mph)
Max landing gear extension speed	108 knots (200 km/h; 124 mph) EAS
Design stalling speed, flaps down, power off	65 knots (120 km/h; 75 mph) EAS
Max rate of climb:	
at S/L	552 m (1,810 ft)/min
at 3,000 m (9,845 ft)	384 m (1,260 ft)/min
at 6,000 m (19,685 ft)	216 m (708 ft)/min
Time to climb to 5,000 m (16,400 ft)	12 min
Service ceiling	9,000 m (29,525 ft)
T-O run at S/L, ISA, zero wind	350 m (1,150 ft)
T-O to 15 m (50 ft), conditions as above	550 m (1,805 ft)
T-O to 15 m (50 ft) at 1,500 m (4,920 ft), ISA, zero wind	800 m (2,625 ft)
Max range on internal fuel, 10% reserves	572 nm (1,060 km; 658 miles)
Max endurance	3 h 18 min
g limits	+ 7.0/-3.5



Offered as a light combat helicopter capable of operating on 'starry nights', the Aerospatiale SA 361H/HCL now has its eight Hot anti-tank missiles supplemented by a nose-mounted FLIR (forward looking infra-red) pod (*Brian M. Service*)

Is Litton's F3 Std INS superior?

YES.



Performance

In the A-10 aircraft, Litton's LN-39 STD INS consistently exceeds navigation requirements flight after flight. And multiple firings of the GAU-8 cannon have no adverse effect on Litton's STD INS whatsoever.

Commonality

Lower cost results from utilization of the many advantages and benefits of Litton's broad production base. Specifically, our STD INS inertial platform, directly derived from a successful series of INS platforms in production for F-5, F-15, F-4, F-18 aircraft and U.S. Cruise Missile, can share in key inertial instrument and electronic component production. Clearly, STD INS can benefit immediately from Litton's assembly lines and assets already being in place and in motion.

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We combine our system's outstanding performance with high reliability, optimized producibility and on-schedule deliveries. The results are superior low life-cycle cost. Litton's STD INS will directly benefit from Litton's broad experience--over 15,000 sophisticated INS produced for high-performance aircraft.

**Litton's LN-39 STD INS.
Superior.**



Litton LN-39 Standard INS

Is the Soviet approach to détente a tactic designed to help the USSR gain military superiority or a policy of genuine cooperation in a search for peace and stability? An answer may lie in the Soviet Union's vast program of military-patriotic education for its youth.

The Other Side of Détente

BY STANLEY H. KOBER

THERE is no more important US foreign policy issue than American relations with the Soviet Union. Détente, the supposedly reciprocal process of lowering tensions between the two superpowers, has been a keystone of that policy for the better part of a decade—and the subject of passionate debate.

Critics of détente claim that it is a one-way street leading to Soviet military superiority, while advocates call it the only way to limit the arms race and prevent a nuclear war. This difference, however, is not the fundamental point of contention, but simply a derivative of it. Ultimately, the issue dividing the pro- and antidétente camps is their divergent assessments of the nature and objectives of the present Soviet leadership.

The critics feel that the Soviets see détente as a tactic designed to fool the West and that it represents no meaningful change of heart; the advocates, on the other hand, believe the critics are living in the past and that Soviet policy under Brezhnev is a positive development that should be encouraged.

Soviet leadership has, in fact, taken pains to revise its image in the West. In a speech at the Karlovy Vary conference of European Communist Parties in 1967, Brezhnev revealed the reason behind his forthcoming support of détente.

... the situation of "cold war" and the confrontation of military blocs, the atmosphere of military threats, seriously hinder the functioning of the revolutionary, democratic forces. In the bourgeois countries in a situation of international tension reactionary elements become active, the military clique raises its head, and antidemocratic trends and anticommunism in general are intensified.

Conversely, recent years have demonstrated particularly clearly that in a situation of reduced international tension the needle of the political barometer shifts to the left.

Unlike Khrushchev, Brezhnev does not make violent threats about Berlin or bang his shoe on the table at the United Nations. All that had done was convince Western

public opinion of the reality of the Red menace. Nor does he brag about alleged Soviet military superiority. Khrushchev's boasting about Soviet missile superiority had only provoked the United States into producing missiles at a rate that left the Soviet Union far behind. On the contrary, Brezhnev cultivates the appearance of a man of peace in an attempt to convince the West that its cold-war image of the Soviet Union is mistaken.

This policy of Westpolitik initially met with considerable success—the SALT agreements in 1972, Brezhnev's visit to the US in 1973. Recently it has encountered growing difficulty, primarily because of burgeoning Soviet military power that has led more and more people to question Soviet purposes in détente. The Soviets, in response, claim the United States is responsible for the arms race and the USSR is only taking prudent defensive measures. The Soviet Union, Brezhnev assures the West, is a peaceful state whose intentions "can . . . be assessed by the entire moral and political atmosphere in which the Soviet people live and are being brought up. Alien to this atmosphere is the propaganda of militarization, appeals to prepare for war, the buildup of mistrust and hostility to other nations." (Tass, May 2, 1978.)

This, then, is the central issue of détente: Is Brezhnev telling the truth? Is the propaganda of militarization alien to Soviet society? If the answer is "no," one must conclude that the Soviet policy of détente is a stratagem designed to deceive the West. The real purpose of that policy must be judged by the standard Brezhnev himself has set.

The Quest for Ideological Purity

In March 1966, Brezhnev informed the 23d Congress of the Communist Party of the Soviet Union that "it is necessary . . . to improve military-patriotic work among the workers, especially the youth." These few words, buried in the massive report of the Central Committee to the Party Congress, attracted little attention in the West, but they soon led to a significant change in Soviet life. Less than two months later, the Central Committee and the USSR Council of Ministers adopted a resolution designed to improve the work of DOSAAF (the Voluntary Society for Assistance to the Army, Air Force, and Fleet), a paramilitary organization. The reso-

tion criticized the quality of work being conducted among the population by DOSAAF and demanded that it improve its performance.

The following year, the Supreme Soviet passed the Law on Universal Military Service, reaffirming the obligation of every capable Soviet male to serve in the armed forces, and introducing a new requirement that Soviet youth undergo military training *before* their induction. This mandatory program of introductory military training was to be conducted at schools and work establishments, which would have to make the necessary facilities available.

The new law was not without precedent. On September 1, 1939, the day the war began in Europe, the Soviet government had adopted a law on universal military responsibility that also had included provisions for introductory military training of pre-draft youth. At that time, training clearly was prompted by the threat of a German attack. After the war, however, compulsory participation in this program ended.

Why did Soviet leadership reinstate compulsory introductory military training in 1967? First, the 1967 Law on Universal Military Service reduced the period of military service by one year, evidently under the pressure of economic requirements, at a time when military equipment was becoming more complex technically. By transferring the basics of military training to a preinduction program, more time would be available for training conscripts in the use of equipment once they were called up.

Second, the Soviet leadership has worried, during the post-World War II period, that its youth is becoming ideologically soft. This problem was compounded by détente, which Soviet leaders fear may soften the image of the "aggressive imperialists" in the minds of Soviet citizens, youth in particular. A 1978 article on Soviet youth in the authoritative journal *Kommunist* (Number 11) states "the broad peace offensive that our Party and country are conducting demands all-round strengthening of ideological training and active opposition to bourgeois ideology." Military-patriotic education is a key element of this ideological training.

Military Indoctrination

As the name implies, military-patriotic education can

be divided into two parts. The first, military training, is designed to raise Soviet children to a certain standard of physical fitness, acquaint them with the use of some weapons, accustom them to military life and discipline, and teach them basic combat tasks and a military specialty such as radio operator or truck driver. Much of this training is conducted in elementary and secondary schools as an integral part of the academic program and extracurricular activities. Under the 1967 Law on Universal Military Service, military instructors are assigned to the schools as regular faculty members. A growing number of schools provides special facilities like firing ranges.

Besides the 140 hours of introductory military training, an additional eighty hours have been required for physical training since 1972. To assure that inductees will be capable of meeting the physical requirements of military life, the Soviets have developed the concept of military-technical sports. "Our responsibility," said A. L. Getman, the chairman of DOSAAF in 1967, "is . . . to considerably strengthen the military applications of each type of sport. DOSAAF athletes must not only be skilled in a particular sport, but they must be able to skillfully employ that sport in combat." All Soviet children are encouraged to meet the physical-fitness standards required for award of the badges "Ready to Defend the Motherland" and "Ready for Labor and Defense," which have been specially designed to have military applicability.

In addition to instruction during the school year, military training for Soviet children is conducted during the summer in military-sports camps and through participation in mass war games. The idea of militarizing summer vacation gained support in the mid-1960s as part of the general intensification of military-patriotic activity. Since then, summer military training has become an integral part of the life of Soviet children, for training in the camps can more closely conform to army life. In Getman's words: "Life in the camp is arranged to conform to Army routine. This instills the elements of military discipline in the future soldiers."

Supplementing instruction at school and camp are two separate mass war-game programs for children. The first, *Zarnitsa* (Summer Lightning), began in 1967. De-

“ . . . the most alarming aspect of Soviet military-patriotic education . . . is the Soviet belief that patriotic instruction must inspire . . . hate for its enemies.”

signed for children in grades five through eight, it is intended to prepare them for the formal course of introductory military training, conducted in grades nine and ten. According to *Military Knowledge* (Number 7, 1970), in *Zarnitsa* "the young soldiers study the fundamentals of military affairs, become familiar with the history of the Soviet Armed Forces, take hikes to battlefields, master rifle firing and the fundamentals of civil defense, and participate in winter and summer military games in the locale." *Kazakhstanskaya pravda* of February 18, 1971, reported that "at many schools this game is played under the guidance of officers, with real combat equipment."

Zarnitsa games are complemented by *Orlenok* (Eaglet) games begun in 1972, for children in grades nine and ten. The *Orlenok* games are more realistic and rigorous than *Zarnitsa*, including such demanding exercises as running through a tunnel that has been set on fire, crossing barbed-wire obstacles, and swimming while carrying a Kalashnikov rifle. More than 16,000,000 children participate each year in *Zarnitsa* and about 8,000,000 in *Orlenok*.

Political Indoctrination

Besides military training, military-patriotic education includes intensive political indoctrination. This is deemed necessary because the West is alleged to be engaged in "ideological subversion" against the Soviet Union. "They are trying to poison the minds of our people, especially young people," thundered Getman in 1966, "with ideas of pacifism and abstract humanism."

Major responsibility for political indoctrination falls on the schools. Unlike purely military training, however, patriotic instruction is not the responsibility of military instructors alone, but of every teacher. Indeed, it is considered the *primary* obligation of all Soviet teachers. As one teacher has put it in *Soviet Patriot* of January 26, 1966: "In preparing the youth for life, we teachers must not only give them a firm understanding of the general disciplines; we must, first of all, promote their ideological tempering." This obligation exists regardless of the subject being taught or the age of the student, for according to L. Balyasnaya, then Deputy Minister of Education of the Russian Republic, "the system envisages purposeful preparation of students for defense of the homeland starting with the first days of their presence at the school in accordance with the peculiarities of their age group." (*Education of Schoolchildren*, November 6, 1971.) The introduction of military-patriotic and civil defense training in the very early primary grades apparently has met with some resistance from teachers and parents, but there is no indication that the Soviet government is retreating.

Probably the most alarming aspect of Soviet military-patriotic education, however, is the Soviet belief that patriotic instruction must inspire not only feelings of love for the Soviet Union, but also of hate for its enemies. According to *Red Banner Defense*, published by DOSAAF in 1975 and edited by Marshal A. I. Pokryshkin, the present head of DOSAAF, this campaign of hatred is necessary because "the education of love for the socialist Motherland is inseparable from the education of burning hatred for its class enemies—the imperialists." A DOSAAF text published in 1977 states that "the Communist Party assigns great importance to the

education in every Soviet person of a feeling of class hatred for the enemies of communism, for the imperialist aggressors."

Soviet publicists have to demonstrate that the West deserves to be hated. The United States, in particular, is depicted as an aggressively militaristic country: "From early childhood the youth of the USA are brought up in a warlike spirit, in a spirit of hatred and suspicion of people," claims *The Soldier and War: Problems of the Moral-Political and Psychological Preparation of Soviet Fighting Men*, published by the Military Publishing House in 1971. "The school, the church, educational institutions, clubs, all kinds of youth organizations—all of this in the final analysis is also directed toward preparing hired killers from the young people."

The Ultimate Issue

How effective is this vast program of military-patriotic education? This is an extremely difficult question to answer: Westerners are not invited to observe the *Zarnitsa* or *Orlenok* games, nor are they permitted to take public-opinion polls. Judgments are necessarily impressionistic. From complaints in Soviet publications, one can determine that the program has had problems: Some instructors, particularly in the early grades, have not taken their duties very seriously; some schools have not provided enough equipment or facilities; some children have been so affected by all the talk of war and death that they reportedly have begun to develop pacifist attitudes, much to the chagrin of Soviet officials. Nevertheless, it would be a mistake to exaggerate such difficulties. The program began only in the mid-1960s and is bound to have growing pains, particularly in view of its vast scale.

Some of the complaints themselves offer only cold comfort: It is hardly reassuring to read about an instructor who is exasperated because he does not have a machine gun in his classroom, or to see a school criticized because its pupils do not know how to assemble a sub-machine gun. That these things are considered deficiencies testifies to the seriousness with which the Soviet government is pursuing this program.

Ultimately, questions about the effectiveness of Soviet military-patriotic education are beside the point. The point is simply that, in a period of détente, the program exists, despite Brezhnev's solemn assurances that no such program could exist. The larger question, therefore, must be what military-patriotic education tells us of Soviet purposes in détente. It is difficult to avoid the conclusion that the USSR has been pursuing two separate policies: an open one designed to fool people in the West who want to believe that the cold war is over, and another, hidden, policy that reflects the Soviet Union's true intentions. Anyone who concludes otherwise must be prepared to demonstrate how military-patriotic education, with its glorification of things military and its campaign of hatred, can be reconciled with Brezhnev's assurances that the USSR seeks, through détente, only peace and stability as those terms are understood in the non-Communist world.

Stanley H. Kober is a Washington-based consultant on Soviet and strategic affairs. He holds a doctorate from the Fletcher School of Law and Diplomacy, Tufts University, where he wrote his dissertation on détente.

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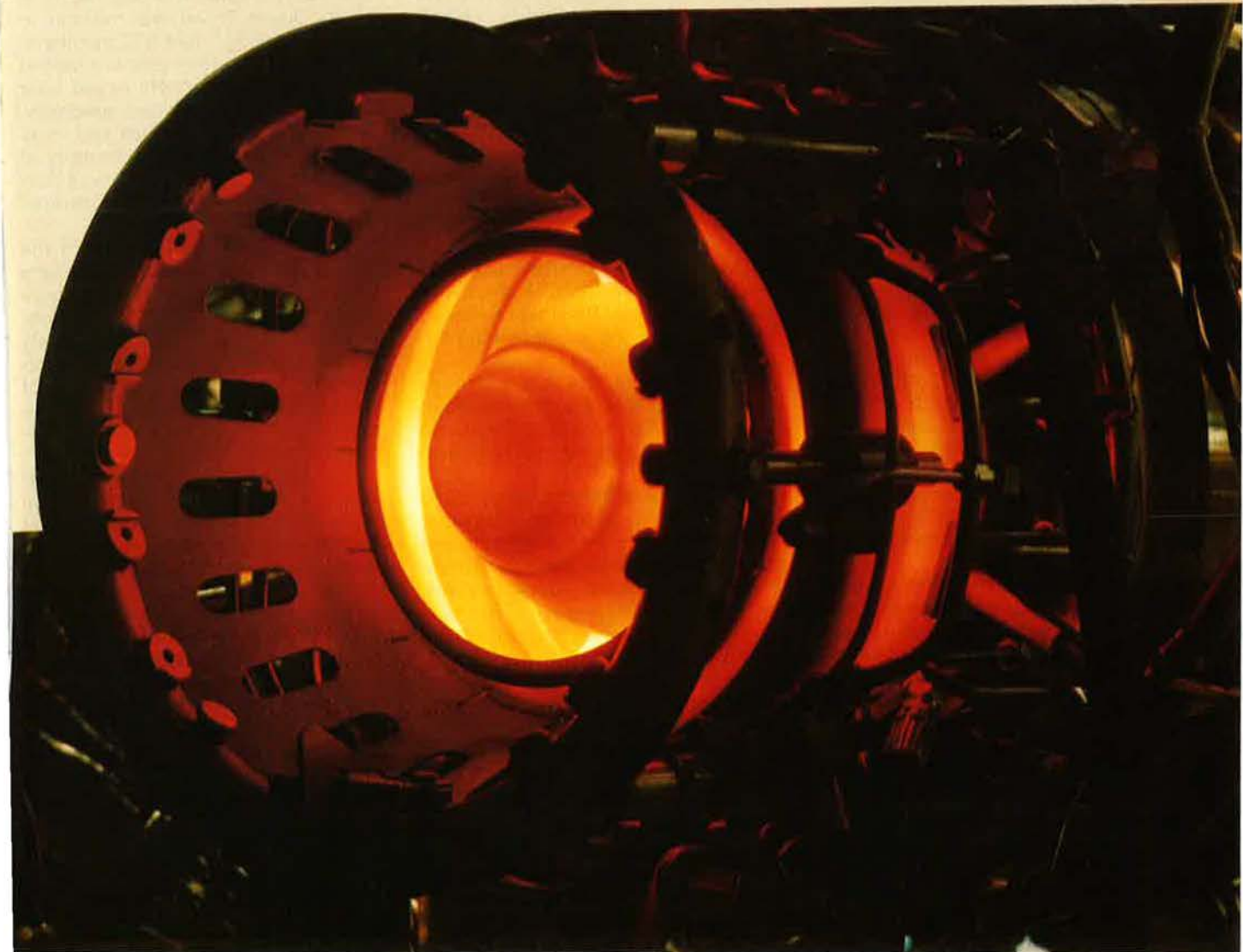
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Airman's Bookshelf

Baling-Wire Invasion

Bay of Pigs: The Untold Story, by Peter Wyden. Simon & Schuster, New York, N. Y., 1979. 327 pages with index, maps, notes, and photographs. \$12.95.

It has been almost nineteen years now since the United States organized, trained, and transported a band of exiles to invade Cuba—and get rid of Fidel Castro.

But the memory lingers on, in books, magazines, and newspapers. Fascination with the catastrophe haunts the American imagination.

This book is not really the untold story—as the title claims. But it is a well-told story. Peter Wyden, an experienced journalist, author, and publisher, did his homework in Cuba, in Miami, and in Washington.

His conclusion—in the final sentence of his book—is: "It could happen again."

By the time the reader comes to this chilling line, he is well conditioned to accept it. For the story Wyden tells is one of self-delusion, wishful thinking—and an arrogance he calls the "gook syndrome."

Of this "syndrome" he writes: "American policy-makers suffer from it chronically. They tend to underestimate grossly the capabilities and determination of people who committed the sin of not having been born Americans, especially 'gooks' whose skins are less than white."

The "syndrome" runs through the tale Wyden tells.

There is the Cuban doctor, preparing to go on the expedition. He points to the preinvasion photo of the beach and says the dark spots are coral. He says he knows. He took pictures of similar water. He is brushed aside by the CIA photo-interpreter—and the invaders hit the coral.

Also disregarded were cautions voiced by the CIA's own David Phillips against switching the landing from

Trinidad to the Bay of Pigs. He argued that the change shifted the landing beach too far from the Escambray Mountains, where the invaders were to go as guerrillas if anything went wrong.

Throughout the planning, the emphasis was on the operations side—at the expense of the intelligence side.

Further, it was jerry-built, a haphazard plan. Even after combat was joined, there was tinkering with the plans and orders.

For example, Cmdr. William Forgy, flying a US Navy jet fighter from the carrier *Essex*, had a Cuban T-33 in his sights—"was right on the guy's tail, right up his pipe." But the air controller radioed frantically: "Don't fire, don't fire! Rules of engagement have been changed."

Just as the Americans underestimated Fidel Castro's strength, they overestimated their own.

Lyman Kirkpatrick, who did an in-house review for the CIA, is quoted as saying the belief was that the CIA could secretly accomplish "with baling wire" what the generals no longer were permitted to do with armies. And he concluded that President Kennedy did a terrible job of becoming informed.

Secrecy was the watchword. Wyden concludes that the President "discovered too late that it was too large to remain secret and too small to succeed."

Kennedy considered secrecy of US involvement a political necessity. There is a sharp exchange between Kennedy and Adm. Arleigh Burke, then Chief of Naval Operations. Angrily, the President says: "Burke, I don't want the United States involved in this."

Distressed, the Admiral raised his voice and said: "Hell, Mr. President, but we are involved."

It was Wednesday, after midnight, in the White House. The Bay of Pigs invaders were already whipped.

—Reviewed by Howard Handleman.

The German Rocketeers

The Rocket Team, by Frederick I. Ordway III and Mitchell R. Sharpe. Thomas Y. Crowell Publishers, New York, N. Y., 1979. 462 pages. \$14.95.

The intercontinental missile and the space rocket are major elements in shaping the present era. The saga of their evolution is long and complex. The ancient Chinese employed short-range, powder-burning rockets, and late in the nineteenth century Russian schoolmaster Konstantin E. Tsiolkovsky theorized about long-range rockets for travel and war. But the more concrete foundations of today's rocket technology lie in the work of Transylvanian schoolmaster Hermann Oberth, whose *The Rocket into Planetary Space* (1923) described large liquid-propellant projectiles.

In the mid and late '20s in Germany, a number of gifted amateur enthusiasts experimented with the kinds of rockets discussed by Oberth. Organizations dedicated to this purpose emerged throughout Germany. The most famous of the day, the Society for Space Travel, was founded in 1927. By 1929, it had 870 members, including a nineteen year old named Wernher von Braun. He would later develop the V-2, the direct predecessor of all modern missiles and rockets. *The Rocket Team* is the story of von Braun and a small group of German engineers whose work changed the world.

The authors, both veterans of the US space program, are prolific writers on rocketry. Ordway has written more than thirty books, several on this subject. Sharpe has written extensively on spaceflight. They devoted ten years to the research and writing of this book. Von Braun read the manuscript and contributed a foreword before his death in 1977.

The first two-thirds of the book details the development of the German V-2 at the rocket research center at Peenemünde. This was a massive undertaking, to which Germany committed approximately \$3 billion, half again as much as the US spent in the Manhattan Project to develop the atomic bomb. The external problems were immense: Allied bombing, Hitler's vacillating commitment, Himmler's interference, Nazi political impediments, and British espionage efforts. But by September 1944, V-2s were operating against Britain and, at the end of the war, von Braun had de-

signs for weapons that could reach the United States.

The final third of the book describes the scramble for the services of the German scientists and the process by which most came to the US to continue their work. Only two chapters discuss the Germans in the US at White Sands, N. M., and later at Huntsville, Ala. This is disappointing, for it was in the 1950s that the foundation was laid for ICBMs and space travel.

This slighting of postwar developments epitomizes the larger problems of the book. The work is neither technical nor scholarly; rather it is a journalistically written account for a popular audience, full of anecdotes and stories. The book is enjoyable reading, but it is superficial and somewhat antiquarian. For example, in the discussion of the Germans' early days in Alabama, we learn about the families obtaining library cards, joining the Jaycees, introducing classical music to Huntsville society, organizing an Evangelical Lutheran Church, and other such trivia; yet the impact of the USSR's Sputnik is not even mentioned. Treatment of political issues is sparse.

Although the book is an engaging social history of this extraordinary group of German engineers and provides new information gained through extensive interviews (and, in a few cases, recently declassified material), it is not a significant contribution on science and technology equal to the works of Frank W. Anderson, James Killian, George B. Kistiakowsky, Robert T. Rosholt, and, most particularly, Dieter K. Huzel's *Peenemünde to Canaveral* (1962) and Clarence G. Lasby's *Project Paperclip: German Scientists and the Cold War* (1971).

—Reviewed by Dr. Joe P. Dunn,
Department of History and Politics,
Converse College, Spartanburg,
S. C.

New Books in Brief

The Engines Were Rolls-Royce: An Informal History of That Famous Company, by Ronald W. Harker. The author, the company's first test pilot, traces Rolls-Royce's rapid growth from cars to airplane engines, and from bankruptcy in 1971 through formation of a new company, Rolls-Royce Motors, Ltd. Of particular interest are the battles between Britain's Spitfire and Germany's Me-109, which demonstrated the superior performance of the Rolls engine.

Photos, index. Macmillan Publishing Co., New York, N. Y., 1979. 202 pages. \$12.95.

Flying the Weather Map, by Richard L. Collins. Following a discussion of basic aviation weather theory, the author, editor of *Flying Magazine*, takes the reader on forty-six actual cross-country flights. He details the en route flight conditions and relates them to preflight weather information, maps, and theory. Each flight episode is further explained in weather maps and charts. Index. Delacorte Press/Eleanor Friede, New York, N. Y., 1979. 244 pages. \$12.50.

The Future of Conflict, edited by Capt. John J. McIntyre, USN. Here are the proceedings of a seminar sponsored by the Assistant Secretary of Defense for International Security Affairs and the National War College. Distinguished panelists met to probe the theme and, while their conclusions are not a road map to the future, they do explore future risks to the US from several perspectives. One conclusion is that American power is essential to ensure that conflict remains avoidable, but time is running out. Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, 1979. 186 pages. \$4.25.

Jane's Infantry Weapons, 1979-80, edited by Col. John Weeks. A large-size, encyclopedic reference of infantry weapons that must be the world's most comprehensive work on this subject. In the *Jane's* tradition, the book is painstakingly thorough with photos, line drawings, specifications, and text. The weapons are organized by type and country. In his Foreword, the editor notes that the world is in the midst of a revolution in the design and development of infantry weapons, and in particular small arms. Franklin Watts, Inc., Jane's USA, New York, N. Y., 1979. 692 pages. \$84.50.

Jane's Weapon Systems 1979-80, edited by Ronald T. Pretty. A large-size, encyclopedic reference to the world's weapon systems organized by type and country and for each entry—photos, line drawings, text, and specifications. Major classifications include missile systems, command and control systems, armored fighting vehicles, ordnance, electronic and optical equipment, and radar. Franklin Watts, Inc., Jane's USA, New York, N. Y., 1979. 940 pages. \$84.50.

The Legendary DC-3, by Carroll V.

Glines and Wendell F. Moseley. Now in its fifth decade of service, the "Gooney Bird" was the workhorse of the air in World War II, and again served with distinction in Korea and Vietnam. It has been a transport, bomber, and gunship. Here in conversational style is the story. Photos, appendices, index. Van Nostrand Reinhold, New York, N. Y., 1979. 224 pages. \$15.95, cloth; \$8.95, paper.

Ocean Flying: A Pilot's Guide, by Louise Sacchi. The author is president and chief pilot of Sacchi Air Ferry Enterprises, and holds the world speed record, set in 1971, for single-engine, piston-powered flight from New York to London. With more than 300 solo ocean flights to her credit, the author explains how to deal with ice, fog, wind, and other vagaries of the weather; how to navigate by the stars or by dead-reckoning; how to maintain a healthy mental attitude during long hours of flying alone; and how to obtain and prepare the papers needed for dealing with foreign governments. Photos, maps. McGraw-Hill Book Co., New York, N. Y., 1979. 230 pages. \$14.95.

Rickenbacker's Luck: An American Life, by Finis Farr. Auto mechanic, auto racer, World War I air ace, auto manufacturer, owner of the Indianapolis Speedway, and head of Eastern Air Lines were roles filled by the larger-than-life American hero. Here in fascinating detail is a new biography of Captain Eddie. Notes, index. Houghton Mifflin Co., Boston, Mass., 1979. 366 pages. \$12.95.

The Search for Extraterrestrial Intelligence, edited by Philip Morrison, John Billingham, and John Wolfe. In the last two decades, an increasingly serious debate has focused on the existence of extraterrestrial intelligent life, and how it might be detected. NASA's Ames Research Center has conducted science workshops in the last two years to examine these questions more closely. Here are the proceedings. Available from the National Technical Information Service, Springfield, Va., 1977. 276 pages. \$11.

The World of Silent Flight, by Richard A. Wolters. The author examines five of the major sports in the increasingly popular area of nonpowered flight: Kites, ballooning, soaring, hang gliding, and parachuting. He discusses cost, proper instruction and training, equipment, clubs to

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Airman's Bookshelf

join, suppliers, and books and magazines for the enthusiast. Stunning photos. McGraw-Hill Book Co., New York, N. Y., 1979. 181 pages. \$15.95.

—Reviewed by Robin Whittle

Recent and of Interest

Airshipwreck, by Len Deighton and Arnold Schwartzman, Holt, Rinehart & Winston, New York, N. Y., 1979. 70 pages. \$10.95.

Fast Attack Craft, edited by John Marriott. Encyclopedia of attack craft with speeds in excess of twenty knots. Crane, Russak & Co., Inc., New York, N. Y., 1979. 263 pages. \$24.50.

The Future United States Space Program, edited by Richard S. Johnston, Albert Naumann, Jr., and Clay W. G. Fulcher. Proceedings of

the AAS conference held in October 1978 in Houston. American Astronautical Society, P. O. Box 28130, San Diego, Calif. 92128, 1979. Two volumes. 841 pages. \$40 each.

Government Contracts, by Herman Holtz. The word on submitting successful proposals. Plenum Publishing Corp., New York, N. Y., 1979. 288 pages. \$19.50.

Guidance and Control 1979, edited by Robert D. Culp. Vol. 39 in the series on astronautical sciences published by the American Astronautical Society, San Diego, Calif., 1979. 477 pages. \$40.

The Heritage of Aviation Medicine, compiled by USAF Col. Robert J. Benford, M. D. (Ret.). The Aerospace Medical Association, Washington National Airport, Washington, D. C. 20001, 1979. 132 pages. \$4.50.

Mustang, by M. J. Hardy. The story of the P-51. ARCO Publishing, Inc., New York, N. Y., 1979. 128 pages. \$11.95.

New Technology and Military Power: General Purpose Military Forces for the 1980s and Beyond, by Seymour J. Deitchman, Westview

Press, Boulder, Colo., 1979. 315 pages. \$24.

Oil Pipelines and Public Policy, edited by Edward M. Mitchell. A conference on oil industry reform and reorganization. American Enterprise Institute, 1150 17th St. N. W., Washington, D. C. 20036, 1979. 392 pages. \$6.75.

A Pictorial History of the World War I Years, by Edward Jablonski, Doubleday & Co., New York, N. Y., 1979. 316 pages. \$14.95.

The Sea Power of the State, by Adm. of the Fleet of the Soviet Union S. G. Gorshkov, The U. S. Naval Institute, Annapolis, Md., 1979. 290 pages. \$17.95.

Typhoon and Tempest at War, by Arthur Reed and Roland Beamont. Report on the RAF's Typhoon and Tempest series of fighters in World War II. Charles Scribner's Sons, New York, N. Y., 1979. 176 pages. \$14.95.

World Aircraft, by Enzo Angelucci and Paolo Matricardi. Two volumes of color illustrations. Origins-World War I and 1918-1935. Rand McNally, Chicago, Ill., 1979. 320 and 319 pages. \$7.95 each.

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In the May 1977 issue of AIR FORCE, we published a letter from Gilbert Wasserman, who had recently visited China, asking any World War II airmen who had been shot down over that country to contact him regarding a possible reunion with their rescuers. The author of this article, who was writing a book on B-29 operations, joined the group of twenty-five for the trip, which finally was arranged in late 1978. This is his story of the . . .

Reunion in China

BY DAVID A. ANDERTON

IT WAS the second time that Bill Savoie and Ernie Brundage had been in China. The first time, thirty-five years earlier, they had bailed out of a blazing B-29 and had been rescued by troops of the 3d Division of Mao Zedong's (Mao Tse-tung's) New 4th Army (N4A). Their interpreter and guide for more than five weeks in 1944 was Liu Young, an English-speaking youth who made a lasting impression on the two airmen.

And now it was April 3, 1979, and Savoie, a retired Air Force colonel, and Brundage were walking through the Beijing (Peking) airport terminal. Waiting to greet them was a small group of Chinese; one, in a heavy blue coat and the uniform of the Chinese Air Force, came forward, smiling. It was Liu Young, and in a moment the three were embracing, shouting, backslapping, moist-eyed in a reunion that none of them had thought would ever be possible.

"The last time we saw Liu Young was in 1944, in the middle of Anhwei Province," Brundage said later. "It was worth the whole trip to see him standing there."

Brundage and Savoie, in requesting Chinese visas for the trip, had expressed a desire to meet anyone connected with their 1944 rescue. Brundage wrote: "There were many people involved in our rescue and return to base, and it would be wonderful to meet someone who remembered—and I'm sure it would be a miracle to find anyone today who participated in our rescue."

The Chinese worked that miracle and more; they arranged for seven of the original rescuers to meet the American airmen. One more—Su

Yu, then a division commander in the Chinese Communist N4A and now Deputy Minister of Defense—was prevented by illness from making the trip. A ninth, once Vice Commander of the N4A and later Vice Premier Chin Yi, had died in 1972.

Savoie and Brundage were two of five airmen from one B-29 crew rescued by the Chinese, following the first daylight bombing raid by Superfortresses on the home islands of Japan. It began this way . . .

O'Reilly's Daughter came off the target at Yawata, the "Pittsburgh of Japan," and swung around for the long trip back to Chengtu. Now out of reach of the anti-aircraft defending the Imperial Iron and Steel Works, the single most important objective in Japan's steel industry, the B-29 gathered speed and headed out over the East China Sea. In the cockpit, Lt. Col. William F. Savoie, aircraft commander and Commander of the 792d Bomb Squadron, 468th Bomb Group, settled back for the run over more than 500 miles of open water, and the 1,000 or more miles over China after landfall, about 100 miles north of Shanghai.

Savoie's crew was one of sixty-one that had bombed Yawata in the first daylight raid on Japan since the Doolittle Raiders' epochal strike of April 18, 1942. The B-29s were based in India, near Calcutta, and operated out of advance bases around Chengtu, in China's Szechwan Province. It was a logistical nightmare: Gasoline, oil, supplies, and ordnance all had to be ferried in from India aboard the B-29s themselves. As one result, the home islands of Japan were not

men being hit with any regularity.

Further, there was official disbelief in Washington—whence came the B-29s' grand strategy—that any Superfort formation could make the 3,200-mile round trip. The few earlier raids on Japan since June 15 had all been at night, and the planes had bombed individually. But one daylight raid on a closer target seemed to indicate the improved accuracy of that type of attack, and XX Bomber Command elected to risk the big one.

So ninety-nine B-29s of the 58th Bombardment Wing (VH) had been loaded, their crews briefed, and had made the first jump from their India bases to the Chengtu area. One was lost on the way. On August 20, seventy-five B-29s roared off the runway; there would have been more, but one of the 462d Bomb Group's planes crashed on takeoff and blocked the south end of the runway, and operations had to be temporarily suspended.

The sixty-one bombers that made it to the target dropped ninety-six tons on Yawata, though doing little actual damage to the production facilities. Antiaircraft scored one direct hit and flamed a B-29; eight others were damaged. Fighters got three more, but the B-29s struck back; Savoie's gunners got two Japanese fighters.

Savoie and his crew made an uneventful return crossing and landfall. Their B-29 had been showing signs of trouble, the kind of mechanical problems that plagued the early Superforts. (*O'Reilly's Daughter*, serial No. 42-6264, a Wichita-built B-29-BW, was the fiftieth production aircraft.) But Savoie and 1st Lt. Raymond K. Lutz, his copilot,



India-based B-29s of the 468th Bomb Group, to which Bill Savoie and Ernie Brundage were assigned, on an earlier mission against targets near Rangoon, Burma.

thought they were in reasonably good shape for the trip back. Then, after nightfall, the B-29 caught fire. Savoie rang the bailout bell, ordering the crew to leave the crippled aircraft.

Through Occupied China

"Lucky landing in farmyard. Hit before I realized because of darkness. Scared stiff. Didn't know which way to go." These are the opening lines scrawled in Savoie's diary, which he kept during his journey through occupied China, escorted on his way first by detachments of the N4A, and later by troops of Gen. Chiang Kai-shek's Kuomintang armies.

Savoie was not alone. Four others from his crew had landed safely, had hidden their parachutes, and were wondering what to do

next. They hid, tried to sleep, and waited for the morning.

The Chinese side of the story was told in three articles that appeared in N4A newspapers. One, translated for Savoie later, told in some quaint English of the finding of two of the airmen:

"An old man . . . saw two red faces in the hay. He was so excited that he was on the verge of falling down. The red faces crept out saying something that no man understood, pointing to the sky, then to the ground, and then took out small banners with Chinese and American national flags joined together, and with Chinese characters on it saying: 'Dear Chinese Friends: We are the Americans who came to China to fight against the Japanese.'

"Afterwards, groups of people escorting the third, and fourth,

American friend arrived. It was said they dropped nearby a somewhat village—one beside a small creek, another in the rice field. People found them when they got up at dawn.”

These four were the copilot, Ray Lutz; navigator Capt. D. G. O'Brien; flight engineer 1st Lt. Casey Stelmach; and central fire control (CFC) gunner SSgt. Ernie Brundage. After a two-week stay in the village near their landing site, they were escorted to N4A headquarters, passing through yet another village on the way. The newspaper story continues:

“While Comrade Su, the Political Director, and a Mr. Tao, who can speak English, had reached the village, they saw a big mass of people was coming escorting the American friends. Comrade Su arranged his troops, saluting to the foreigners, and making a short welcome speech. . . .

“When we arrived at the place of the 3d Company, thousands of people of the vicinities came, busy to show his care to the foreigners—serving tea with Chinese cake, and presenting them bacon and eggs. The most magnificent example was belonged to a poor old lady who took out underneath the bed more than twenty eggs saved for her daughter in her giving borne to a child. She told the political director gladly, ‘Please send these eggs to the American friends. Tell them I am too poor. The eggs are too few.’”

Savoie, picked up separately, was later taken to join the other four rescued airmen. One crewman was captured by the Japanese after he

landed, and survived the war as a prisoner. The other six were never found or reported dead or captured.

For three months, the five surviving airmen evaded Japanese troops occupying the areas in Anhwei, Kiangsi, and Hunan Provinces through which they were escorted. They were picked up by an American C-47 finally, which landed behind Japanese lines, took the five on board, and flew them back in stages to their home base near Chengtu.

A Sentimental Journey

For Savoie and Brundage, the second visit came last April. Together with three other airmen who had been based in China—retired Col. James Pattillo, a former B-29 aircraft commander; Lt. Gil Wasserman, once a B-29 radar operator who organized and led the 1979 tour; and Capt. Bernie Kahn, who flew bridge-busting B-24s out of Guilin—they returned to the Middle Kingdom.

And Liu Young, now a research officer in the Chinese Air Force College, was there to meet them.

“We had eleven different interpreters and guides during our 1944 walk through China,” Savoie said. “Liu Young stayed with us the longest time, and he proved to be the most important one for us. We met him at N4A headquarters, and he was with us from then until we were transferred to the Nationalist Army troops behind Japanese lines.”

Liu was one of the hosts at an official banquet in Beijing’s Horn of Plenty restaurant the following evening. Forget all you’ve ever experienced in most Chinese-American restaurants. In the true Chinese restaurant, there is no choosing one from Column A and one from Column B. There is, instead, an embarrassment of choices, platters piled upon platters, with cold meats, pickled vegetables, fish, shellfish, hot meats, hot vegetables, greens, rice, and—in Beijing and northern cities—superb bread.

The official host was Yueh Tai-Heng, chief of the China International Travel Service, whose efforts had gotten the trip off to such an outstanding start.

Savoie and Brundage were surprised to meet another one of their rescuers, Yen Chang Chen, now

Savoie (left) and Brundage with Liu Young in a garden of the Summer Palace in Beijing. Liu is now a research officer at the Chinese Air Force College.



—Photo by the author



—From the Savoie Collection

A local cease-fire was arranged to transfer Savoie's crew from the Communist N4A area to the region controlled by the Nationalists. (The two factions were fighting each other as well as the Japanese). From left, Lt. K. R. Lutz, copilot; Liu Young; Capt. D. G. O'Brien, navigator; N4A regimental commander; Lt. Col. William Savoie; Nationalist representative; Lt. Casey Stelmach; Nationalist representative. Ernie Brundage remained in the Nationalist area to guarantee the safety of the N4A escorts.

Chief of Staff for Ordnance in the People's Liberation Army. Yen was a regimental commander in the area where the B-29 had crashed, and had led the brigade that fought off the Japanese at the site in order to save documents and to salvage guns and other useful material.

"He was a real fighter," Savoie recalls. "He was our escort for about five days, and I rode across the Grand Canal in his boat."

Wang Yi, currently director of the Foreign Language Publication Bureau in Beijing, also had come to meet Brundage and Savoie. In 1944, he had been a supply officer in N4A headquarters and, as Savoie said, "He certainly knew us well, because he had to furnish a lot of special things for us—a wooden tub to bathe in, books to read, coffee, cigarettes, and playing cards. Those things just appeared; we didn't know from where. Now we do; either he had to steal it from the Japanese, buy it in Nanking, or make it. He was invaluable."

Senior officers at the banquet were Chao Li Hui, Deputy Commander of the Chinese Air Force (CAF), and Huang Li Ching, Deputy Political Commissar, CAF. Both men were veterans of the Long March and of the battles against the Japanese, although they had not been personally involved in the rescue network.

It was the first of several banquets, marked by speeches, countless toasts to the friendship of the Chinese and American people, and dozens of "gam bei," a charming Chinese custom that requires you to drain your glass of *mao tai* in one gulp and then to hold it upside down over the tablecloth to show it is empty.

I had brought along two copies of my book, *B-29 Superfortress at War* (Scribners, 1979), because it contained one chapter about the rescue of another party of American airmen under then Maj. Francis Morgan. Photographs of the rescuers were in the book, and there in one picture was the youthful Liu Young. Savoie, Brundage, and I inscribed a copy of the book and presented it to Liu as a token of thanks and friendship.

Our itinerary had been carefully planned, and we left Beijing aboard an Antonov An-24 of Chung Guo Ming Hang, the airline of the People's Republic of China (PRC), headed for the hills of Yanan, Mao Zedong's wartime headquarters in what was then called Shensi Province and terminus of the Long March. All commands for the Red armies had been radioed from Yanan, and that included the directions for the escape and escort of the five B-29 airmen.

After almost three days in Yanan,

the cradle of the revolution, we flew to Xian, an amazing archeological site, and then on to Shanghai for another dramatic meeting.

During the 1944 trek across China, the N4A needed an interpreter-guide on short notice to move with a cavalry detachment and the airmen. Quai Shih-Hsuing was pressed into service, although he had never been a guide or ridden a horse. Mr. Question, as he was called then and now because of the English pronunciation of his name, stayed with Savoie's party five days and then went back to his newspaper job. Now seventy-four and retired, he was a guest at the banquet in Shanghai, sitting next to Bill Savoie and reliving their shared experience.

From Shanghai we flew to Guilin (Kweilin), wartime headquarters of the Fourteenth Air Force, in a spectacular setting of high, conical mountains. One of the stops en route was Changsha, and there, parked on the ramp, was an immaculate white Curtiss C-46, sporting the gold and red insignia of the CAF on its fuselage. "No pictures, please," said the guide. "But we built them in the United States in 1942," I protested, reluctantly putting down the camera.

Guilin was Bernie Kahn's territory, and it was his time for homecoming. His old B-24 base

now is the Guilin airport, but we saw very little of it from the air. We approached in driving rain and low cloud, and broke out on the very low edge of minimums. The An-24 slammed onto the wet runway and roared to a reverse-pitch stop, quivering in every longeron and stringer.

Guilin is beautiful, truly beautiful, even in the rain that dogged us through most of our Chinese days. We cruised the Li River in a teeming downpour, photographing the mists and the mountains and riverside life. It was too short a stay; but we were scheduled to go to Canton (Guangzhou in the new spelling), and it was to be our last, and in many ways the most memorable, stop of the trip.

On our last night in China we were guests at a reception hosted by top-ranking officers of the CAF, Canton Military District. Gen. Yang I-Fung, Vice Chief of Staff, and Gen. Chang Wen-Yi, his aide and pilot, had been at N4A headquarters during Savoie's rescue. Chang was sixteen years old then; now his experience includes time in Shenyang F-6 fighters, the Chinese-built MiG-19. They were joined by Liu Young, whose superiors had authorized him to fly from Beijing to Guangzhou to join us, another of the many thoughtful gestures the Chinese made during our trip. Mr. Wong, then in supply with the N4A

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and now a finance official in Guangzhou, also was in our party.

After the reception, there was a superb banquet in the Bei-yuan restaurant, the finest in the city, and one that would give any restaurant, anywhere, a run for first place. The menus were hand-written in artistic Chinese calligraphy. One of them, framed, now hangs in my office like a piece of fine art.

Course followed course, and I found myself in a "gam bei" contest with General Chang. Out of respect for our aging airframes, we called it a draw at seven rounds and switched to the fine Chinese beer. Presentations were made, speeches were followed by more speeches, and the evening was a tremendous success.

The PRC—Some Impressions

As we were leaving, we were told that a couple of friends would go to the railroad station in the morning to see us off properly. When we arrived on the platform, there was the top command level of the CAF, our hosts of the night before, come to say goodbye and to wave until our train was well out of the station.

For Savoie, Brundage, and the other returning airmen, it was a trip that could never be forgotten. For those of us fortunate to accompany them, it was a fascinating introduction to a country that has been too long a mystery. The glimpses we had were impressive; we visited communes, schools, hospitals, museums, an artist's home, workers' apartments, docks, and craft factories. With the exception of the C-46 incident, we were free to photograph anything anywhere. We were free to walk or taxi around any of the places we visited, and did so.

The food was superb in most places, but average hotel fare in a few. Our guides were excellent. Knowledgeable and tireless, they kept the group moving without resorting to pressure, and were really responsible for the success of the trip.

The children were beautiful; the adults were very friendly, and willing to try their English in conversation on the street or in shops. And the care that was lavished on the few in our party who became ill set a standard that any medical association here would be well advised to emulate.

It had been the same way in 1944. Savoie summed it up this way:

"We would not have accomplished this return to our base, a distance of more than 1,000 miles, were it not for the tireless and outstanding assistance of the New 4th Army. I was most favorably impressed with the transportation—boat, junk, mule, horse, donkey, bamboo raft, and sedan chair—accommodations, security, food, guides, interpreters, medical help, entertainment, gifts, military briefings, and educational lectures offered to us in such a warm, friendly, and efficient manner. We enjoyed and appreciated the singing, dancing, and welcome meetings held for us along our escape route. We were impressed by the Communist troops and their officers. I was seldom afraid of being captured, and I felt secure even under very difficult wartime conditions." ■



—Photo by the author

PRC General Yang I-Fung (center) at the Guangzhou (Canton) reception with Gil Wasserman (left), a former B-29 radar operator, and retired USAF Colonels Bill Savoie and Jim Pattillo.

The Bulletin Board

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

Service Volunteers Shrink

For the first time in memory, all four US military services failed to meet their recruiting goals for three consecutive quarters. The period in question (October '78 through June '79) found the Air Force, despite an intensive drive for new manpower, hitting just ninety-seven percent (46,600 of a targeted 48,200) of its "objective." The percentages for the other services ranged from eighty-eight to ninety. All were well below the comparable period for the previous year, and the new statistics also disclose a further drop in quality Defense-wide.

The bad news suggests that draft registration legislation is more essential than ever. The Defense Department, however, though concerned about the continuing recruiting fall off, chose the occasion to restate its support for the All-Volunteer Force and blast the peacetime registration proposal that many congressional leaders and groups like AFA support.

Defense's manpower chief, Assistant Secretary Robert B. Pirie, Jr., declared that registration isn't needed now. In a speech at the Air Force Academy, he urged Congress to give the Selective Service System funds to improve computer equipment, increase its staff slightly, and beef up emergency planning for post-mobilization and induction.

Revitalizing Selective Service would be accompanied by tests to see if mobilization needs could be met. If they cannot, Secretary Pirie said, then Defense Secretary Harold Brown will not hesitate to recommend that he President order a peacetime registration under the authority he now possesses."

The manpower chief said that mobilization plans assume very little training time. Thus, the 2,100,000 active-duty members would bear the

main burden of a fast-breaking war. Also, he said, the 95,000 youths who have agreed to enlist in the Regular and Reserve Forces but who have not begun training would be speeded to active duty. Other available manpower includes the million selected Reserves and individual Ready Reservists and recent military retirees.

His overall pitch was that ample manpower is available and that inductees aren't needed. With a draft, he also declared, terms of service would be reduced, the overall experience level would drop, quality would plunge, disciplinary problems would increase, and training costs would soar.

Eighty-one percent of USAF's recruits entering service during the nine-month period covered by Defense's new statistics owned high school diplomas. That's two percentage points lower than the same period a year before. The same trend prevailed in the test-category stats: Air Force took in seventy Category IVs (the lowest group) during the recent nine-month period, compared to just twenty the previous year.

Air Force continues to meet its female enlistment quotas, though officials said the quality, as measured by high-school completions, has been slipping steadily.

These personnel officials are visibly distressed by the gloomy manpower developments. They did predict that Air Force would meet its numerical goal of 20,276 nonprior-service recruits for the July-September 1979 quarter. It barely met its July goal of 7,049, achieving 7,084.

USAF Recruiters Outrecruit All Others

Recruiting, as the previous report underscores, is tough all over and steadily getting more difficult. But the US Air Force's record in signing up qualified youths dwarfs the efforts of

all the other services in recruiting.

Consider the number of recruiters each service employs and their production records. Last year, USAF had only 1,631 recruiters compared with 5,150 Army, 3,552 Navy, and 2,249 Marine Corps recruiters. The latter service is only one-third the size of the Air Force. USAF recruiter strength currently is 1,776 and is expected to inch up only another fifty-five slots next year. The new recruiters will beat the bushes for OTS candidates with technical degrees. The other services' recruiting staffs are also expected to increase.

Perhaps the key figures are the average number of recruits signed up per recruiter. Last year's results: USMC eighteen, Navy twenty-four, Army twenty-six, and Air Force forty!

What's happened, of course, is that Congress, watching the Air Force regularly meet its goal while the other services faltered, has authorized large increases in the others' recruiting forces over the years, but has kept a tight rein on USAF's.

"Job satisfaction" is behind the Air Force's excellent recruiting record, according to the USAF Recruiting Service. Officials there said a recent survey among recruiters showed that eighty-one percent "love it," referring to the work they are doing.

What are an applicant's chances of winning a recruiting post? Pretty good. The Recruiting Service told AIR FORCE Magazine that half of the 1,250 applications received between October 1978 and July 1979 asked for billets in the south or west. Officials said they need more volunteers for the large metropolitan areas in the north, west, and central areas.

Since October, seventy-six percent of all applicants for recruiting duty have been selected. About 600 people are needed annually to replenish the recruiting force.

Extra rewards for recruiters are modest, mainly proficiency pay of \$50 to \$150 per month. They are reimbursed up to \$40 per month for certain out-of-pocket expenses. Nearly 600 USAF recruiters and their families and 125 single recruiters live in "adequate" private housing leased by the government. Uncle Sam also pays the utilities. Recruiters "fare equally" in promotions with members of other specialties, Air Force officials say.

There are numerous special recruiter citations, including AFA's annual salute to the best AFRAP support base. At the National Convention last month, AFA also honored the top Recruiting Flight Supervisor. In a new

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program next year, AFA will honor the top recruiter in each of the five recruiting groups and the Reserve and Guard. They and their spouses will spend a full week in Washington and New York, ending up with recognition at the AFA Iron Gate Chapter Ball in New York City.

Seven Percent Raise Okayed

At the last minute, the President changed signals and approved a seven percent pay increase for military and federal civilian personnel, instead of the 5.5 percent figure he had suggested early this year. (See also "Speaking of People," below.) Congress is expected to go along with the higher figure and assure that the raise is effective October 1. AFA, along with other associations, has decried the 5.5 percent limit.

The Joint Chiefs of Staff, Service Secretaries, and other ranking service officials also came out publicly for a larger than 5.5 percent increase. Heavy pressure was applied to the

White House by rank-and-file military and federal workers.

The Air Force, among the services, developed detailed studies clearly showing that a seven percent hike would not exceed the President's wage guidelines. One internal Air Force study, while making a strong case for at least a seven percent hike, concluded that the Chief Executive would not budge from his earlier expressed intention to stay with the 5.5 percent cap.

Officer Continuation, Hike Programs Expand

Air Force is "continuing" more and more officers on active duty. And the improved promotion "opportunity" recently given captains looking for major has been extended to majors vying for light colonel. Here are the recent separate but related actions:

- What the service calls the Retirement Eligible Reserve Officer Continuation Board considered 290 active-duty non-Regulars nearing retirement who volunteered for two years of extra service. The Board chose a whopping 288 of them. It wasn't long ago that allowing Reservists to serve beyond twenty years was a rare occurrence. But times have changed; USAF needs officers. Next year's board, however, probably will

pick somewhat fewer volunteers for continuation, one Hq. USAF authority indicated.

- The calendar 1979 temporary majors board has chosen 3,387 captains (from 5,113 contenders) for temporary O-4. Pilots, the service's most critical group, fared far better than the others.

- Seventy-four percent (2,517 of 3,420) of the first-time line eligibles also were chosen, as were smaller percentages of officers considered three through five times. This all adds up, the Air Force says, to meeting the ninety percent "opportunity" it promised earlier. It's an increase from the eighty percent opportunity of previous years.

The majors' panel asked ninety-five of the non-Regulars passed over for the second time to stay aboard. Their only option is departure with \$15,000 in severance pay (less a big tax bite).

Fifty-three of the fifty-six double passovers with critical skills—pilots, navigators, and engineering types—were offered continuation, close to the 100 percent opportunity the service had promised. Among the other specialties, thirty-eight of the 187 double passovers involved received continuation bids. That equals the promised twenty percent opportunity. Next year, however, perhaps

Ed Gates . . . Speaking of People

And Yet Another Pay Study

The military community will be forgiven if it fails to stand up and cheer over the formation of another pay study. After all, it has been showered with them, but the results have been disappointing or nonexistent.

The Defense Department, as we have reported, recently trotted out Secretary Harold Brown and his chief manpower aide, Assistant Secretary Robert B. Pirie, Jr., to unveil the new development at a press conference.

The new study group, Secretary Pirie declared, will come to grips with "compensation adequacy," incentive pays, pay for new recruits, and other pressing issues. Authorities say the job will take only a few months; after all, military pay has been studied and restudied, inside and out, in recent years.

The fanfare surrounding the announcement of the new study may partially counter the sting inflicted on service people by the Administration's do-nothing stance on compensation the past few years. Holding out hopes for progress could buoy up the troops' expectations and even convince some that the Pentagon is fighting their battle. The President's political antennas had doubtless picked up the growls of federal civilians and military personnel over his October 1, 1978, 5.5% pay cap, and his threat to repeat that cap with the October 1, 1979, raise. Fortunately, he raised the cap to seven percent at the last minute.

Eight officers of the different services constitute the new pay study, with USAF's Col. Leon Hirsh, the DoD Director of Compensation, in charge. They have been comparing military pay with private sector wages, checking the need for special bonuses and travel pay, eyeing flight pay, and taking a new look at that most-

looked-at-of-all stipend, the Stateside variable housing allowance (VHA). A VHA in one form or another has been on service and Defense drawing boards at least a dozen times over the past twenty years. It has never flown because the government wouldn't accept the cost.

Colonel Hirsh told AIR FORCE Magazine the study's first chore is to determine which pay improvement steps are the most needed. He also said he'll press for funding approval in the FY '81 budget for the highest-priority items. That budget is now in the process of being formulated.

Ample funding, of course, is the crux of the matter.

The government in recent years has made various gestures suggesting it intended to stay on top of military pay and ensure that compensation levels remained adequate. In August 1965, Congress, with White House endorsement, enacted legislation requiring the President to order a complete review of the military compensation system every four years and report the findings with recommendations for change to Congress.

The first of these Quadrennial Reviews of Military Compensation (QRMC) got under way in 1967, followed by the second in 1971 and the third in 1975. Each voluminously staffed exercise stretched out for months. Lengthy reports eventually surfaced.

In addition to the QRMCs, three sizable *ad hoc* commissions have analyzed military compensation and recommended a host of changes: the Gates Commission (1969), the Defense Manpower Commission (1976), and the President's Commission on Military Compensation (PCMC) (1978). Also getting into the pay study act were the Special Panel on Federal Salaries (1965), and a twenty-

200 twice-failed captains may be continued, including many more non-rated officers than this year, a Hq. USAF source indicated.

• The annual temporary lieutenant colonel board, which convened in late summer, was authorized to provide a seventy-five percent selection opportunity. It's been seventy percent in recent years. In addition, the board was to pick about seventy-five promotion contenders for Regular commissions. Heretofore, this board has chosen only a token five to ten for Regular. The action parallels somewhat the above-cited increase in tenure for many veteran active-duty Reservists.

Harris Conducting Viet-Era Probe

The Veterans Administration has awarded pollster Louis Harris a half-million-dollar contract to conduct a survey of public attitudes toward Vietnam-era veterans. The project will help the government in making policy decisions relating to such veterans, the VA said.

A brief overview of the public's attitudes was to be completed this month. However, VA said the major portion of the Harris survey will measure the attitudes of four groups: employers, educators, the general pub-

lic, and the Viet-era vets themselves. The results are due next July.

Off-Base Fatigue Wear Nixed

For years numerous USAF people have complained about the service's strict rules regulating the wear of fatigue uniforms off base. With a few exceptions, such as stopping to buy gas while driving from the base to home, or vice versa, the practice is a definite no-no.

It's the type of gripe some critics assign to the "Mickey Mouse" category that alienates members and causes them to leave service. Air Force traditionally has viewed fatigue wear off the reservation as damaging to its image.

That position was upheld recently when the Air Force Uniform Board rejected a proposal to authorize the "unlimited wear" of fatigues off base. The Board, among its thirteen other disapprovals of proposed uniform changes, also said "no" to replacing the present green fatigues with blue ones. It okayed the wear of USAF sweaters under the service coat, provided the sweater "does not show."

NCO Drug Pusher Gets Sixteen Years

A USAF staff sergeant in West Germany has been nailed with a sixteen-

year prison sentence for possessing and selling pot, amphetamines, and LSD. A report of the unusually stiff sentence appeared in numerous base newspapers as both a news item and a warning to other USAF members involved in drugs or thinking about it.

The NCO, of Sembach AB, Germany, received, in addition to the sixteen years, a dishonorable discharge and forfeited all pays. His was the most notorious of several recent courts-martial for drug abuse at Sembach.

Last September, USAFE launched Operation Counterpush, a then-new effort to curb the brisk drug activity throughout the command. OSI agents stepped up their probes. During the first quarter of FY '79, they completed investigations in USAFE involving 293 persons, which resulted in seizures of more than eleven kilograms of drugs worth \$42,000.

Until Counterpush, most of the USAFE antidrug effort focused on lower graders, E-1s through E-4s. The latest verdict is believed to be the first involving an NCO to receive Air Force-wide publicity.

Is Counterpush proving effective? An official close to the USAFE situation said it is difficult to tell, though he told AIR FORCE Magazine, "We believe we have driven most of the users

two-month-long DoD examination of the compensation of Reserve Forces, ending in June 1978.

Almost all of the many recommendations from these studies went nowhere. The main exception is the second QRMC that materialized in the variable reenlistment bonus and in a slight rise in flying pay. Certain changes proposed by the PCMC are contained in the Uniformed Services Retirement Benefit Act (USRBA), a legislative package Defense sent to Congress in July. However, there is no indication Congress will seriously consider it.

The most significant pay developments of the past fourteen years did not spring from any formalized pay study. One of these is the Rivers amendment, enacted by Congress in December 1967, which linked military pay to federal civilian pay, thus assuring that general raises for the latter would be extended to uniformed personnel. And the move to an All-Volunteer Force in 1971 was accompanied by significant increases in junior members' pay which, prior to that, was at the poverty level.

Those two changes—linkage with federal pay and the AVF-induced rates—advanced military compensation to more reasonable standards. However, according to the US Comptroller General, these actions unfortunately blunted certain service incentives to revamp the compensation system as advocated by the various study groups.

Widely different views on the value of the "X factor"—the dollar figure attached to the dangers and turbulence associated with a military career—is another reason given to explain why pay study recommendations have bogged down. Another reason is that compensation study proposals usually wind up as massive and complex packages that most members of Congress don't understand.

The major roadblock to streamlining the pay system and returning to adequate levels of compensation is cost. Administration after administration imposes "budget restraints." Meanwhile, necessarily expensive but long overdue people programs such as

the Stateside VHA, housing and subsistence allowance equality for single members, and reasonable per diem and travel stipends remain on the shelf year after year.

The very existence of the massive compensation probes of recent years serves to stifle certain pay initiatives. Concurrent with each big pay study, Pentagon officials often declare a moratorium on consideration of separate pay proposals. The rationale for the moratoriums is that as long as a formal study is reviewing compensation in general, it would be inconsistent to push for prompt action on a particular bonus, travel pay, or special pay, no matter how crucial the need.

With compensation studies groaning on and on for months or even years, this approach can effectively smother development of significant pay reforms. Probably the longest pay study of recent memory was chalked up by the Defense Manpower Commission. Created in November 1973, it did not conclude its work until April 1976.

Fortunately, the new study shouldn't drone on endlessly. The main participants are all knowledgeable active-duty officers; they know what's needed. Their key task, it appears from this corner, is to convince higher authorities that more funds are needed.

The funding must be substantial, if the things that need doing—such as making up for the pay caps, successfully competing for recruits at the diminishing marketplace, making flight pay more competitive with airline salaries, and nailing down that illusive VHA—are done.

A general military federal pay raise of just five percent costs about \$1 billion a year. A VHA would easily cost \$100 million, and more if realistic rates were established. Other necessary projects would also carry high price tags which, heretofore, Uncle Sam has rejected.

If the Administration refuses to cough up this kind of loot, the outcome of the new pay study may be a disappointing replay of those in the recent past. ■

The Bulletin Board

and dealers off the bases." Other reports hold that US troops have no problem finding all kinds of drugs in German cities.

The Office of the Secretary of the Air Force, meanwhile, has urged base newspaper editors "to give prominent play to courts-martial involving drug-related offenses."

Legal Officer Hopefuls, Hear This

Although Congress continues to take pot shots at USAF's modest legal officer training program, the service is going ahead with it. The service is inviting company-grade line officers with two to six years' service to apply between January 1 and March 1, 1980. On winning their law degrees, they'll become Air Force JAGs.

Twenty-five of the upcoming applicants will be fully subsidized; for their three years in law school they'll assume a six-year service obligation on graduation. Air Force figures that when their commitment is up they will have completed twelve to fourteen years' service and almost certainly will stay in.

A group of fifteen applicants will enter USAF's "excess leave program" at the same time. Unlike the subsidized students, they will lose their Air Force pay. The government won't pay their law school expenses, though they will continue to enjoy such active-duty benefits as medical care, exchanges, and commissaries.

They also will accrue time for promotion and retirement purposes.

Each year the House Appropriations Committee questions USAF's need for the special programs, contending that the services get enough lawyers "right out of law school" from other procurement projects. Air Force officials in recent congressional testimony agree, but noted that most of them leave at the earliest opportunity. Thus, the officials said, the forty new lawyers the service gets each year from the special training programs help plug the "middle-management" gap and provide the JAG corps with some stability. The lawmakers, apparently buying that pitch at least for the present, have not cut or reduced training funds in the FY '80 budget.

USAF Vows to Guarantee Twenty-Year Retirement

Whatever direction the Uniformed Services Retirement Benefit Act takes, the Air Force wants all hands to know it will go all out to protect the present twenty-year retirement system. The USRBA is the legislative package, sent to Congress recently, that would create entirely new retirement machinery. However, it also would let present members elect to continue under the current rules.

Hq. USAF officials told AIR FORCE Magazine, however, that they fear many NCOs and officers aren't aware of the measure's "grandfather" clause. Also, they noted that numerous members fear the grandfathering might be eliminated or watered down during the legislative process.

To help allay such fears, a new Hq. USAF statement beamed at all members states:

"Air Force leaders, from the Sec-

retary and Chief of Staff on down consider it their obligation to follow through on commitments made at the time of enlistment or commissioning. Therefore, you can be assured that they will forcefully defend your entitlement to continue under the current system during congressional hearings on the USRBA and any other forum where the USRBA is addressed.

"Our highest priority during the legislative process on the USRBA will be to guarantee that the twenty-year retirement system and current annuity levels are preserved for individuals who elect to remain under the current retirement system."

Meanwhile, Sen. Gary Hart (D-Colo.), who formerly opposed the findings of the pay study that led to the USRBA, has come out in support of the legislation. Senator Hart is on the Armed Services Committee.

Short Bursts

The first of four FY '80 Reserve officer recall boards met in July and extended active-duty bids to sixty-one former officers, mostly **ex-pilots, navigators, and technical types**. It represents another service initiative to offset large-scale officer separations and keep active-duty strength at authorized levels in these skills. The second board was scheduled to convene this month. Interested Reservists can get complete details by calling the Air Reserve Personnel Center, Denver, Colo., on toll-free number 1-800-525-1964.

The **Civil Air Patrol** is looking for USAF retirees to assume leadership posts with its 60,000-member cadet corps. Contact CAP's National Headquarters, Maxwell AFB, Ala. 36112, or call (205) 293-5416, for information. And the service once again is urging retirees to consider jobs with the **Air Force Junior Reserve Officer Training Corps**. Near-retirees, NCOs and officers, plus those who have retired within the past four years, are solicited. Call toll-free (800) 611-8750, ext. 7741.

The Air Force Manpower and Personnel Center is cranking up for the third annual board to choose a handful of chief master sergeant volunteers to **serve for thirty-three years**; thirty is the most they normally serve. Selectees receive special assignment consideration, but some feel the extra-tenure chiefs should also receive up to \$150 extra pay per month. The tenure board, to convene in January, will pick about fifty.

Big deal. During authorized drill

The new Deputy Chief of Staff for Plans and Programs for the North American Air Defense Command (NORAD), Colorado Springs, Colo., is Canadian Forces Maj. Gen. Claude A. LaFrance. The forty-seven-year-old native of Quebec City, while he was in Korea on exchange duty with USAF, shot down a Russian-built MIG-15; he received the US Distinguished Flying Cross. General LaFrance replaces Canadian Maj. Gen. R. Russell Barbor, who retired July 30 after thirty-five years of service.



periods, Army and Air Force Reservists and Guardsmen are now allowed to attend **base movies** while off duty. Why, one wonders, has the privilege been withheld so long?

Only 500 graduate degree and 125 Education With Industry spaces have been established for the FY '80 **Air Force Institute of Technology (AFIT)** program. Some 4,000 officers are now being looked at. Of the new AFIT entrants pursuing advanced degrees, only 200 will enter civilian universities; the others will study at AFIT, Wright-Patterson AFB, Ohio. Selections are to be announced in December. The **paucity of new spaces** follows House Appropriations Defense Subcommittee action to cut \$2.5 million from USAF's FY '80 graduate-education request. The lawmakers for years have charged the services with having more graduate-degree officers than necessary, not using AFIT and Navy's Postgraduate School to full capacity, and other alleged abuses.

By the time this is read, Congress may have decided whether to approve an **increase in GI education benefits**. Earlier, the Senate Veterans Affairs Committee had approved a seven percent hike in the benefits, but the Senate Budget Committee said it couldn't approve the \$250 million the plan would require. The Veterans Committee bill also would give some veterans an extra three years to use their GI benefits, a move AFA supports, and reduce from ninety to sixty percent the amount of flight training costs that would be paid by the Veterans Administration.

They used to be called PIOs, for Public Information Officers. Then, some years back, Air Force dropped the P and they've been known as IOs. It took a long time for most people to understand just who IOs were. Now, their identity well established, Air Force is giving them a new designation—"PAO" for **Public Affairs Officer**. Information offices will become Public Affairs Offices, just like in the Army. The change is effective this month. Perhaps the next change will bestow the more realistic label: PRO, signifying Public Relations Officer.

Senior Staff Changes

RETIREMENTS: M/G John W. Colens III; B/G Cecil D. Crabb; B/G Edward L. Ellis; M/G Ralph S. Saunders; M/G Robert L. Thompson, Jr.; M/G George M. Wentsch.

CHANGES: B/G Stanley C. Beck,

from Cmdt., ACSC, ATC, Maxwell AFB, Ala., to Cmdr., 57th AD, SAC, Minot AFB, N. D., replacing B/G James D. Gormley . . . **B/G Tommy I. Bell**, from Dep. Dir., Dev. & Prgm., DCS/RD&A, Hq. USAF, Washington, D. C., to Dir. of Dev. & Prgm., DCS/RD&A, Hq. USAF, Washington, D. C., replacing M/G William B. Maxson . . . **B/G James D. Gormley**, from Cmdr., 57th AD, SAC, Minot AFB, N. D., to Dep. Dir., Legislative Liaison, OSAF, Washington, D. C., replacing B/G Eugene M. Poe, Jr. . . . **M/G William W. Hoover**, from Cmdr., Lowry TTC, ATC, Lowry AFB, Colo., to Dir. of Military Application, DoE, Washington, D. C.

B/G Robert C. Karns, from Vice Cmdr., USAFTAWC, TAC, Eglin AFB, Fla., to Cmdt., ACSC, ATC, Maxwell AFB, Ala., replacing B/G Stanley C. Beck . . . **B/G Stanley C. Kolodny**, from Base Dental Surgeon, USAF Regional Hospital, Sheppard AFB, Tex., to Asst. Surgeon General for Dental Svcs., Ofc. of the Surgeon General, Hq. USAF, Bolling AFB, Washington, D. C., replacing retiring M/G Robert L. Thompson, Jr. . . . **M/G William B. Maxson**, from Dir. of Dev. & Prgm.,

DCS/RD&A, Hq. USAF, Washington, D. C., to Cmdr., Lowry TTC, ATC, Lowry AFB, Colo., replacing M/G William W. Hoover . . . **B/G Forrest S. McCartney**, from Dep. for Space Comm. Sys., SAMSO, AFSC, Los Angeles, Calif., to Asst. Dep. for ICBM, SAMSO, AFSC, Norton AFB, Calif. . . . **B/G Cornelius Nugteren**, from Vice Cmdr., Ogden ALC, AFLC, Hill AFB, Utah, to Cmdr., ARRS, MAC, Scott AFB, Ill., replacing retiring M/G Ralph S. Saunders . . . **B/G Eugene M. Poe, Jr.**, from Dep. Dir., Legislative Liaison, OSAF, Washington, D. C., to Dep. Asst. to Sec. of Defense (Legislative Affairs), OSD, Washington, D. C. . . . **B/G Davis C. Rohr**, from Cmdr., 388th TFW, TAC, Hill AFB, Utah, to Chief, Ofc. of Mil. Cooperation, Cairo, Egypt, replacing retiring B/G Cecil D. Crabb.

SENIOR ENLISTED ADVISOR CHANGE: CMSgt. Marvin G. Penfield, from 4th AD, SAC, Francis E. Warren AFB, Wyo., to Senior Enlisted Advisor, USAF Academy, Colo., replacing CMSgt. Elmer W. Wienecke, who has been named Special Aide to the Supt., USAF Academy, Colo. ■

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31st Annual Conclave in St. Louis

"... today, many citizens don't seem interested in where we as a nation are going, or how to get there, or who'll get us there. Because the young people at this conclave are interested in these questions, they are very important people indeed."

—Gen. William G. Moore, Commander in Chief, Military Airlift Command, speaking before the Arnold Air Society's Conclave

LOOKING ahead to another year of serving the Air Force and the nation, the combined Arnold Air Society and Angel Flight National Conclave held last spring in St. Louis was one of the most successful ever. Highlights of the five-day event included remarks by Gen. William G. Moore, then Commander in Chief, Military Airlift Command; Beverly K. Stokes, outgoing Angel Flight National Commander; and a seminar entitled "Angel Flight: An Air Force Voice in Tomorrow's Community." (See below.)

Led by ROTC Cadet Steven W. Dickey, pilot candidate at the University of Southern Illinois at Carbondale, a consortium of Arnold Air units from six universities hosted the thirty-first annual conclave.

Other host units are located at Southeast Missouri State University at Cape Girardeau, Southern Illinois University at Edwardsville, Parks College of St. Louis University, University of Missouri, and University of Illinois at Champaign.

Some 1,200 Arnold Air Society and Angel Flight members from 140 colleges and universities attended.

General Moore will serve as the Society's 1979-80 Honorary Na-

tional Commander, succeeding Gen. David C. Jones, Chairman of the Joint Chiefs of Staff. At the awards luncheon, General Moore discussed the importance of mobility forces to US defense strategy. He also pointed out that continued Air Force support from such organizations as the Air Force Association, Arnold Air Society, and Angel Flight is vital to the military institution.

Beverly Stokes opened the conclave with a keynote address expanding on the objectives of Angel Flight. Describing Angel Flight members as select college students not necessarily interested in a military commission or career, Miss

Stokes noted that members will fill influential roles in their communities and can be a valuable ally of the Air Force after graduation. A seminar sponsored by the AFA and conducted by former members of Angel Flight expanded on this theme.

Other activities included visiting a static display from Scott AFB emphasizing military airlift, a Field Organization Group display from Wright-Patterson AFB, a Boeing Aircraft Co. multiple projector visual presentation of new technology in tactical and strategic mobility, and a display of more than 1,000 detailed replicas of US military aircraft representing the evolution of America's airpower.

Cadet Thomas C. Lennep, Jr., University of Southern Mississippi, was elected Commander of the Arnold Air Society for 1979-80. National command headquarters of Angel Flight was retained at Louisiana State Uni-



Tootie Perry, national Angel Flight IO, prepares to take the controls of a flight simulator on display.



New National Commanders of Angel Flight and Arnold Air Society are Angel Flight Brig. Gen. Kathy Hufft, a Louisiana State senior, and AAS Brig. Gen. Thomas Lennop, a senior at the University of Southern Mississippi. Right, homeward-bound cadets relax in a C-130.



versity, with Kathy Hufft as the new commander.

Selected as the outstanding Arnold Air Society Area Commander, Cadet Brent Hathaway from Utah State University was awarded the H. H. Arnold Sabre.

Three squadrons out of 140 were recognized as best overall by size. Receiving the Maryland Cup for large squadrons was the John "Boots" Stratford Squadron of Auburn University. Medium-sized squadron receiving the Hagan Trophy was George V. Holloman Squadron of North Carolina State University. For outstanding performance as a small squadron, the Robert E. Lamotte Squadron at Michigan Technological University was awarded the Chennault Trophy.

Marianne Baird of The College of St. Catherine, Minn., and Mary Jo Herman, University of Nebraska-Lincoln, were honored as outstanding Angel Flight area commanders. Teri Nave of Auburn University was awarded the Aerospace Education Foundation's Lovelace Memorial Medallion as the outstanding cadet in the AFROTC southeast region. Miss Nave was also designated the outstanding commander of an individual Flight.

Miss Patti Poole of Baylor University was selected as "Little General," succeeding Holly Bac-

kus Eicher of St. Catherine College Angel Flight.

Arnold Air Society Distinguished Medallions were presented to the outstanding USAF advisors in each of the twelve areas. Recognition went to Capt. Phillip R. Crews of Virginia Polytechnic In-

stitute and State University; Maj. Jack Gregory, Clemson; Maj. Francisco J. Irizarry, University of Puerto Rico-Mayaguez; Lt. Col. Peter L. Henderson, Auburn; Capt. John L. Tullis, Ohio University; Capt. Richard J. O'Neil, University of Illinois, Champaign;

Contributing their extra time and personal funds to do something for someone else.

Angel Flight— An Air Force Voice in Tomorrow's Community

Participants and observers of the Air Force ROTC program sometimes ask the question, "Why Angel Flight?" With its predominantly female membership, isn't the organization counterproductive, now that women are entering the Air Force ROTC Cadet Corps in significant numbers?

The answer is that the two organizations represent a complementary relationship of future military and civilian leadership.

Angels contribute their extra time and not-so-extra funds to participate with the Arnold Air Society in campus and community service projects. They provide their own uniforms and conform to a standard acceptable to the AF-

ROTC Detachment Commander. They join in or host many of the Society-sponsored organizational and social functions for the AF-ROTC. In the process, the Angels become acquainted with the Air Force and its future leaders without incurring a military commitment. After graduation, Angels enter a variety of civilian professions. Some join the military as a result of experience as an Angel. They are an Air Force asset.

To demonstrate this, the Angel Flight and AFA sponsored a seminar at this year's national conclave in St. Louis. The topic: "Angel Flight: An Air Force Voice in Tomorrow's Community." Seven former members, now established in their communities, were asked to participate in the panel.

For the 900 people in the audience, the message was clear. Angels don't carry banners or march in parades. They do remain active in their communities. As Mrs. Kay Parish commented "... in the world of art, people are not exactly national defense-oriented. Yet, when the subject

Capt. Craig R. McCollar, University of Minnesota-Duluth; Capt. Lloyd Richards, University of Oklahoma; Capt. Ray Gregg, Grambling University; Maj. Curtis Godfrey, University of Kansas; Maj. Ronald C. Jones, University of Washington; and Maj. Stephen Eaves, Utah State.

Col. Thomas Jackson, AFROTC Detachment Commander at Louisiana State University, was recognized as the Outstanding Angel Flight Advisor. Col. John E. Wolter at University of Nebraska-Lincoln was honored as the Outstanding National Area Advisor.

Lt. Gen. Howard M. Fish, USAF, and Alfred R. Musi were reelected for second three-year terms as members of the Society's Board of Trustees Reserve Funds.

The Society realigned its area district lines to coincide with new AFROTC Regions. It will now consist of fourteen areas. To cope with problems caused by inflation, area management procedures were tightened for future official meeting activities.



Arnold Air Society's new "Little General," Patti Poole of Baylor University (holding the flowers), poses with other newly elected AAS and Angel Flight officers. Seven former Angels participated in a special seminar at the conclave. Six of them are shown below (no photo was available for Rhonda Rogers).

Dallas, Tex., was chosen as the site for the next National Conclave, which will be held April 5-9, 1980. Host squadrons will be Baylor University, at Waco; East

Texas State University, at Commerce, Tex.; Texas Christian University at Fort Worth; and North Texas State University, at Denton, Tex. ■

arises, the fact that I have something positive to say about the Air Force achieves at least the reaction that maybe there is something good about it."

For us in the AFA, it poses a challenge. If these seven participants are representative of former Angels everywhere, then there are people in communities throughout the country who do—or who would—enthusiastically support the Air Force, and the role it plays in national defense. Who are they? Where are they? How can they be heard? How can they be kept informed? The first two questions can be answered by Angels and former Angels; the last two perhaps cannot. Angels by and large are not veterans, do not belong to AFA, and only a few have access to information that makes today's defense issues understandable.

Finding a way to reemploy the services of former Angels—that is a made-to-order challenge for the Air Force Association.



Mitzi Clark is a nurse in Columbus, Ohio. She was in Angel Flight at Ohio State. She is married.



Capt. Joan Fudala, USAF, is a PAO in the Pentagon. She was the first Angel to become an AFROTC cadet.



Ms. Kay Kirkpatrick, former LSU Angel, now is an Assistant District Attorney for Baton Rouge, La.



Mrs. Bonnie Dunbar McDonald, former U. of Washington Angel, is a materials engineer for NASA at Houston.



Mrs. Kay Parish works as an administrative assistant for the Hunter Museum, Chattanooga, Tenn.



Ms. Colleen Wei is a reporter for WDM-TV, Washington, D. C. She attended the University of Maryland.

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KEYNOTERS:

The Hon. Hans M. Mark, Secretary of the Air Force
Gen. Lew Allen, Jr., Chief of Staff, USAF

SPEAKERS:

Dr. Seymour L. Zeiberg, Deputy Under Secretary of Defense
for Research and Engineering
Gen. Richard H. Ellis, Commander in Chief, SAC
Gen. James R. Allen, Deputy Commander in Chief
US European Command
Gen. Alton D. Slay, Commander, AFSC
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Gen. John W. Pauly, Commander in Chief, USAFE
Lt. Gen. James D. Hughes, Commander in Chief, PACAF
Lt. Gen. Hans H. Driessnack, Comptroller of the Air Force

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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): **Frank M. Lugo**, 5 S. Springbank Rd., Mobile, Ala. 36608 (phone 205-344-9234).

ALASKA (Anchorage, Fairbanks): **David W. Robinson**, P. O. Box 1120, Anchorage, Alaska 99510 (phone 907-274-3561).

ARIZONA (Phoenix, Tucson): **R. C. Olson**, 8313 E. Encanto, Scottsdale, Ariz. 85258 (phone 602-991-4208).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Arthur R. Brannen**, 605 Hospital Dr., Jacksonville, Ark. 72076 (phone 501-982-2595).

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, Fort 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 203-565-6994).

DELAWARE (Dover, Wilmington): **John E. Strickland**, 8 Holly Cove Lane, Dover, Del. 19901 (phone 302-678-6070).

DISTRICT OF COLUMBIA (Washington, D. C.): **Jack Reiter**, 881 17th St., N.W., Washington, D. C. 20006 (phone 202-298-8660).

FLORIDA (Bartow, Broward, Cape Coral, Fort Walton Beach, Gainesville, Jacksonville, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa): **John G. Rose**, 5723 Imperial Key, Tampa, Fla. 33615 (phone 813-355-4046).

GEORGIA (Athens, Atlanta, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **Lee C. Lingelbach**, 17 Ridgeland Dr., Warner Robins, Ga. 31093 (phone 912-922-7615).

HAWAII (Honolulu): **William B. Taylor**, 233 Keawe St., #630, Honolulu, Hawaii 96813 (phone 808-531-5035).

IDAHO (Boise, Twin Falls): **Ronald R. Galloway**, Box 45, Boise, Idaho 83707 (phone 208-385-5247).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, Peoria): **Kurt Schmidt**, 2009 Vawter St., Urbana, Ill. 61801 (phone 217-367-6633).

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. Pottsbaum**, 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-683-3963).

KENTUCKY (Louisville): **Bill Dotson, Jr.**, 3736 Mamaroneck, Louisville, Ky. 40218.

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **John H. Allen**, 10064 Heritage Dr., Shreveport, La. 71115 (phone 318-797-3306).

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**, 24 Cherrywood Dr., Stoughton, Mass. 02072 (phone 617-223-5630).

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): **Kenneth M. Holloway**, 13 Hermosa Dr., Ocean Springs, Miss. 39564 (phone 601-857-8382).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **Stuart E. Popp**, 5605 Hancock, St. Louis, Mo. 63139 (phone 314-351-8902).

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 Wilf**, 203 Cranford Rd., Cherry Hill, N. J. 08003 (phone 609-429-4245).

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): **Henry C. Newcomer**, 30 Brompton Circle, Williamsville, N. Y. 14221 (phone 716-633-9615).

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): **Warren L. Sands**, 7 Spruce CC Village, Minot, N. D. 58701 (phone 701-852-1061).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Toledo, Youngstown): **Edward H. Nett**, 1449 Ambridge Rd., Centerville, Ohio 45459 (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): **Martin T. Bergan**, 12868 SE Ridgecrest, Portland, Ore. 97236.

PENNSYLVANIA (Allentown, Beaver Falls, Chester, Dormont, Erie, Harrisburg, Homestead, Lewistown, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **John B. Flaig**, P. O. Box 375, Lemont, Pa. 16851 (phone 717-233-0357).

RHODE ISLAND (Warwick): **Charles H. Collins**, 143d TAG (RIANG), Warwick, R. I. 02886 (phone 401-737-2100).

SOUTH CAROLINA (Charleston, Columbia, Greenville, Myrtle Beach, Sumter): **Edith E. Callihan**, P. O. Box 959, Charleston, S. C. 29402 (phone 803-577-4400).

SOUTH DAKOTA (Rapid City): **D. L. Corning**, Camp Rapid, Rapid City, S. D. 57701.

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Jack K. Westbrook**, P. O. Box 1801, Knoxville, Tenn. 37901 (phone 615-523-6000).

TEXAS (Abilene, Austin, Big Spring, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Frank Manupelli**, P. O. Box 5250, San Antonio, Tex. 78201 (phone 512-349-1111).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **William C. Athas**, 2916 Willow Creek Rd., Sandy, Utah 84070 (phone 801-973-4300).

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): **H. B. Henderson**, 10 Cove Dr., Seaforth, Va. 23696 (phone 804-838-1300).

WASHINGTON (Seattle, Spokane, Tacoma): **Jack Gamble**, 7010 Turquoise Dr., SW, Tacoma, Wash. 98498 (phone 206-584-1610).

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).

AFA News

By Vic Powell, AFA AFFAIRS EDITOR



Rep. Cecil Heftel (D-Hawaii), member of the House Ways and Means Committee, was guest speaker at a recent luncheon meeting of the Hawaii Chapter. With Mr. Heftel are Chapter President William Taylor, left, and Maj. Gen. Hoyt S. Vandenberg, Jr., right, Vice Commander in Chief, Pacific Air Forces, Hickam AFB, Hawaii.



Problems of the SALT II Treaty were outlined recently in a speech given by Maj. Gen. George J. Keegan, USAF (Ret.), right, to the Indiana State AFA convention in Indianapolis. General Keegan formerly was head of Air Force Intelligence. Among those in the audience was John DePrez, center, publisher of the Shelbyville News. Roy P. Whitton, left, was reelected President of Indiana State AFA.



A Jimmy Doolittle Fellow Award, in memory of Col. Thomas W. Steed, Commander of the 456th Bomb Group, was presented by AFA Board Member retired Maj. Gen. Dan Callahan at a recent gathering of the bomb group association. From left: Dan C. Lowes, President; A. K. Trobaugh; W. C. Phillips, Director; General Callahan; L. A. Weissinger, Director; and J. F. Watkins, Secretary-Treasurer. The 456th Bomb Group Association donated \$1,000 to AFA's Aerospace Education Foundation. The funds are used to disseminate Air Force courses to the civilian education community.



Col. Steve Hinderliter, Office of Public Affairs, SAF, received the Member of the Year award during the recent Virginia State AFA convention. Jon R. Donnelly, outgoing President, received a Special Recognition award. H. B. Henderson, left, succeeds Donnelly as State President. Larry S. Dyer, right, President of the Northern Virginia Chapter, was presented the President of the Year plaque and the Chapter of the Year award at the convention.

chapter and state photo gallery



Recipients of the Maxwell A. Kriendler Memorial Award were J. Gilbert Nettleton, Jr., left, an AFA Board Member, and Sen. Howard W. Cannon (D-Nev.), third from left. The presentations were made by Iron Gate Chapter President Col. Francis S. Gabreski, USAF (Ret.), far right, top living American ace. The awards were made at this year's National Air Force Salute, the annual major event of the Iron Gate Chapter. Second from left is Sheldon Tannen, nephew of the late Mr. Kriendler, who gave a brief history of the Iron Gate Chapter, named for the decor at New York City's "21 Club," original meeting place of the Chapter.

Lt. Gen. Lawrence A. Skantze, center left, Commander of Aeronautical Systems Division at Wright-Patterson AFB, Ohio, presents a \$1,300 check to Col. Richard Uppstrom, Director of the Air Force Museum. Funds to support the Museum were donated from the ninth "Stewart Open" golf tournament. John McCollom, left, was tournament director. Salvador Ramos, right, is President of AFA's Wright Memorial Chapter, host for the event. A check for \$1,000 was also sent to the Aerospace Education Foundation, AFA's affiliate.



COMING EVENTS

AFA's National Symposium. "New Defense Horizons: Changing Strategy for a Changing World," Hyatt House Hotel, at Los Angeles International Airport, Calif., October 25-26 . . . **Eighth Annual Air Force Ball,** Century Plaza Hotel, Los Angeles, Calif., October 26 . . . **Iron Gate Chapter's 17th National Air Force Salute,** Sheraton Center, New York, N. Y., March 22, 1980 . . . **AFA Golf and Tennis Tournaments,** The Broadmoor, Colorado Springs, Colo., May 23, 1980 . . . **AFA Nominating Committee and Board of Directors Meetings,** The Broadmoor, Colorado Springs, Colo., May 24, 1980 . . . **Twenty-first Annual Dinner Honoring the Air Force Academy's Outstanding Squadron,** The Broadmoor's International Center, Colorado Springs, Colo., May 24, 1980.



Five of the thirteen Air Force ROTC cadets who recently visited Grand Forks AFB, N. D., and attended the Red River Valley Chapter Ball and Awards ceremony chat with Chief Master Sergeant of the Air Force Robert A. Gaylor, right, the featured speaker. The cadets are participating in the AFROTC Advanced Training Program, an opportunity to experience leadership, human relations, and management challenges facing the Air Force.

AFA News



Gen. Bryce Poe II, Commander of the Air Force Logistics Command, Wright-Patterson AFB, Ohio, was guest speaker at a recent meeting of AFA's Illini Chapter at Chanute AFB, Ill. Here, he greets Maj. Gen. Norma Brown, Commander of Chanute Technical Training Center. General Brown formerly reported to General Poe when she served as Deputy Chief of Staff for Manpower and Personnel at AFLC.



AFA's Chattanooga, Tenn., Chapter has installed new officers. They include, from left: John Glass III, Vice President, and Maj. George Gunter, USAFR, President. C. Wayne Shearer, immediate past President, and Jack Westbrook, President of Tennessee State AFA, who took part in the installation.



Texas State AFA recognized the Air Force's leading recruiting team recently by sponsoring a week-long trip to San Antonio for the recruiters and their spouses. SMSgt. Don Doty, Recruiting Flight Supervisor in Fort Worth, Tex., received this plaque as leader of the top USAF recruiting flight in the nation. At left is Frank Jones, Vice President of the state organization, and on the right is Texas State AFA President Frank Manupelli.



This monument, donated by California State AFA, was dedicated on the twenty-fifth anniversary of the Space and Missile Systems Organization (SAMSO), on August 3. Among those attending the silver anniversary monument ceremonies at SAMSO's El Segundo, Calif., headquarters were, left to right, Dick Doom, Vice President, California State AFA South; Matt Portz, Los Angeles Air Power Chapter; Jack Bruyan, monument signer; Clarence Hill, California State AFA monument chairman; Mrs. Carpenter and E. Carpenter, Los Angeles Air Power Chapter President; and Lt. Col. Paul Heye, SAMSO.

photo gallery



Karl Benkesser, left, President of AFA's Blue Barons Chapter, and Steve Brantley, right, President of Colorado State AFA, present an AFA Certificate of Appreciation to Bob Cannon, Education Director, Estes Industries (model rocketry). Cannon was recognized for his continued support and promotion of aerospace education in the state of Colorado.



Mrs. Evelyn Parker, Mayor Pro-Tem of Spring Lake, N. C., and board member of the Pope AFB Chapter of AFA, recently presented an AFA commemorative plate to Royal Air Force Wing Commander Pat Tootal in a ceremony at RAF Lyneham, England. Mrs. Parker, along with regional and local news media, visited the UK to observe how the Military Airlift Command and the 317th Tactical Airlift Wing from Pope AFB support NATO and US Air Forces in Europe.



The 1979 Service Award of the Curtis E. LeMay Chapter of Orange County, Calif., was presented recently to AFA member Bob Clifford, left, President of Air California, by Tom Scott, Chapter President. The award is given annually to an outstanding citizen of Orange County for civic contributions and for support of the goals of the Air Force Association.

Shown is Master Navigator tie.



XMAS presents that are good all year. For \$10 you can get one of these ties for a friend or yourself and contribute to the Air Force Historical Foundation: Command Pilot, Pilot, Master Navigator, Missileman, Navy Pilot, and the brand-new Flight-Surgeon. Send your check and specify pattern to: **AEROSPACE HISTORIAN** Eisenhower Hall Manhattan, KS, 66506, USA.

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My check (or money order) for \$ _____ is enclosed.

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20%
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Paid for 1978 Reduction
Net Cost to All-Time Low

CURRENT BENEFIT TABLES

Insured's Attained Age	STANDARD PREMIUM: \$10 per month	HIGH OPTION PREMIUM: \$15 per month	HIGH OPTION PLUS PREMIUM: \$20 per month
	Basic Benefit*	Basic Benefit*	Basic Benefit*
20-29	\$85,000	\$127,500	\$170,000
30-34	65,000	97,500	130,000
35-39	50,000	75,000	100,000
40-44	35,000	52,500	70,000
45-49	20,000	30,000	40,000
50-54	12,500	18,750	25,000
55-59	10,000	15,000	20,000
60-64	7,500	11,250	15,000
65-69	4,000	6,000	8,000
70-74	2,500	3,750	5,000
Aviation Death Benefit*			
Non-war related	\$25,000	\$37,500	\$50,000
War related	\$15,000	\$22,500	\$30,000
Extra Accidental Death Benefit*	\$12,500*	\$15,000*	\$17,500*

*The Extra Accidental Death Benefit is payable in addition to the basic benefit in the event an accidental death occurs within 13 weeks of the accident, except as noted under AVIATION DEATH BENEFIT (below).

*AVIATION DEATH BENEFIT: The coverage provided under the Aviation Death Benefit is paid for death which is caused by an aviation accident in which the insured is serving as pilot or crew member of the aircraft involved. Under this condition, the Aviation Death Benefit is paid in lieu of all other benefits of this coverage. Furthermore the non-war related benefit will be paid in all cases where the death does not result from war or an act of war, whether declared or undeclared.

OTHER IMPORTANT BENEFITS

COVERAGE YOU CAN KEEP. Provided you apply for coverage under age 60 (see "ELIGIBILITY") your insurance may be retained at the same low group rates to age 75.

FULL TIME, WORLD WIDE PROTECTION. The policy contains no war clause, hazardous duty restriction, combat zone waiting period or geographical limitation.

DISABILITY WAIVER OF PREMIUM. If you become totally disabled at any time prior to age 60 for at least a 9-month period, your coverage will be continued in force without further payment of premiums as long as you remain disabled.

FULL CHOICE OF SETTLEMENT OPTIONS. All standard forms of settlement options, as well as special options agreed to by the insured and United of Omaha, are available to insured members.

CONVENIENT PAYMENT PLANS. Premium payments may be made by monthly government allotment (payable to Air Force Association), or direct to AFA in quarterly, annual or semi-annual installments.

DIVIDEND POLICY. AFA's primary policy is to provide maximum coverage at the lowest possible cost. Consistent with this policy, AFA has provided year-end dividends in all but three years (during the Vietnam War) since the program was initiated in 1961, and basic coverage has been increased on six separate occasions.

ADDITIONAL INFORMATION

Effective Date of Your Coverage. All certificates are dated and take effect on the last day of the month in which your application for coverage is approved, and coverage runs concurrently with AFA membership. AFA Military Group Life Insurance is written in conformity with the insurance regulations of the State of Minnesota. The insurance will be provided under the group insurance policy issued by United of Omaha to the First National Bank of Minnesota as trustees of the Air Force Association Group Insurance Trust.

EXCEPTIONS: There are a few logical exceptions to this coverage. They are:
Group Life Insurance: Benefits for suicide or death from injuries intentionally self-inflicted while sane or insane will not be effective until your coverage has been in force for 12 months.

The Accidental Death Benefit and Aviation Death Benefit shall not be effective if death results: (1) From injuries intentionally self-inflicted while sane or insane, or (2) From injuries sustained while committing a felony, or (3) Either directly or indirectly from bodily or mental infirmity, poisoning or asphyxiation from carbon monoxide, or (4) During any period a member's coverage is being continued under the waiver of premium provision, or (5) From an aviation accident, either military or civilian, in which the insured was acting as pilot or crew member of the aircraft involved, except as provided under AVIATION DEATH BENEFIT.

ELIGIBILITY

All active duty and retired* personnel of the Armed Forces of the United States, members of the Ready Reserve* and National Guard*, Armed Forces Academy cadets*, and college or university ROTC cadets* are eligible to apply for this coverage provided they are under age 60 and are now, or become, members of the Air Force Association.

*Because of certain restrictions on the issuance of group insurance coverage, applications for coverage under the group program cannot be accepted from non-active duty personnel residing in either New York or Ohio. Non-active duty members residing in these states, however, may request special application forms from AFA for individual policies which provide coverage quite similar to the group program.

OPTIONAL FAMILY COVERAGE

(may be added to any of the above Plans)

PREMIUM: \$2.50 per month

Insured's Attained Age	Life Insurance Coverage for Spouse	Life Insurance Coverage for each Child*
20-39	\$10,000	\$2,000
40-44	7,500	2,000
45-49	5,000	2,000
50-54	4,000	2,000
55-59	3,000	2,000
60-64	2,500	2,000
65-69	1,500	2,000
70-74	750	2,000

*Between the ages of six months and 21 years, each child is provided \$2,000 coverage. Children under 6 months are provided with \$250 coverage once they are 15 days old and discharged from hospital.

Please Retain This Medical Bureau Prenotification For Your Records

Information regarding your insurability will be treated as confidential. United Benefit Life Insurance Company may, however, make a brief report thereon to the Medical Information Bureau, a nonprofit membership organization of life insurance companies, which operates a information exchange on behalf of its members. If you apply to another bureau membership company for life or health insurance coverage, or a claim for benefits is submitted to such company, the Bureau, upon request, will supply such company with the information in its file.

Upon receipt of a request from you, the Bureau will arrange disclosure of any information may have in your file. (Medical information will be disclosed only to your attending physician if you question the accuracy of information in the Bureau's file, you may contact the Bureau and seek a correction in accordance with the procedures set forth in the federal Fair Credit Reporting Act. The address of the Bureau's information office is P.O. Box 105, Essex Station Boston, Mass. 02112. Phone (617)426-3660.

United Benefit Life Insurance Company may also release information in its file to other life insurance companies to whom you may apply for life or health insurance, or to whom a claim for benefits may be submitted.

Coverage Up to \$170,000



**APPLICATION FOR
AFA MILITARY GROUP LIFE INSURANCE**



Group Policy GLG-2625
United Benefit Life Insurance Company
Home Office Omaha Nebraska

Full name of member _____
Rank _____ Last _____ First _____ Middle _____

Address _____
Number and Street _____ City _____ State _____ ZIP Code _____

Date of birth _____
Mo. Day Yr. _____
Height _____
Weight _____
Social Security Number _____

Name and relationship of primary beneficiary _____

Name and relationship of contingent beneficiary _____

Please indicate category of eligibility and branch of service.
 Extended Active Duty
 Ready Reserve
 National Guard
 Retired
 Armed Forces Academy
 ROTC Cadet
 Air Force
 Other _____
 (Branch of service)

This insurance is available only to AFA members
 I enclose \$13 for annual AFA membership dues (includes subscription (\$9) to AIR FORCE Magazine).
 I am an AFA member.

Please indicate below the Mode of Payment and the Plan you elect:

Mode of Payment	Standard Plan		High Option Plan		High Option PLUS Plan	
	Member Only	Member And Dependents	Member Only	Member And Dependents	Member Only	Member And Dependents
Monthly government allotment. I enclose 2 month's premium to cover the necessary period for my allotment (payable to Air Force Association) to be established.	<input type="checkbox"/> \$ 10.00	<input type="checkbox"/> \$ 12.50	<input type="checkbox"/> \$ 15.00	<input type="checkbox"/> \$ 17.50	<input type="checkbox"/> \$ 20.00	<input type="checkbox"/> \$ 22.50
Quarterly. I enclose amount checked.	<input type="checkbox"/> \$ 30.00	<input type="checkbox"/> \$ 37.50	<input type="checkbox"/> \$ 45.00	<input type="checkbox"/> \$ 52.50	<input type="checkbox"/> \$ 60.00	<input type="checkbox"/> \$ 67.50
Semi-Annually. I enclose amount checked.	<input type="checkbox"/> \$ 60.00	<input type="checkbox"/> \$ 75.00	<input type="checkbox"/> \$ 90.00	<input type="checkbox"/> \$105.00	<input type="checkbox"/> \$120.00	<input type="checkbox"/> \$135.00
Annually. I enclose amount checked.	<input type="checkbox"/> \$120.00	<input type="checkbox"/> \$150.00	<input type="checkbox"/> \$180.00	<input type="checkbox"/> \$210.00	<input type="checkbox"/> \$240.00	<input type="checkbox"/> \$270.00

Names of Dependents To Be Insured	Relationship to Member	Dates of Birth Mo. Day Yr.	Height	Weight

Have you or any dependents for whom you are requesting insurance ever had or received advice or treatment for: kidney disease, cancer, diabetes, respiratory disease, epilepsy, arteriosclerosis, high blood pressure, heart disease or disorder, stroke, venereal disease or tuberculosis? Yes No

Have you or any dependents for whom you are requesting insurance been confined to any hospital, sanatorium, asylum or similar institution in the past 5 years? Yes No

Have you or any dependents for whom you are requesting insurance received medical attention or surgical advice or treatment in the past 5 years or are now under treatment or using medications for any disease or disorder? Yes No

If YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, EXPLAIN FULLY including date, name, degree of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I apply to United Benefit Life Insurance Company for insurance under the group plan issued to the First National Bank of Minneapolis as Trustee of the Air Force Association Group Insurance Trust. Information in this application, a copy of which shall be attached to and made a part of my certificate when issued, is given to obtain the plan requested and is true and complete to the best of my knowledge and belief. I agree that no insurance will be effective until a certificate has been issued and the initial premium paid.

I hereby authorize any licensed physician, medical practitioner, hospital, clinic or other medical or medically related facility, insurance company, the Medical Information Bureau or other organization, institution or person, that has any records or knowledge of me or my health, to give to the United Benefit Life Insurance Company any such information. A photographic copy of this authorization shall be as valid as the original. I hereby acknowledge that I have a copy of the Medical Information Bureau's prenotification information.

Date _____, 19____ Member's Signature _____

Bob Stevens'

"There I was..."

WHEN VARIOUS FIGHTER GROUPS MIXED IT UP WITH THE ENEMY OVER THE BOMBER STREAM - and ALL ON A COMMON FREQUENCY - MISTAKES WERE BOUND TO HAPPEN...



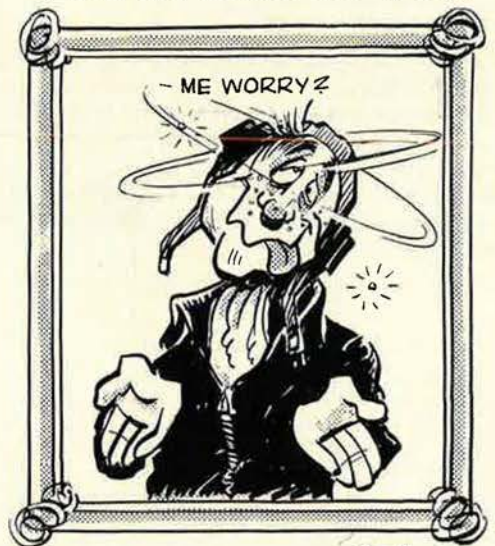
MOST OF OUR AAF WWII FIGHTERS, WITH THE NOTABLE EXCEPTION OF THE P-47 & P-61, WERE POWERED BY LIQUID COOLED IN-LINE ENGINES (IF YOU THINK I'M GOING TO GET INTO THE PROS & CONS OF THIS DECISION, YOU'RE CRAZY). ONE THING WAS FOR SURE WITH THESE ENGINES, HOWEVER; WHEN YOU WERE OUT OF COOLANT, YOU WERE OUT OF LUCK!



ONE WAY TO DETERMINE WHETHER THE PUDDLE UNDER YOUR BIRD WAS FUEL OR COOLANT - A MIXTURE OF ALCOHOL and WATER - WAS TO DIP A PINKIE IN and TASTE IT.



PORTRAIT OF A PILOT WITH A LEAKY COOLANT TANK



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