OCTOBER 1988/$2

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New Pressures on International Security

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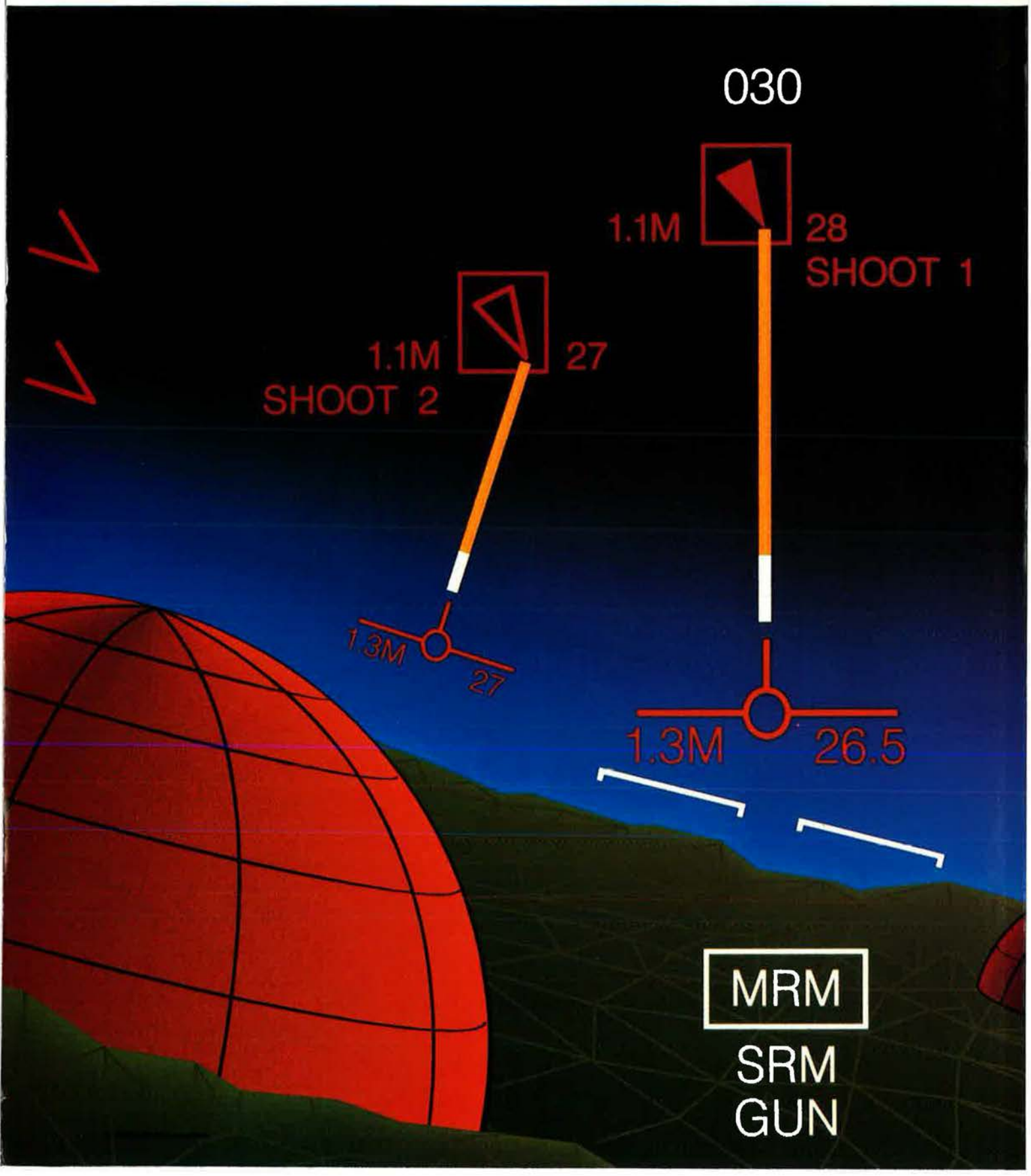

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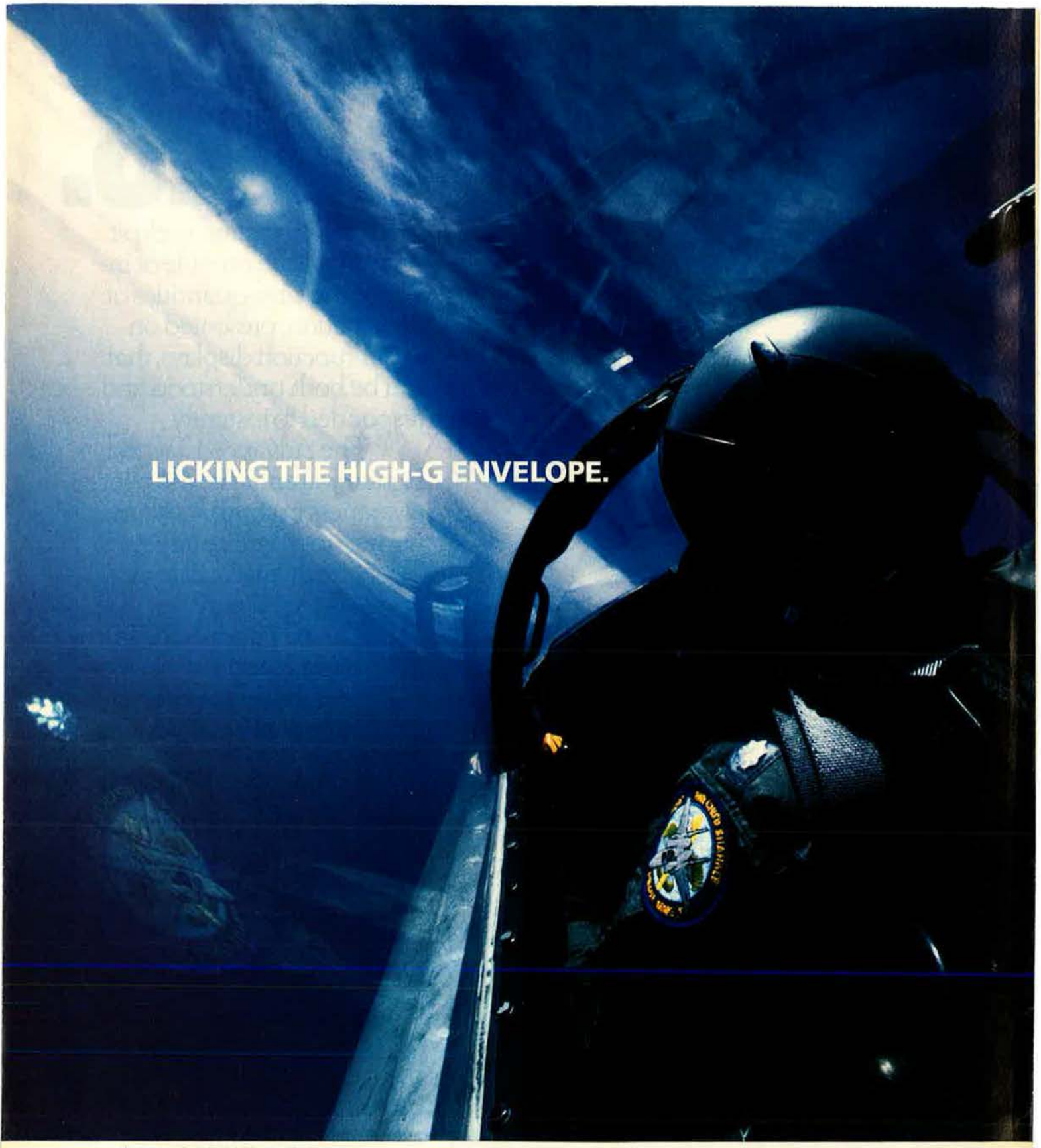

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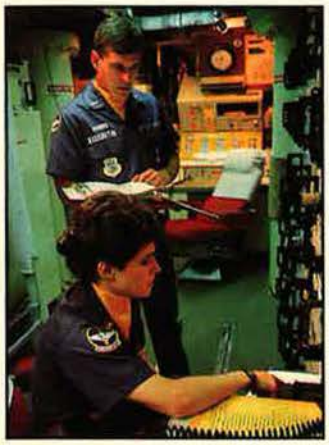

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About the cover: In a recent exercise, SrA. Curtis Weaver, of the 823d Civil Engineering RED HORSE Squadron, donned his gas mask and provided cover fire. A special section on "International Security" begins on p. 34. (USAF photo by A1C Gary Coppage)

Special Section: International Security

Features

Departments

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An Editorial

What Military-Industrial Complex?

By John T. Correll, EDITOR IN CHIEF

ONE OF THE great myths of modern times is that a conspiratorial "military-industrial complex" is somehow undermining our national purpose and well-being. The myth gained new life this summer from allegations by the Justice Department that some industry consultants, in cahoots with government insiders, had been trying to manipulate the defense procurement process. These revelations have fed demands that Congress and the Administration toughen up their controls on the Pentagon and the defense industry.

As specific charges emerge, the public may conclude that shady actions are typical of the defense acquisition community from top to bottom. Many people may see the current scandals as confirming the sinister military-industrial complex myth. If so, they will be making a big mistake.

To begin with, the beast does not exist. The defense industrial base has so shrunk that it can no longer respond to a call for surge production or wartime mobilization. For that matter, domestic industry has trouble meeting peacetime defense needs. Within the next decade, the United States may become even more dependent than it already is on foreign sources for critical components in its high-technology weapon systems. Defense plays second fiddle to commercial product lines in the marketplace. The government-industry relationship, far from cozy, is becoming increasingly adversarial, strained, and hostile.

Such are the sorry facts about what the mythmakers paint as a powerful and dangerous conspiracy. A more valid concern would be that the United States is on the road toward becoming a second-rank manufacturing and technology power.

The term "military-industrial complex" was introduced by President Eisenhower in his 1961 Farewell Address. Usually forgotten is that his warning about its potential for "unwarranted influence" was a corollary to his larger points that "we can no longer risk emergency improvisation of national defense" and that a strong armaments industry had become essential to US security.

President Eisenhower acknowledged that the armed forces he led in World War II could not have won without support from the "Arsenal of Democracy." At peak production, American industry turned out a military aircraft every ten minutes, a tank every twenty-five minutes. That capability is gone, probably forever.

Today, the average waiting time for aircraft landing gear is twenty-eight months; for engine bearings, twenty-three months. No more than a handful of suppliers remains for gun mounts, specialty lenses, optical coatings, and many other components. The F-16 fighter and the M1 Abrams tank are just two of the US military systems that contain semiconductor chips available only from foreign sources.

Most defense contractors are honest and intensely serious about national defense. There are some shifty operators and, unfortunately, a few real crooks. For example, the outfit that deliberately sold defective flash suppressors for M16 rifles, then shrugged it off by saying that if the faulty equipment killed one soldier, there would be more soldiers around to complete the job. Such cretins, however, are not typical. Decent contractors are as revolted by them as the rest of us are.

The decent contractors are tagged with a bad reputation they do not deserve. It has been compounded by the folklore that waste, fraud, and abuse are rampant in government, especially in defense. The aggressive fraudbusting initiatives of the 1980s have turned up some wrongdoing, but they have also found that fraud exists only in a small fraction of defense procurements.

Since 1982, the Department of Defense has increased its fraud investigation force by 178 percent and the number of auditors by forty-six percent. It has installed fraud-reporting hotlines and has told government employees to be alert for anything that looks like fraud. As we know from the Justice Department's recent revelations, bugging and wiretaps have been in active use. The number of suspensions and debarments of defense contractors has risen tenfold. It is doubtful, however, that any other sector of industry would have looked better—or as good—if put through the same wringer.

Unfortunately, this bad image is only part of the defense industrial base's problem. Federal budgets that allocate less than six percent of GNP to defense have left today's industry a pale shadow of the "Arsenal of Democracy." Wild fluctuation in funding from year to year creates an atmosphere of instability and uncertainty. Procurements are governed by a nightmarish tangle of laws and regulations that often contradict each other and throw incentives and disincentives into confusion.

American industry has not made the long-range commitments, capital investments, or productivity enhancements to compete in the world market. While we remain sensitive to accusations of "protectionism," foreign firms, with the strong backing of their governments, continue to penetrate US markets.

The public should not waste its time wondering whether a mythical "military-industrial complex" is growing too strong. It should worry instead about a defense industrial base that has become too weak for its own good—or for ours. ■

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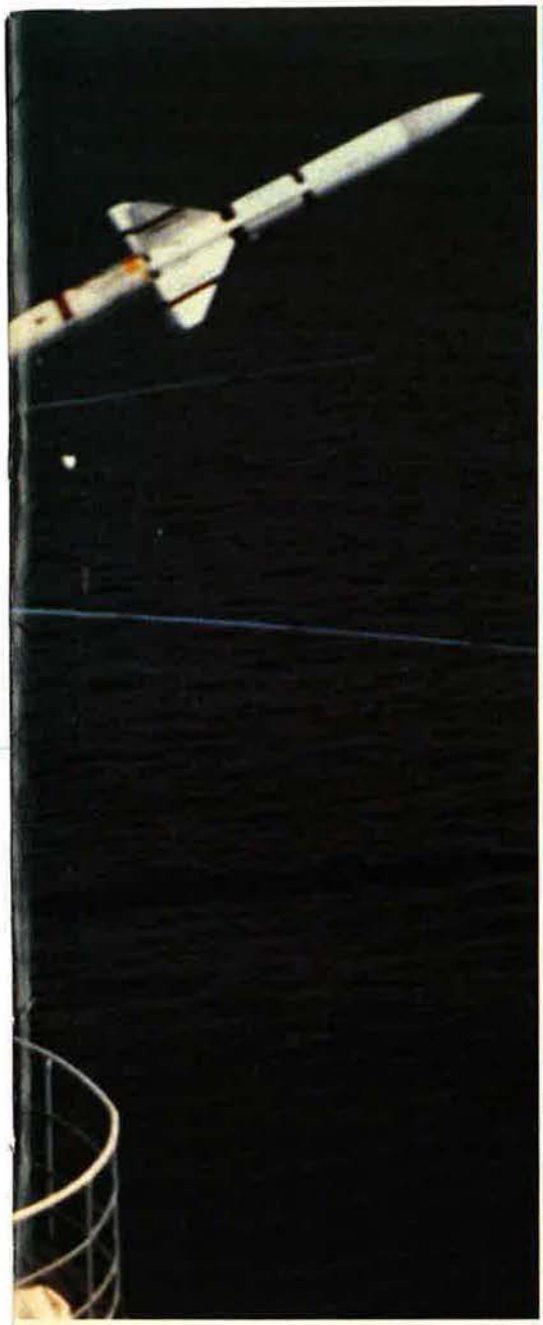

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What Had to Be Done

John T. Correll concludes his excellent editorial *(see "The Hard Realities of War," p. 4, August '88 issue)* by asking "how well we as a nation comprehend the hard realities of war" in relation to the shoot-down of the Iranian airliner on July 3, 1988. How many Americans comprehend "the hard realities of war"? Can anyone who has not been in combat understand "the hard realities of war"? I doubt it. Of an estimated population of 240,000,000, has one percent or two really been under enemy fire? . . .

As the reports of the *Vincennes* incident came in, my mind flashed back to December 2, 1944. The B-24 on which I was the tailgunner had received battle damage over Black Hammer synthetic oil refineries. After losing an engine, we fell behind the rest of the formation, very vulnerable to German fighters. Far out to my left were two fighters. Were they Me-109s or P-51s? I had been drilled and drilled on aircraft recognition, especially on the differences between the Me-109 and the P-51. But I was scared.

Now they wing up and start a pursuit curve. I see they are P-51s. But wait—aren't the Germans flying captured US aircraft? Should I fire? In gunnery school the combat veteran instructor told us that when a fighter goes into a pursuit curve he has to be considered a threat. Now they break off the pursuit curve and dive under us. Thank God, they're gone!

All these thoughts raced through my mind in a matter of seconds, a tenth of the time that it took you to read this. That is the way that it is in combat, and that is the way it was to the sailors on the *Vincennes.* Damn the critics; what was done had to be done.

MSgt. Edwin O. Learnard, USAF (Ret.)
San Diego, Calif.

Low-Intensity Conflict

In the August 1988 issue of AIR FORCE Magazine, you presented an excellent editorial, "The Hard Realities of War," in which you focused on the nature of modern technological combat in the Persian Gulf/Arabian Sea.

We must take some exception to the remark that the Gulf War is widely perceived as a "low-intensity conflict" (LIC) due to the tactics and weaponry involved. . . . This must be viewed as a limited definition. To be sure, armed conflict is a portion of the full spectrum of warfare; however, it is incorrect to define warfare solely in terms of *armed* conflict. "War" is not an operational term. It describes an environment in which military operations of a highly specific type are conducted, *e.g.,* attack, defend, delay, withdrawal. The Gulf War is an LIC based on the US national objectives there and the means we are using to pursue those objectives.

The OJCS-approved definition of LIC reflects the overarching political nature of LIC, in which military force represents but one of the national instruments of power that support the national *political* goals. Within the war environment, however, *military force* represents the preeminent national instrument. In war, the capabilities of the armed services are aimed at destroying the enemy's centers of gravity, defined as enemy forces. In the LIC environment, the center of gravity is the populace itself. Hence, military capabilities are not applied solely to "force on force" combat activities, but in many nontraditional roles that support the host nation through infrastructure development and security/stability operations.

Military traditionalists have a problem accepting such roles. Former Naval Secretary James H. Webb's observation, "Nations make war. Soldiers merely fight them," reflects this problem of thinking of military personnel and units solely in terms of power projection, rather than as national capabilities available to prevent war, not just wage war.

Lt. Col. William H. Thornton, USA
Army-Air Force Center for Low Intensity Conflict
Langley AFB, Va.

Effective Employment

An initiative started by Det. 5, 602d Tactical Air Control Wing at Fort Ord, AIN, Calif., will reduce the C-141 sorties required to transport a division tactical air control party (TACP) maintenance element from four to just one and a half. Alaskan Air Command is taking action to procure this package, and Tactical Air Command is writing a statement of need.

This package recommends the use of a Gichner GMS-1316 shelter mounted on an M-1031 CUCV with a cab-over diesel generator/ECU. AFCC's dual-wheel modification is suggested on the M-1031, which increases payload and stability and allows easy towing of an M-101 trailer. Use of RDA Logicon's eleven-foot-by-eleven-foot Integrated Command Post System (ICPS) tents [increases] the flexibility and usable floor space of this concept.

A key to this concept is the fielding of a multifunctional test set. IFR's FM/AM-1500s, or a comparable item, is suggested to alleviate the duplication involved in today's single-function items. Any future radio buys should stipulate maintainability with a multifunctional test set to preclude excessive mobility loads.

This concept warrants Air Staff appraisal, as it allows a more effective employment of DoD resources. Experience at Fort Ord indicates the Army's Signal Corps is also faced with outsized C-E shelters. This modular, drive-direct-aboard aircraft (allows use of C-130, C-141, KC-10A, C-5A, and C-17A) concept will allow more sorties for truly needed outsized cargo—tanks, artillery pieces, and helicopters. With the C-17As going for $166 million apiece, we cannot afford

Do you have a comment about a current issue? Write to "Airmail," AIR FORCE Magazine, 1501 Lee Highway, Arlington, Va. 22209-1198. Letters should be concise, timely, and legible (preferably typed). We reserve the right to condense letters as necessary. Unsigned letters are not acceptable, and photographs cannot be used or returned.

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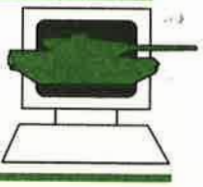

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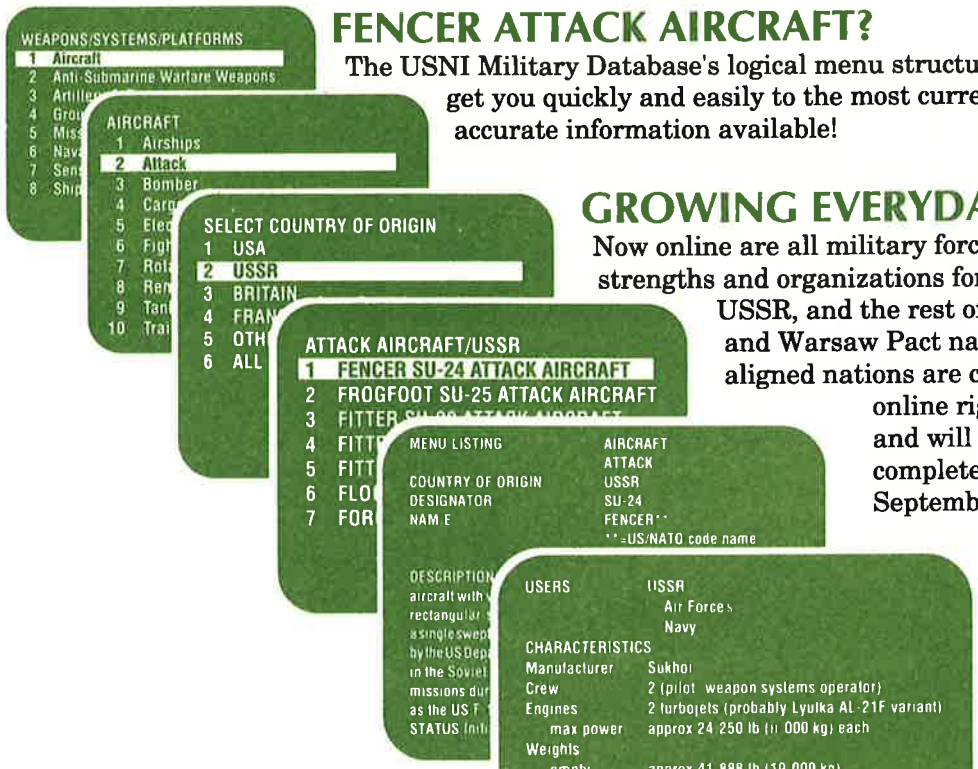

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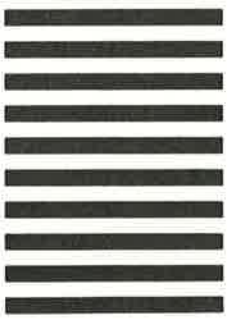

to waste this critical defense asset.

The "Light Concept" is projected at the same cost as that of replacing the M-35 two-and-a-half-ton trucks with the M-923 five-ton series, which requires an increase in sorties.

Anyone desiring more information, or having additional ideas on this concept, please contact me.

SMSgt. Mark E. Houston, USAF
Det. 5, 602d TAIRCW/LGK
Fort Ord, Calif. 93941-7460
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C-17 Airlifter

Congratulations to Jeffrey Rhodes on his excellent story on the C-17 in your August issue *("The First C-17," p. 54)*. He certainly gave his readers a wealth of information on this latest addition to MAC's fleet of great cargo airlifters.

However, aside from brief mention of a capability to airdrop outsized equipment and a reference to LAPES, the true *airdrop* potential of the C-17 and the many innovative design improvements that will make this possible seem to have escaped mention. Often in the past, stories on new airlifters have deemphasized the importance of the airdrop role because airdrop missions would account for only a small percentage of the total lifetime flights of the aircraft.

This is not so in the case of the C-17, in which airdrop should enjoy a much larger slice of the total usage pie. . . . Heavier ADS siderails, a larger and stronger cargo ramp, and push-button operation promise an increased role for the C-17 as a substitute for the larger, more vulnerable C-5A in the ultraheavy airdrop role (loads exceeding 60,000 pounds each). . . .

However, weight growth of the aircraft is dictating remedial decisions not [in keeping with] the airdrop mission. Operational utility, described by a MAC loadmaster recently as the "lifeblood of the MAC mission," is often sacrificed in the interest of weight-cutting. How many of the design improvements will remain intact in the C-17 when it is produced may depend to a great extent on how flexible the Air Force is regarding the tradeoff between aircraft weight and operational utility. . . .

Henry J. Hunter
Lancaster, Calif.

With reference to your August 1988 article on the C-17, please be advised that the tires to be supplied for this new aircraft are not radials, as you describe.

BFGoodrich is currently developing these tires using the advanced AAT bias construction similar to that developed for the Space Shuttle tires.

Reinhard H. Golz
BFGoodrich Aerospace
Akron, Ohio

• *Reader Golz is correct.*—THE EDITORS

Phantom vs. Voodoo

There are a couple of points I'd like to make regarding "Triumph at Thai Nguyen" by John L. Frisbee *(see "Valor," p. 114, July '88 issue).*

First, the RF-4C arrived at Udorn Royal Thai AB in July 1966. The first detachment of the 9th Tac Recce Squadron (TRS) deployed from Shaw AFB, S. C., landed at Udorn Royal Thai AB three days later, and became the 6461st TRS. We remained the 6461st until around October 1966, when the rest of our squadron came over and brought our unit name (9th TRS) to us. We were the leading edge of the new RF-4Cs, and we shared the 20th TRS Operations Building. In fact,

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Airmail

we were still in place and had long since gotten our baptism under fire when Lt. Col. Jim Brickel arrived. Our twelve new RF-4Cs and fifteen crews had been working hard "up north" since July 1966. Many of us flew pre-strike missions on the steel plant at Thai Nguyen.

Second, the RF-4C was designed to replace the RF-101, but not at Udorn, as the article implies. The RF-4C at Udorn offered the RF-101 a day-mission partner and a true night-recce capability with or without on-board illumination.

The Voodoo was a great and beautiful "long bird," and I loved her more than 800 hours worth, but the Phantom offered many more options for the TAC recce mission and was a better platform.

Col. Thomas H. Saunders,
USAF (Ret.)
Sumter, S. C.

Tonkin Rescue

As wingman for Maj. Jim Peerson, I was intimately familiar with all the details of the mission [described in] "Rescue in the Gulf of Tonkin" by John L. Frisbee *(see "Valor," p. 105, August '88 issue).* However, I would like to point out that you did get the date of the incident wrong. The actual date was March 14, 1966. The reason I remember so vividly is because March 14 is my birthday, and we had planned a big party. Jim Peerson's birthday was two days before, and my backseater John Burkhart's birthday was a couple of days later.

Neeedless to say, after Jim was shot down, we did not celebrate anyone's birthday.

Enjoyed your article. Keep up the good work.

Col. A. L. Lambert,
USAF (Ret.)
Fort Worth, Tex.

Zuni vs. Hydra

The "Jane's Supplement" to your August 1988 issue describes the US Marine Corps SuperCobra AH-1W. The armament section correctly includes 2.75-inch rocket launcher pods but incorrectly refers to the 2.75-inch rocket as Zuni. Zuni is in fact a five-inch rocket, now being phased out in favor of an expanded family of 2.75-inch (70-mm) rockets and warheads. Known as Hydra 70 in the US Army aviation world, the weapon is an outgrowth of the old 2.75-inch rocket fired by many USAF pilots in the Vietnam era and earlier. Navy-sponsored rocket motor redesign, coupled with Army-developed fire control, warheads, and fuzes, has completely modernized the weapon system.

Jerry Scnopf
Fort Worth, Tex.

Chart Page Fan

As a longtime reader of AIR FORCE Magazine, I would like to express my pleasure with "The Chart Page." Congratulations to Staff Editor Colleen Nash for the fine job she is doing on it.

With the masses of information that have become available, it is totally confusing to attempt to sort through it all. Have you ever attempted to digest the information in *The Statistical Abstract of the U.S.*? Charts are a way to convey large blocks of information in a readily digested format, and Ms. Nash excels at selecting appropriate material and presenting it in a lively and timely manner.

Lt. Col. Phil D. Garey,
USAF (Ret.)
Olympia, Wash.

Gulf Photo

With regard to the photo of a Persian Gulf convoy in the June '88 issue (p. 46), the caption correctly identifies the tanker *Sea Isle City* and the frigate *Crommelin*. However, *Sea Isle City* was the victim of an Iranian Silkworm cruise missile, not a mine. The significant mine casualty was *Bridgeton,* which sustained severe damage on July 24, 1987, while in convoy en route to Kuwait. *Sea Isle City* was hit on October 16, 1987, while barely under way in Mina-Al-Ahmadi anchorage, and was set afire by the HY-2 missile.

Lt. James J. Mulquin,
USNR (Ret.)
Rockville, Md.

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trying to obtain names and addresses of the pilot and crew of an Air Force KC-135. They went to the assistance of a Navy aerial refueling tanker that had run low on fuel itself while trying to save several Navy fighters also low on fuel.

General Johnson would like to make reference in his biography to this unusual aerial multiple refueling feat, in which both men and aircraft were saved. . . .

If you have information pertinent to unusual aerial refueling operations or SAR operations, please write to the address below.

Waller A. Hurtt
6099 South Elati St.
Littleton, Colo. 80120
Phone: (303) 795-1545

Instructor/Student Manuals

I am a former USAF Physiological Training instructor interested in obtaining copies of the Physiological Training instructor/student manuals and the Basic Medical Helper student's manual that were in use in the Air Force from 1966 to 1969.

Please contact the address below.

Robert J. Martin
P. O. Box 6311
Akron, Ohio 44312

Eagle Squadrons

I am researching first-person experiences and accounts of members of the RAF World War II Squadrons 71, 121, and 133—the Eagle Squadrons.

Any Eagle Squadron members or individuals having firsthand accounts of Eagle Squadron activities are asked to contact me at the address below.

Helene Grey
P. O. Box CAF
Harlingen, Tex. 78551

49th Fighter Squadron

I am writing to see if there is any organization of former members of the 49th Squadron, 14th Fighter Group, Fifteenth Air Force, stationed in Italy [during World War II]. I would like to hear from you. Please send any information to me at the address below.

F. Patrick Collins
5511 Cherrywood Rd.
Columbus, Ohio 43229

Roll Call

I am trying to locate an old friend from my Air Force days, Col. Charles G. (Don) Kulp. The last I heard, he was being transferred to the Okinawa Exchange System in 1979 or 1980. If anybody knows of his whereabouts, please call or write me at the address below.

William (Bill) Pace
15955 Windom
Webster, Tex. 77598
Phone: (713) 486-7324

I am interested in trying to locate anyone who knew my cousin, Lt. Chas. B. Easley, a P-51 Mustang pilot during World War II (107th Squadron, 67th TAC Group, 1st TAC Air Command). He was stationed in Le Moley, France, in July 1944. I am particularly interested in locating his wingman, Lt. Raymond J. Doyle, or anyone who could put me in touch with him.

Phil Bittle
127 No. Muscatel Ave.,
Unit C
San Gabriel, Calif. 91775

Would you help me find a few good men?

The few good men mentioned are World War II veterans and were assigned to the 351st Heavy Bombardment Group at Polebrook, England, between 1943 and 1945. There are about 5,000 lost souls, and some of

them may be in your area. We have formed an association of flying and ground crews and have annual reunions. If you fit the above description, please contact the address below.

Ken Vaughn
1 Shady Lane
Belleville, Ill. 62221

I am trying to locate Knox B. McKee, Jr., a 94th Bomb Group pilot, Eighth Air Force, World War II, on behalf of the 94th Bomb Group Memorial Association and his World War II aircrew. Please write or call collect with any information pertaining to Colonel McKee. Other 94th'ers are requested to respond as well.

Col. Frank N. Halm
USAF (Ret.)
433 NW 33d St.
Corvallis, Ore. 97330
Phone: (503) 752-1845

Martin B-10

I am interested in hearing from anyone who had the experience of flying and working on the Martin B-10 aircraft and in learning how many of us are left. I towed targets with a B-10BM at the Las Vegas Flexible Gunnery School in 1941–42.

I would be willing to help plan a reunion if there is enough interest. I am in possession of a copy of Tech Order 01-35A, Handbook of Instructions and Parts Catalog, dated November 15, 1934 (revised May 1, 1935).

Please contact me at the address below.

MSgt. DeWayne L. Tuttle,
USAF (Ret.)
3347 Oak Ridge Dr.
Joplin, Mo. 64804

RB-69A

I have recently begun researching a little-known electronic reconnaissance aircraft called the RB-69A. Seven P-2 Neptunes were specially modified for the Air Force under this designation.

I am looking for information on the modifications made to the aircraft and on where they were stationed and where they were deployed to. Photographs would be especially helpful.

Any help would be greatly appreciated. Please contact me at the address below.

Chris Diehl
15137 Stillfield Pl.
Centreville, Va. 22020

SEA Night Missions

I am beginning research for a book on night missions flown in Southeast Asia (in and out country). I need information from any pilots and crew members who flew with outfits specifically tasked with night missions.

I am interested in all such missions, including FAC, night strike/interdiction, SAR, flare illumination, recce, etc.

John R. Wiley III
764 Old Paper Mill Rd.
Marietta, Ga. 30067

Hobby Book Club

I am anxious to communicate with administrative, agent, or general "sworn" personnel who were members of the unknown "Hobby Book Club" of the US Army Air Forces during World War II. I feel it is time for the closet door to be opened, permitting exposure of a heretofore closed operation.

Meritorious acts should be recognized properly and memorialized for both relatives and posterity.

Contact me at this address:

Newton A Jones
RR 1, Box 264
Nobleboro, Me. 04555

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ST 0800 90 Min. $59.95

☐ The Red Baron

This is the story of Manfred von Richthofen, WWI's premier ace who shot down 80 allied planes! This Ace of Aces was the greatest aerial tactician of World War I. Included are interviews with the last surviving pilots who flew with and against him. Excellent WWI dogfight footage, crashes, and The Red Baron's last flights are highlighted in this compelling story of most legendary personality in the annals of aviation.

TN 2215 60 Min. $29.95

☐ Kamikaze

One of the most extraordinary films is now available on video. Witness the raw realism amid the heat of battle as camera crews captured the horror of the Kamikaze. For 82 days the Japanese launched a "one-way air force" that sank 164 allied ships and caused more than 10,000 casualties. This was the advent of the "human death machine." *Gripping!*

NF 1100 84 Min. B&W $29.95

☐ The Smashing of the Reich

By mid-1942, the Nazis owned Europe. It was obvious to the Allies that precision bombing had to knock out Germany's manufacturing centers. The advent of the P-51 long-range fighter enabled the Allies to rule the sky over Germany. This award-winning film captures the drama, tragedy, and finally the victory over Hitler's armies.

NF 1520 84 Min. $29.95

☐ Modern Combat Aircraft: Fighters and Bombers

Leading aviation authority enthusiast Christopher Chant scripted this all-action film of the West's most modern and powerful land-based fighters and bombers. Included are the Dassault Mirage 2000, Boeing B-52 Stratofortress, Northrop's F-5 Tiger II and F-20 Tigershark, and more.

ST 0100 60 Min. $59.95

☐ The Fury of Eagles

Take a jet ride through our combat jet arsenal. 6-G turns, vertical climbs, and a nostalgic look at aviation development make for a solid hour of great "birdwatching."

FG 9302 60 Min. $39.95

☐ Combat Teams-Supersonic Thunderbirds

Three films highlight this collection. F-100 Sabrejets, Loops, Vertical 360 turns, and the T-38 Talons provide all the excitement you can take.

ST 9114 60 Min. $39.95

☐ F-4 Phantom II

Modern and great archival footage tells the story of the "war horse" of 12 western air forces. This carrier-based versatile plane won its spurs in Vietnam. A detailed look at its weaponry, trials, and engine development makes this essential viewing for every aviation and military enthusiast.

ST 0388 60 Min. $59.95

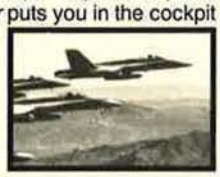
☐ Escort: The P-51 Mustang

Action-packed combat footage from the cockpit fills this film about the legendary P-51 Mustang. Included is Hess Bomberger's mighty "Vergeltungswaffe." You will experience first-hand the thrill of flying in the P-51 and see aerial combat as it really was.

TC 1000 60 Min. $39.95

☐ Jet Fighter

An exciting overview of America's current front-line jet fighter that puts you in the cockpit for a 9G ride you won't soon forget. This is a close-up look at the F-14, F-15, F-16, F/A-18, and the new F-20. *Jet Fighter* puts you in the cockpit where you can experience dogfights and weapons demonstrations that will leave you speechless. All action!



FG 9101 45 Min. $39.95

☐ Korea: MacArthur's War

This thought-provoking film explores the war that has been passed over by history but not forgotten by the millions of men who served. Includes captured footage from North Korea never before seen...**until now!**

MP 1421 50 Min. $29.95

☐ Eagle Country

Have you ever dreamed of flying in the world's hottest fighter aircraft? The F-15 Eagle's superior dogfight capabilities will keep you at the edge of your seat as the F-15s go head-to-head against F-14s, F-16s, and F/A-18s. This one is for anyone interested in aviation.

ST 6015 85 Min. $59.95

☐ Hell Over Korea

A gripping account of the savagery of Bloody Ridge, T-bone, Punch Bowl and The Battling 24th with their back to the wall at Pusan. A handful of P-51s flew 24-hour air strikes to slow five North Korean divisions sweeping across the 38th.

FG 2973 100 Min. $39.95

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All-action footage puts you on board the top types that are western naval air power today. You'll ride in the cockpit of the most advanced aircraft in the world, including: F-8 Crusader, F/A-18A Hornet, F-14A Tomcat, F-4 Phantom II, E-2C Hawkeye, and many more. Also included is a detailed look at the instruments and weaponry as we witness anti-submarine, ground attack, interceptor runs.

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Then it can get out of the threat area quickly, avoiding the enemy with rapid maneuvers, but with no loss of speed or energy.

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From the bomb run to the balance sheet, this is an amazing airplane. LTV Aircraft Products Group, the A-7's original builder, will deliver the A-7 Plus at a firm, fixed flyaway price. What's more, operating and support costs will be guaranteed, and its economic life warranted through the year 2010.

What it all boils down to is combat effectiveness *plus* cost efficiency. The A-7 Plus is the equal of any CAS/BAI aircraft—but at significant savings across the board.

LTV Aircraft Products Group
Aircraft Modernization and Support Division

L T V : L O O K I N G A H E A D

Capitol Hill

By Brian Green, CONGRESSIONAL EDITOR

Washington, D. C.

Authorization Bill Vetoed

President Reagan vetoed the FY '89 defense authorization bill, throwing what had been a relatively smooth congressional budget process into disarray. The action is widely interpreted as a political move to highlight the differences between Republicans and Democrats during the campaign.

In his veto message, the President expressed dissatisfaction with the arms-control amendments attached to the bill and the funding reductions for the Strategic Defense Initiative (SDI) program. The arms-control amendments included measures to limit SDI testing, to compel the US to abide by SALT II limits on multiwarhead weapons, to plan for a ban on underground nuclear testing, and to ban tests of depressed-trajectory ballistic missiles. Secretary of Defense Frank Carlucci advised against the veto.

In response, the Senate again passed its own version of the authorization bill and also attached it as an amendment to the Senate defense appropriations bill. The Senate authorization bill contained little of the offending arms-control language included in the authorization bill that the President vetoed. The House referred its authorization bill back to the House Armed Services Committee, where it is expected to be approved in virtually the same form as the bill the House approved last May. House-Senate conferences on the appropriations bill and a new authorization bill were to have taken place in September.

If no compromise on the disputed provisions can be worked out, Congress could be reduced to passing a short-term continuing resolution for defense (that would continue expenditures at the FY '88 rate), staying in session—and off the campaign trail—until the budget difficulties are resolved.

Some at DoD and in the Air Force have expressed concern at the partisan use of the defense bill. While the Republicans might gain politically, congressional revisions might leave the Air Force and Pentagon worse off than before the veto.

B-1B Under Fire

The B-1B bomber is under fire from several sources who claim that deficient defensive avionics will keep it from performing its mission. The Air Force may face a concerted effort to choke off further funding needed to improve the bomber's performance. The Air Force maintains that a combination of high-speed, low-level penetration, low radar cross section, flexible targeting, and defense suppression, along with its limited electronic countermeasures (ECM) capabilities, will allow the bomber to penetrate to its target.

The most concerted attack has been launched by Chairman of the House Armed Services Committee (HASC) Representative Les Aspin (D-Wis.), who has threatened to cut off further funding for the bomber. In a letter to Secretary Carlucci, Representative Aspin argued that "if a case cannot be made for the B-1B, I do not see how we can spend any more money on it." He called for a "candid and independent assessment of the B-1B's current mission effectiveness" and a cost-benefit analysis of B-1B modifications. The Air Force said in response that it "welcomes a thorough and objective review of the progress of the B-1B program."

A HASC spokesman denied that Representative Aspin's attacks were politically motivated. The spokesman said that the threat to cut off B-1B funding referred to funds intended to upgrade and fix the bomber, and not—"at this point"—to an effort to ground the fleet.

More criticism came from DoD's Director of Operational Testing and Evaluation John Krings, who testified that the B-1B "will probably accomplish about fifty to sixty percent . . . of what it was supposed to do." The Air Force strongly disputes Mr. Krings's assessment of the bomber's capability.

The Congressional Budget Office (CBO) also issued a report criticizing the B-1B's ECM systems, smaller-than-anticipated payload, problems with its terrain-following radar, and a shortage of spares. The Air Force contends that the latter three problems will all be corrected within a short time. The CBO estimated it would cost $7.9 billion to fix the problems and upgrade the bomber. The CBO cost estimate also includes many upgrades, which are crucial to keep any major weapon system responsive to evolving threats, but are not required to fix the problems.

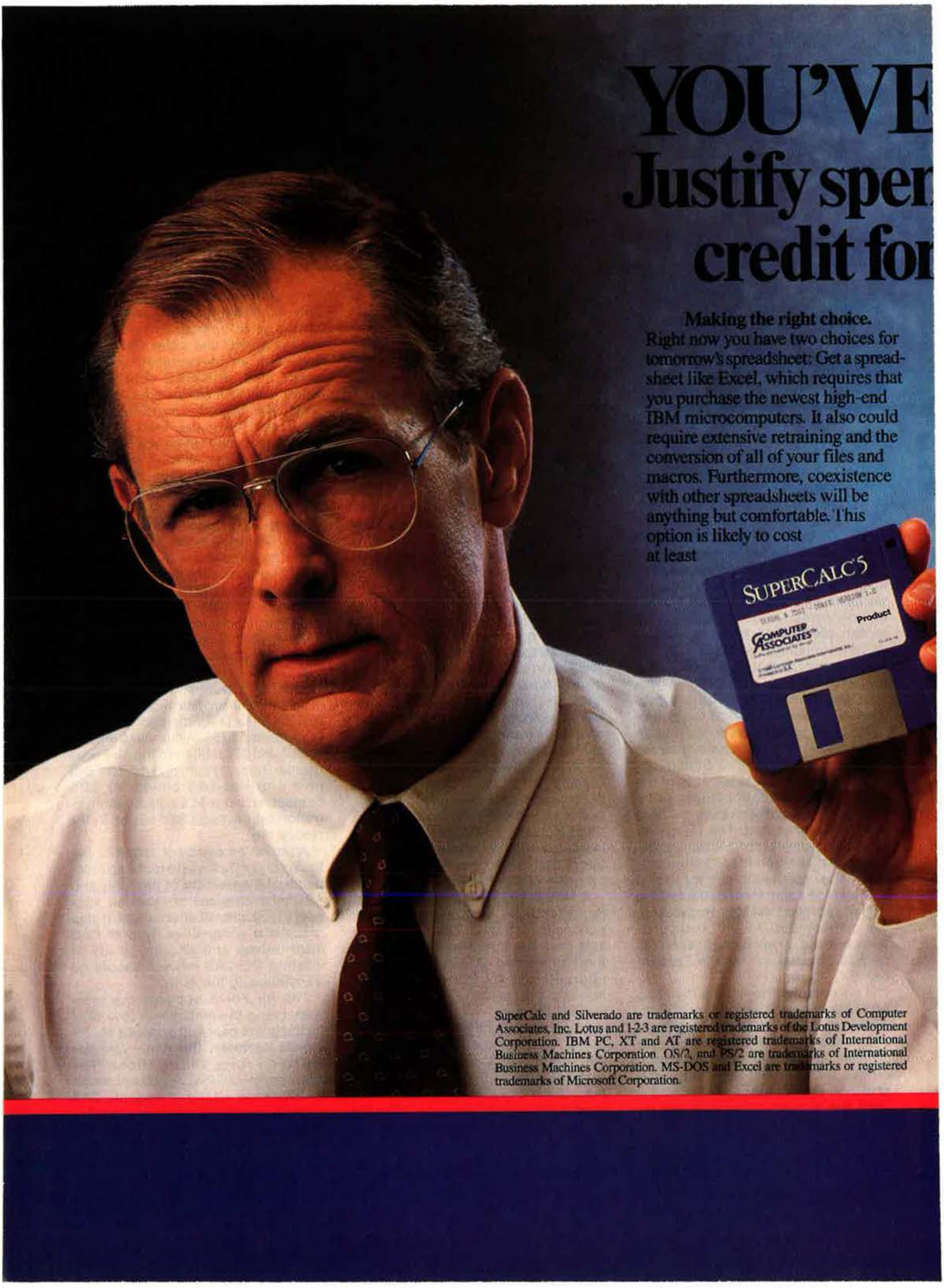
Senate Appropriations

The Senate passed its FY '89 defense appropriations bill by a vote of 90–4. It provides, as do other defense bills this year, $299.5 billion in budget authority (BA, the legal authority to obligate funds) and $294 billion in outlays (actual expenditures). BA is one percent less compared to last year.

The bill was amended to delete a controversial provision to shift $600 million in DoD funding to NASA. Of that money, $250 million was shifted to SDI and $50 million to the Air Force Space Recovery Program. The bill now provides $4.3 billion for SDI, compared to the $4.9 billion Administration request and $3.5 billion in the House bill.

Another amendment requires the Secretary of Defense to make an independent assessment of the Army and Air Force analyses of close air support (CAS) aircraft alternatives. It also requires a competitive flyoff of CAS alternatives and another study of whether the CAS mission should be transferred to the Army.

The Air Force opposes the measure, citing the ambiguous results of flyoffs in the past and previous agreements between the Army and Air Force on roles and missions. The Army and Air Force have closely coordinated their efforts to upgrade CAS aircraft, in view of new Army requirements to fight on a fluid battlefield, one not marked by static battle lines, and to fight deep in the enemy rear. Army leadership is in full accord with the Air Force approach, according to top Air Force sources. ■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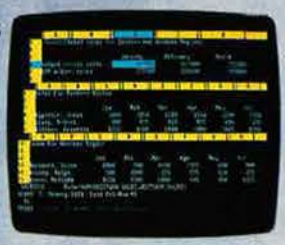

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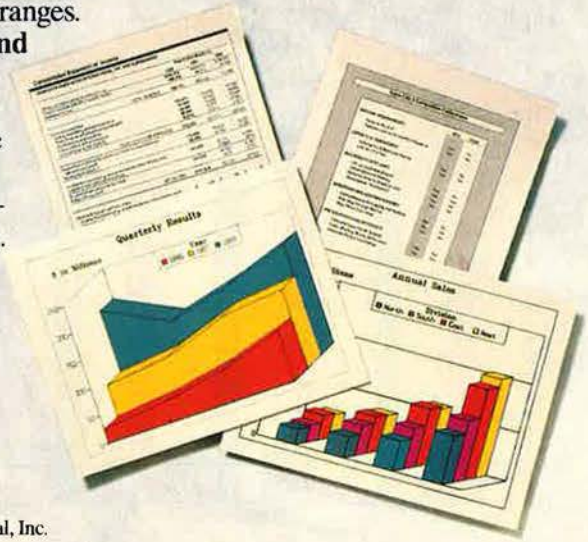

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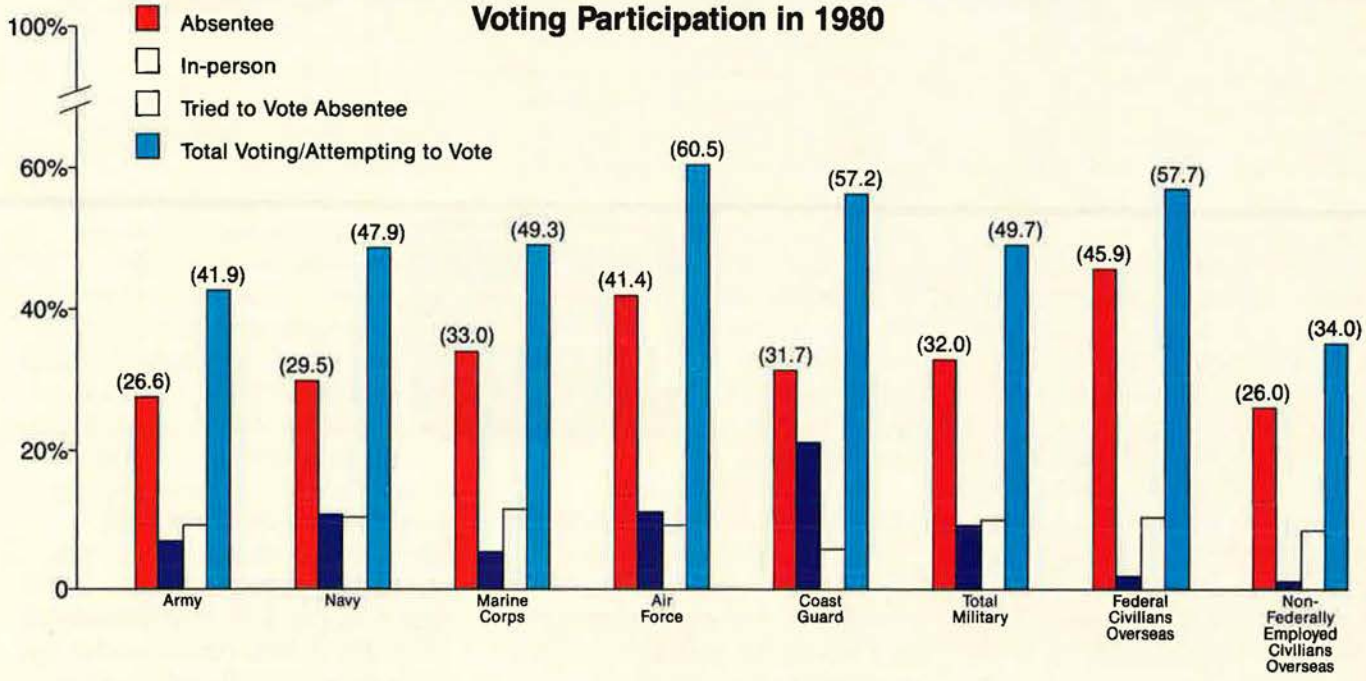
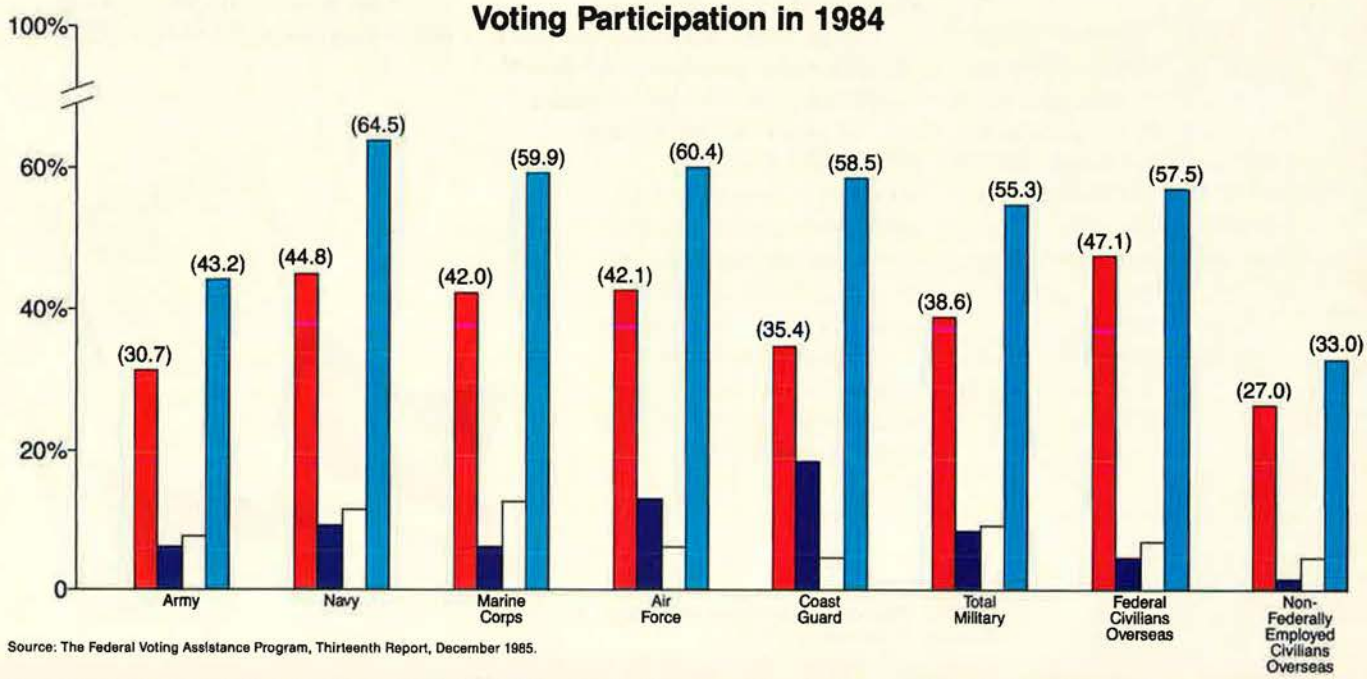
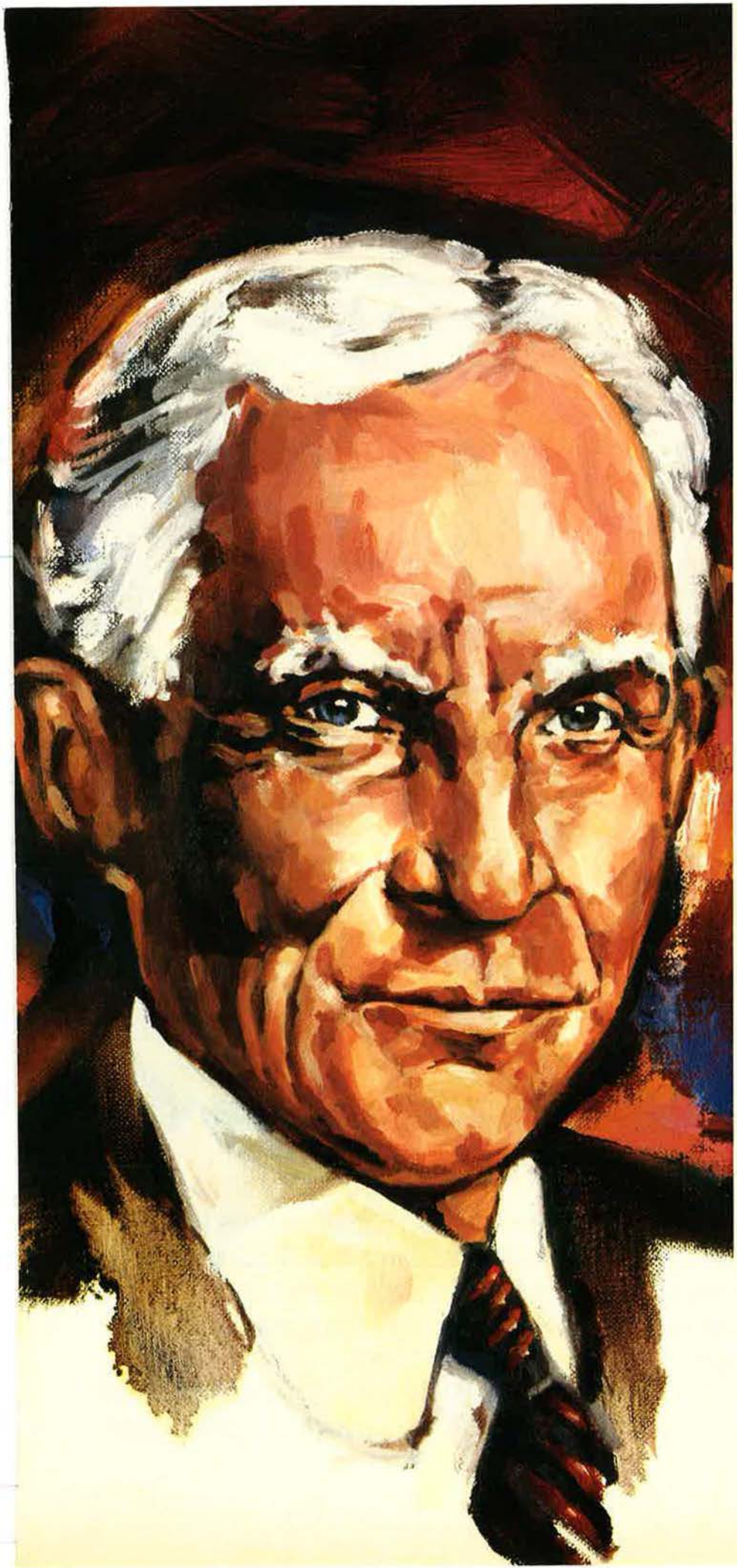
Edited by Colleen A. Nash, STAFF EDITOR





Source: The Federal Voting Assistance Program, Thirteenth Report, December 1985.

From the 1980 presidential election to that of 1984, the total voting record for the US armed forces improved by 5.6 percentage points to 55.3% participation, surpassing the 1984 national average, which was 53.27%. However, military voting fell off significantly in 1986, a nonpresidential election year. According to a post-election survey, the number-one reason for not voting was that people did not know how to vote. To encourage voting, DoD has established a special election-year AUTOVON line in CONUS, Germany, and Korea, and a special emergency ballot is available to overseas voters only. Further, Defense Secretary Frank Carlucci has issued an open letter to all members of the National Guard and the Reserve, requesting that they vote this year. AFA believes that all citizens should exercise their Constitutional right to vote.



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Henry Ford
American Industrialist
1863-1947

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one Space Test Program satellite beginning in 1991 and continuing throughout the decade. A derivative launch vehicle, Atlas IIA, will also be available for commercial missions to complement the current Atlas I.

Atlas, born as an Air Force program, has reliably served both government and private customers for nearly 30 years. Today, the new Atlas II is proud to be back in uniform.

GENERAL DYNAMICS

A Strong Company For A Strong Country

Aerospace World

By Jeffrey P. Rhodes, AERONAUTICS EDITOR

Washington, D. C.

★ After much heated discussion and little progress over the last few months, British Aerospace (BAe) will assume the lead in developing the AIM-132A advanced short-range air-to-air missile (ASRAAM). Bodenseewerk Geratetechnik (BGT), BAe's West German partner, will now become the principal subcontractor. BBT, the partnership firm established by the two companies, will be dissolved.

The change in leadership does not signal a change in work shares for BAe (missile and integration), BGT (seeker head), and Raufoss Ammunisjonsfabrikker (motor), the Norwegian company that joined the effort in 1984. The companies will continue to work within a previously agreed-upon cost framework. Full-scale development of the AIM-132 is expected to begin by next year.

The AIM-132 will replace the AIM-9 Sidewinder family, which has been in production since the 1950s. ASRAAM will have an infrared seeker and infrared proximity fuze. Under the Memorandum of Understanding (MOU) signed in 1980, the US is supposed to buy ASRAAM or build it under license. The US has not committed itself to the missile yet, though.

The US, meanwhile, directed the development effort on the AIM-120A advanced medium-range air-to-air missile (AMRAAM) under the MOU. Now in the final stages of testing by Air Force Systems Command's Armament Division at Eglin AFB, Fla., AMRAAM will be bought or built under license in Europe. After the ASRAAM shakeup, the German government will now pick a contractor to take the lead on EURAAM, the AMRAAM version to be built under license.

In other missile news, the Navy successfully carried out two tests of the BGM-109 Tomahawk sea-launched cruise missile. On August 7, the submarine USS *Providence* (SSN-719) launched an unarmed conventional Tomahawk (TLAM-C) while submerged in the Gulf of Mexico. The missile flew a fully guided land attack profile of approximately 450 miles. The missile was recovered on the range at Eglin and will be refurbished.

Hughes recently delivered the most advanced longwave infrared sensor (LWIR) ever developed to Boeing Aerospace as part of the Airborne Optical Adjunct (AOA) project being conducted for the Strategic Defense Initiative. The AOA sensor subsystem includes a focal plane array, signal processors, a pointing and stabilization system, and an optical telescope. There are more than 38,000 detectors in the focal plane, each generating data 10,500 times a second.

Two days later, an inert Tomahawk nuclear land attack missile (TLAM-N) was fired from the Vertical Launch System (VLS) of the destroyer USS *Fife* (DD-991) in the Pacific Missile Test Center (PMTC) sea test range off California. The missile flew approximately 850 miles to a simulated target at the Naval Weapons Center at China Lake, Calif. That missile was also recovered.

The Air Force successfully carried out the 133d and 134th launches in a series of Follow-On Operational Test (FOOT) shots of the LGM-30G Minuteman III missile in July. The first Minuteman was launched by an airborne crew, while the second was fired by a crew on the ground. Both missiles were launched from Vandenberg AFB, Calif., and traveled 4,200 miles to the Western Missile Test Range near Kwajalein in the Pacific Ocean in approximately thirty minutes.

★ The Air Force lost its last tangible link to its beginnings recently as the last Lockheed T-33A Shooting Stars were retired from active duty. The last three "T-birds" left Tyndall AFB, Fla., on July 7, ending an era that began in 1948. The last T-33s left in the Air National Guard were to be retired by October.

Originally designed as an advanced trainer, the T-33 was used for all manner of tasks, including target drone, over its forty-year career. The last T-birds were used by the 95th Tactical Fighter Training Squadron at Tyndall to teach pilots the basics of fighter maneuvers and to teach weapons controllers how to make and keep contact with airborne targets. The T-33s were also used to chase QF-100 drones, fly against ground radar, and act as communications relays.

The last three active-duty T-33s were flown to the Aerospace Maintenance and Regeneration Center (AMARC) at Davis-Monthan AFB, Ariz. Pilots on the last flight were Capt. Bill Winkler, Lt. Col. Jim Keeler (who ferried the first aircraft he ever flew in, back in 1962, to AMARC in June), and Maj. Danny Fender, the last to land.

The last Air Guard T-33s belonged to the 131st Tactical Fighter Wing at Lambert Field, St. Louis, Mo. (three aircraft), the 142d Fighter Interceptor Group at Portland International Airport in Oregon (four aircraft), and the 144th Fighter Interceptor Wing at Fresno ANGB, Calif. (one aircraft). Two of these aircraft have been relegated to static display, and five others will be sold. The fate of the other is undetermined at this writing.

Almost forty countries used (or still use) the T-33 for everything from reconnaissance to ground attack. Those still flying the T-33 show little interest in getting rid of their T-birds.

Lockheed built 5,691 T-33As at its plant in Burbank, Calif., in twenty-eight lots with funds from eleven fiscal years (FY '48 through FY '58). According to Air Force Logistics Command, close to 4,300 T-33s have fallen to all types of attrition. Almost 700 aircraft were sold. The rest have been stored, damaged, scrapped, or placed on static display, or have crashed. The Navy called its 699 T-33 aircraft TV-2s, although they were later redesignated T-33Bs. One, and possibly two, NT-33s may continue to fly with the Air Force as test aircraft.

★ While the T-33s first flew in the 1940s, eight aircraft that last flew in 1942 have been found on the Greenland ice cap. In July, after a seven-year search, an expedition led by Pat Epps and Richard Taylor found six Lockheed P-38Fs and two Boeing B-17Es under 260 feet of ice.

The aircraft were being flown from Thule, Greenland, to Reykjavik, Iceland, in July 1942, when the pilots ran into bad weather. The Bolero Tomcat Blue (B-17) and Tomcat Yellow (P-38) flights were unable to communicate with Reykjavik. The crews, with planes low on fuel, returned to Greenland and bellied in. All twenty-five crewmen aboard the planes were rescued, but an expedition had to be mounted later to retrieve the Norden bombsight left in one of the bombers.

Mr. Epps and his team used the services of an Icelandic guide and two subsurface radars to find the planes. Once the aircraft were located on the radars, the expedition confirmed the site to its satisfaction by driving an eighty-foot-long steam probe down on the end of a 300-foot rubber hose until it struck metal. Five other holes were bored near the first, confirming the locations of the planes.

Once a sponsor is found for the next expedition in the spring of 1989, Mr. Epps hopes to hire a contractor to do the actual digging to recover the airplanes. To get to the aircraft, the expedition will have to cut a vertical shaft through the ice or an inclined tunnel nearly 500 feet long. Either tunnel will have to be ten to twenty feet in diameter.

The aircraft will be disassembled, brought to the surface, and shipped out. Depending on the condition of the aircraft, Mr. Epps, a fixed-base operator in Atlanta, Ga., hopes to fly one or two of the aircraft off the ice.

★ **APPOINTED—Dr. Robert W. Selden,** Director of the Center for National Security Studies at the Los Alamos (N. M.) National Laboratory, **has been selected as the Air Force's new Chief Scientist.** Dr. Selden has been involved with basic and applied re-

Heading off to a well-deserved retirement, the last active-duty Lockheed T-33A Shooting Stars prepare to depart Tyndall AFB, Fla., this past summer. The 95th Tactical Fighter Training Squadron at Tyndall used the T-33s for chase and instructional missions. The last Air National Guard T-33s were retired early this fall.

Resplendent in its new paint scheme, the McDonnell Douglas F-15 STOL (short takeoff and landing) and Maneuvering Technology Demonstrator (SMTD) sits on the tarmac at the company's plant in St. Louis, Mo., prior to its first flight on September 7. The modified F-15B will go through a series of flights before being fitted with two-dimensional, thrust-vectoring nozzles later this year.

—GE photo by Steve Dunwell

The Customs Service awarded GE Government Services a $51.3 million contract recently for four aerostat systems for use in detecting low-flying aircraft and surface vessels suspected of being used in drug smuggling. The 595,000-cubic-foot aerostats are tethered to the ground and allowed to ascend to altitudes of 15,000 feet. With its L-88 radar system, an aerostat at that height can detect small aircraft at ranges of up to 200 miles. The aerostats will be moored at sites along the US's southwestern border and around the Caribbean.

search projects in theoretical and computational physics at both Los Alamos and the Lawrence Livermore National Laboratory in California since 1965. He holds a doctorate from the University of Wisconsin, Madison, and serves as chairman of the Weapons Panel of the Air Force Scientific Advisory Board.

★ **HONORS**—The new 282,000-square-foot **building housing the Navy's Naval Training Systems Center (NTSC) and the Army's Project Manager for Training Devices (PM TRADE)** was dedicated in honor of **the late Rear Adm. Luis de Florez** on August 12. Located in Orlando, Fla., NTSC is the primary Navy center for research, development, test, and evaluation (RDT&E), acquisition, and logistics support of training systems. It also provides interservice coordination and training system support for the Army and Air Force. Admiral de Florez (1889–1962) is credited with convincing the Navy of the value of "synthetic training," or using simulators, as a training aid. He was awarded the Legion of Merit and won the 1944 Collier Trophy for his work.

The fourth annual **"Great Comebacks" award,** given by ConvaTec and the National Foundation for Ileitis and Colitis, was presented to **Capt. George C. Vogt,** an instructor pilot at Columbus AFB, Miss. In 1985, Captain Vogt was diagnosed as having ulcerative colitis, and he was operated on in the fall of 1986. He is the first Air Force pilot to return to flight status following a bout with inflammatory bowel disease (IBD). After a mandatory waiting period, he will probably requalify to fly fighters. The award recognizes any individual personal battle to overcome ostomy surgery or IBD and inspires others facing similar challenges.

★ **DELIVERIES**—The **first production Rockwell B-1B** was recently **turned over to Strategic Air Command.** It was flown from the Air Force Flight Test Center at Edwards AFB, Calif., to Ellsworth AFB, S. D., where it will be used as a ground trainer for weapons loading. The aircraft was flown a total of 617 hours in a variety of tests at Edwards. Using the No. 1 aircraft (which was greatly modified for flight test) for ground training will free one of Ellsworth's thirty-five operational aircraft for training sorties or to stand alert. The Flight Test Center will continue to fly the ninth and twenty-eighth B-1s built. In a related note, **Maj. Ned Schoeck** of the 319th

Refuting the myth that ostomy surgery means the end to an active and productive life, Capt. George Vogt is the first pilot in the Air Force to return to flight status after a bout with inflammatory bowel disease. The fourth annual "Great Comebacks" award winner is assigned to Columbus AFB, Miss.

Bomb Wing at Grand Forks AFB, N. D., recently became the **first pilot to have flown more than 1,000 flight hours** in the B-1B.

Two improvements to the McDonnell Douglas **F-4G "Wild Weasel"** radar-suppression aircraft have **recently entered service.** Air Force Systems Command's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, accepted the first Weasel Attack Signal Processor **(WASP), a new and better computer for the plane's AN/APR-38 Radar Homing and Warning (RHAW) system,** on August 3. The new computer has a processing capability eight times that of its predecessor. Unisys is delivering 150 of the computers under an $83 million contract.

The **AN/ALQ-184 electronic countermeasures (ECM) pod** achieved initial operational capability (IOC) with the F-4Gs in early August. A significant modernization of the AN/ALQ-119 pod, the -184 increases effective radiated power, reduces ECM response time, and improves reliability and maintainability. Raytheon is building 175 of the new pods. The "Wild Weasel" aircraft are assigned to the 37th Tactical Fighter Wing at George AFB, Calif.

★ **MILESTONES**—According to recently compiled statistics, the Air Force's **fleet of 271 Lockheed C-141s** (285 aircraft were built) **has logged more than 8,000,000 flight hours.** Multiplying that number by the plane's cruising speed of 500 mph results in a total of 4,000,000,000 miles flown, or the equivalent of 8,373 round trips to the moon! One of the safest airlifters in history, the C-141s have an impressive history of military and humanitarian airlift. Six Military Airlift Command wings fly C-141Bs, as do one Air National Guard and one Air Force Reserve wing.

Capt. Mike "Bags" Wilson of the 52d Tactical Fighter Wing at Spangdahlem AB, West Germany, recently became the 500th pilot to log 1,000 hours in the General Dynamics F-16. His milestone flight hour came on an F-4G/F-16C hunter-killer, low-level training mission over Germany.

On August 17, **for the first time ever, US and Soviet scientists together conducted an underground nuclear test.** The eight-foot-tall canister containing a hydrogen bomb was buried 2,020 feet under the Nevada desert near the town of Mercury, and the hole was covered with layers of sand and epoxy and concrete plugs. Two sets of cables, one Soviet and one US, were installed in the canister. By measuring the rate at which the cables were crushed, technicians measured the exact yield of the blast (thought to be in the 150-kiloton range).

This test was conducted to improve methods of verifying the force of nuclear test explosions in both countries. US scientists were scheduled to monitor a Soviet nuclear test at Semipalatinsk in September.

The Low-Altitude Navigation and Targeting Infrared for Night **(LANTIRN) test team** at Edwards AFB, Calif., recently **flew its 2,000th sortie** with the two-pod system. Maj. Chris Glaeser and Col. Timothy O. Westover crewed the F-16 that made the record flight. Testing with the Martin Marietta LANTIRN system began in 1983, and deployment to Luke AFB, Ariz., is scheduled to begin next year. LANTIRN will be fitted to some 350 F-16s and all F-15E aircraft.

The **first** Regional Equipment Operator Training Site **(REOTS) was recently opened by Air Force Reservists** at Dobbins AFB, near Atlanta, Ga. The one-week course at the school provides specialized wartime rapid runway repair training to active duty, Air National Guard, and Reserve technicians on the four major pieces of equipment essential to runway repair (excavator, bulldozer, grader, and loader). The concept, scenario, and lesson plans for REOTS took a year to develop. The school, the second of three runway repair training levels needed for technicians to be proficient, has acquired twenty-three pieces of equipment valued at $1.9 million.

—Rockwell photo by Jim Bealle

The first Lockheed C-130H that will be converted into a new AC-130U gunship was delivered to Rockwell's North American Aviation plant in Palmdale, Calif., on July 28. The conversion process will begin on October 1, and the aircraft's first flight as a gunship is scheduled for April 1990. Rockwell is converting four C-130Hs to AC-130U standard.

The 33d Aerospace Rescue and Recovery Squadron recently recorded the largest "save" in its history. The HC-130N crew was (front row, left to right): Maj. Paul N. Smith, SSgt. Jerry A. George, SSgt. Larry W. Dukes, and SSgt. Michael E. McFee; (back row, left to right): 1st Lt. Brus D. Messinger, A1C Louis V. Distelweig, Capt. Clay M. Griswold, Capt. John E. Long, TSgt. Jerry R. Dunphy, Sgt. Jeffery W. Johnston, A1C Martin R. Juarez, and Sgt. Douglas E. Priest.

The numbers are in, and the twenty-four F-16Cs of the **17th Tactical Fighter Squadron** at Shaw AFB, S. C., **flew a record 1,077 sorties** for a total of 1,832.6 hours during the thirty-day **Coronet Warrior II exercise.** More than 550 people were involved with the exercise, which tested the adequacy of the F-16C war readiness spares kit (WRSK). A Dyna-metric computer model predicted that nine aircraft would be grounded at the end of the month, but only three ended up non-flyable—a testimonial to the ground troops and the reliability of the aircraft. The 1,077 sorties surpassed the number flown by the F-15Cs of the 94th TFS at Langley AFB, Va., during Coronet Warrior I in 1987.

The **33d Aerospace Rescue and Recovery Squadron** at Kadena AB, Okinawa, Japan, **recorded the largest "save" in its history** on July 15. While searching for the crew of a downed Navy T-39, the HC-130N crew, with an assist from the Western Pacific Rescue Coordination Center and Manila and Singapore air traffic controllers, found a forty-five-foot, wooden, motor/sail craft dead in the water 210 nautical miles south of Vietnam. Using the HC-130's ten radios, the crew contacted several ships in the area. Ninety minutes after spotting the boat, the British merchantman *Osaka Bay* rescued the sixty-three refugees on board.

Detachment 9 of the 67th Special Operations Squadron at Zaragoza, Spain, **formally deactivated** on September 30, **bringing to an end the Bell UH-1 Huey helicopter's involvement with active-duty Air Force combat rescue.** Detachment 9, which flew the twin-engine UH-1N, was the last existing active Air Force light-lift helicopter combat rescue unit. The unit completed flying activities on June 30.

Col. C. Gordon Fullerton, now a test pilot for NASA at the Dryden Flight Research Facility at Edwards AFB, Calif., **retired from the Air Force on July 27.** Assigned to the space program in 1969, Colonel Fullerton piloted the Space Shuttle *Enterprise* during approach and landing tests in 1977. He was pilot of the Shuttle *Columbia* on STS-3 in 1982 and commander of *Challenger* on STS 51-F in 1985. In addition to his other duties, he flies NASA's Shuttle-carrier aircraft, a Boeing 747.

Rear Adm. John D. Bulkeley, the last Navy admiral to see combat duty in World War II, **retired** on August 31 after fifty-five years of military service.

October Anniversaries

- *October 11–15, 1928:* The German *Graf Zeppelin* (LZ-127) makes the first transoceanic voyage by an airship carrying paying passengers. The *Graf Zeppelin* travels from Friedrichshafen to Lakehurst, N. J., in nearly 112 hours with twenty passengers and a crew of thirty-seven.
- *October 14, 1938:* Company test pilot Edward Elliot makes the first flight of the Curtiss XP-40 at Buffalo, N. Y. In production until 1944, almost 14,000 P-40s would be built. First flight of the Douglas 7B (A-20) would be made twelve days later.
- *October 14, 1943:* Eighth Air Force conducts the second raid on the ball-bearing factories at Schweinfurt, Germany. As a result, the Germans would disperse their ball-bearing manufacturing, but cost of the raid is high—sixty of the 293 B-17s launched do not return, and 138 more are damaged.
- *October 31, 1943:* Over New Georgia in the Solomons, a Chance-Vought F4U-2 Corsair accomplishes the Navy's first successful radar-guided interception.
- *October 15, 1948:* Maj. Gen. William H. Tunner assumes command of the newly created Combined Airlift Task Force during the Berlin Airlift.
- *October 3, 1953:* Navy Lt. Cmdr. James B. Verdin establishes a new world speed record of 753.4 mph in the Douglas XF4D-1 Skyray over the Salton Sea in California. This marks the first time a jet-powered carrier plane has held the speed record.
- *October 19, 1953:* Assistant Secretary of the Air Force Roger Lewis reveals that Boeing B-52 bombers will cost approximately $3.6 million each in production, but the first four aircraft will cost about $20 million each to amortize the design, development, and tooling costs. Each F-15E of today costs about $32 million.
- *October 1, 1958:* The National Aeronautics and Space Administration (NASA) is officially established, replacing the former National Advisory Committee for Aeronautics (NACA).
- *October 17, 1963:* The first LGM-30A Minuteman I Operational Test Launch is carried out from Vandenberg AFB, Calif., by a crew from Malmstrom AFB, Mont. The shot is a partial success: the reentry vehicle overshoots the target.
- *October 11–22, 1968: Apollo-7,* the first test mission following the disastrous *Apollo-1* fire is successfully carried out. Wally Schirra, Donn Eisele, and Walter Cunningham stay in earth orbit for ten days, twenty hours, and nine minutes.
- *October 24, 1968:* With Bill Dana at the controls, the North American X-15 makes the type's 199th and final flight, completing ten years of flight testing. On the last flight, the plane reaches a speed of Mach 5.04 and an altitude of 250,000 feet.
- *October 25, 1983:* "Operation Urgent Fury," the rescue of American medical students in Grenada, begins.

A Medal of Honor recipient, Admiral Bulkeley first gained notoriety as the officer who safely evacuated Gen. Douglas MacArthur to Australia from the Philippines in 1942. For the past twenty-one years, he served as head of the Naval Board of Inspection and Survey.

★ **NEWS NOTES—Military Airlift Command crews began transporting Canadian troops to the Middle East** on August 15. The troops will be part of the United Nations peacekeeping force monitoring the cease-fire between Iran and Iraq. Air Force C-5s from Dover AFB, Del., and Travis AFB, Calif., are being used to airlift the Canadian army communications unit and its equipment from CFB Trenton, Ontario, directly to Iraq or to Turkey, where they will transfer to Canadian planes for the flight to Iran.

As a result of the Radiation Exposed Veterans Compensation Act, the **Veterans Administration** announced on August 4 that **Eleanor Shumard,** wife of the late Robert Shumard, would be **receiving service-related death benefits.** Former Master Sergeant Shumard was a gunner on the B-29 *Enola Gay,* which dropped the atomic bomb on Hiroshima in August 1945. He died of leukemia in 1967.

The new compensation act, which went into effect in May, allows veterans or their survivors to claim service-related benefits if the veteran was exposed to radiation and suffered certain cancers within forty years of exposure or certain types of leukemia within thirty years of exposure. Mrs. Shumard's benefits will be increased to approximately $665 a month.

Navy Capt. Roger A. Burnett, the program manager for the Navy Advanced Tactical Fighter (NATF), **was named a deputy in the Air Force's ATF System Program Office** (SPO) at AFSC's Aeronautical Systems Division at Wright-Patterson AFB, Ohio, on August 1. Under a 1986 Memorandum of Understanding, Captain Burnett will oversee the development of the preliminary system specification for a carrier-suitable variant of the Air Force's ATF. The efforts of the ATF SPO and the NATF office will result in a joint source selection in 1991 for full-scale development of a new fighter that will be used by both the Air Force and Navy.

The **efforts of cadets** at the Air Force Academy in Colorado Springs, Colo., **will keep indigents in Boston a little warmer this winter.** During two drives near the end of the last academic year, the cadets collected 8,000 pounds of mostly civilian clothes and prepared them for shipment on August 28 on opportune airlift to Pease AFB, N. H. From there, three former cadets attending graduate school at Harvard—Lts. Martha McSally, John Ullmen, and Jennifer Schwanz—will distribute the clothes in New Hampshire and Boston. This is the second year the Academy has undertaken this project.

In late July, President Reagan announced that **the name of America's permanently manned space station will be *Freedom.*** The winning choice was picked from among 700 names submitted for consideration. *Freedom* was chosen partly because it is easy to translate into Japanese and the languages of other countries that will be using the space station.

A few days later, NASA announced that the **new advanced solid-rocket motors** (ASRM) for the Space Shuttle **will be built** in the government-owned, contractor-operated plant in Yellow Creek, Miss., **and tested** at NASA's Stennis Space Center near Bay St. Louis, Miss. Contracts for ASRM will be awarded next year. Contractors will also have the option of proposing other sites.

Vikings traditionally traveled by boat. But **"Hagar the Horrible,"** the comic-strip character created by artist Dik Browne, will soon be **traveling on a KC-135 tanker** at Pease AFB, N. H. As part of SAC's nose-art program, Maj. Chris J. McWilliams, the 501st Organizational Maintenance Squadron commander, wrote Mr. Browne (a

Magazine Names New Assistant Managing Editor

Francine Krasowska has joined the staff of AIR FORCE Magazine as Assistant Managing Editor. She assumed her new position in August after spending most of the last five years with Robert R. Nathan Associates, an international economic and management consulting firm based in Washington, D. C.

While there, Ms. Krasowska served as production coordinator and editor of the firm's proposals and reports. She interviewed, hired, and evaluated the word-processing staff and supervised their training. She was also instrumental in the firm's computer system modernization.

Ms. Krasowska has extensive editorial and word processing experience, having held positions with the Berlitz School, COMSAT, and *Army* Magazine. She also worked as a free-lance editor. She is familiar with many systems and keeps up on developments and innovations in word processing and desktop publishing.

Born and reared in Geneva, Ohio, Ms. Krasowska is a 1983 honor graduate of The American University in Washington, D. C.

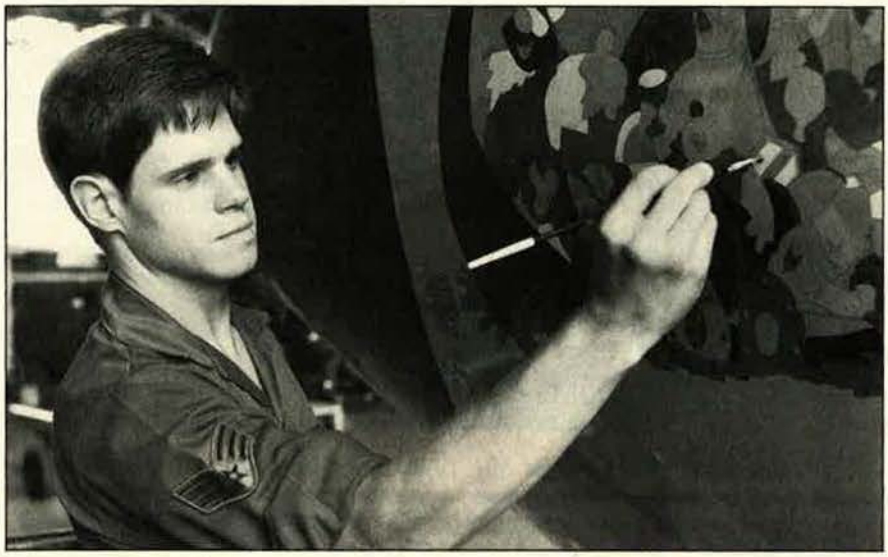
Senior Staff Changes

PROMOTION: To be **Lieutenant General:** Robert P. **McCoy.**

RETIREMENTS: L/G Melvin F. **Chubb,** Jr.; M/G Lee V. **Greer;** B/G Albert L. **Logan;** L/G Kenneth L. **Peek,** Jr.; B/G Carmelita **Schimmenti;** ANG B/G John A. **Slifer;** L/G Robert D. **Springer;** B/G Gorham B. **Stephenson;** B/G Daniel A. **Taylor,** Jr.; B/G Charles A. **Vickery;** M/G Bernard L. **Weiss.**

CHANGES: M/G Harold N. Campbell, from Dep. Dir., DLA, Cameron Station, Va., to Ass't DCS/L&E, Hq. USAF, Washington, D. C., replacing M/G Charles P. Skipton . . . **B/G Clifton C. Clark, Jr.,** from Dep. Dir., Ops., NMCC, J-3, OJCS, Washington, D. C., to DCS/O&R, Hq. ATC, Randolph AFB, Tex., replacing B/G Jeffrey T. Ellis . . . **B/G Jeffrey T. Ellis,** from DCS/O&R, Hq. ATC, Randolph AFB, Tex., to Cmdt., AFROTC, ATC, Maxwell AFB, Ala., replacing B/G Ralph R. Rohatsch, Jr. . . . **Col. (B/G selectee) Antonio Maldonado,** from Chief, Strategic Ops. Div., J-3, OJCS, Washington, D. C., to Dep. Dir., Ops., NMCC, J-3, OJCS, Washington, D. C., replacing B/G Clifton C. Clark, Jr.

M/G (L/G selectee) Robert P. McCoy, from Cmdr., Ogden ALC, AFLC, Hill AFB, Utah, to Vice Cmdr., Hq. AFLC, Wright-Patterson AFB, Ohio, replacing L/G Charles McCausland . . . **B/G Ralph R. Rohatsch, Jr.,** from Cmdt., AFROTC, ATC, Maxwell AFB, Ala., to Cmdr., Hq. AFDW, Bolling AFB, D. C., replacing retiring B/G Edward N. Giddings . . . **M/G Charles P. Skipton,** from Ass't DCS/L&E, Hq. USAF, Washington, D. C., to Cmdr., Air Force Contract Mgmt. Div., AFSC, Kirtland AFB, N. M., replacing retired M/G Bernard L. Weiss . . . **B/G W. John Soper,** from Vice Cmdr., San Antonio ALC, AFLC, Kelly AFB, Tex., to DCS/Log., Hq. ATC, Randolph AFB, Tex., replacing retired B/G Daniel A. Taylor, Jr. ■



—USAF photo by A1C Cheryl Gilberto

Sgt. Gary C. Cassidy, an administrative specialist with the 509th Organizational Maintenance Squadron at Pease AFB, N. H., paints part of the nose art on* Valhalla Express. *The design was drawn for the unit by cartoonist Dik Browne. Hagar the Horrible and the rest of his entourage will be finished when the KC-135 comes off alert status.

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friend of the Major's father) for permission to use the character. Mr. Browne not only gave permission but also drew two originals that will be used to finish painting the design on *Valhalla Express* when the KC-135 (62-3538) comes off alert.

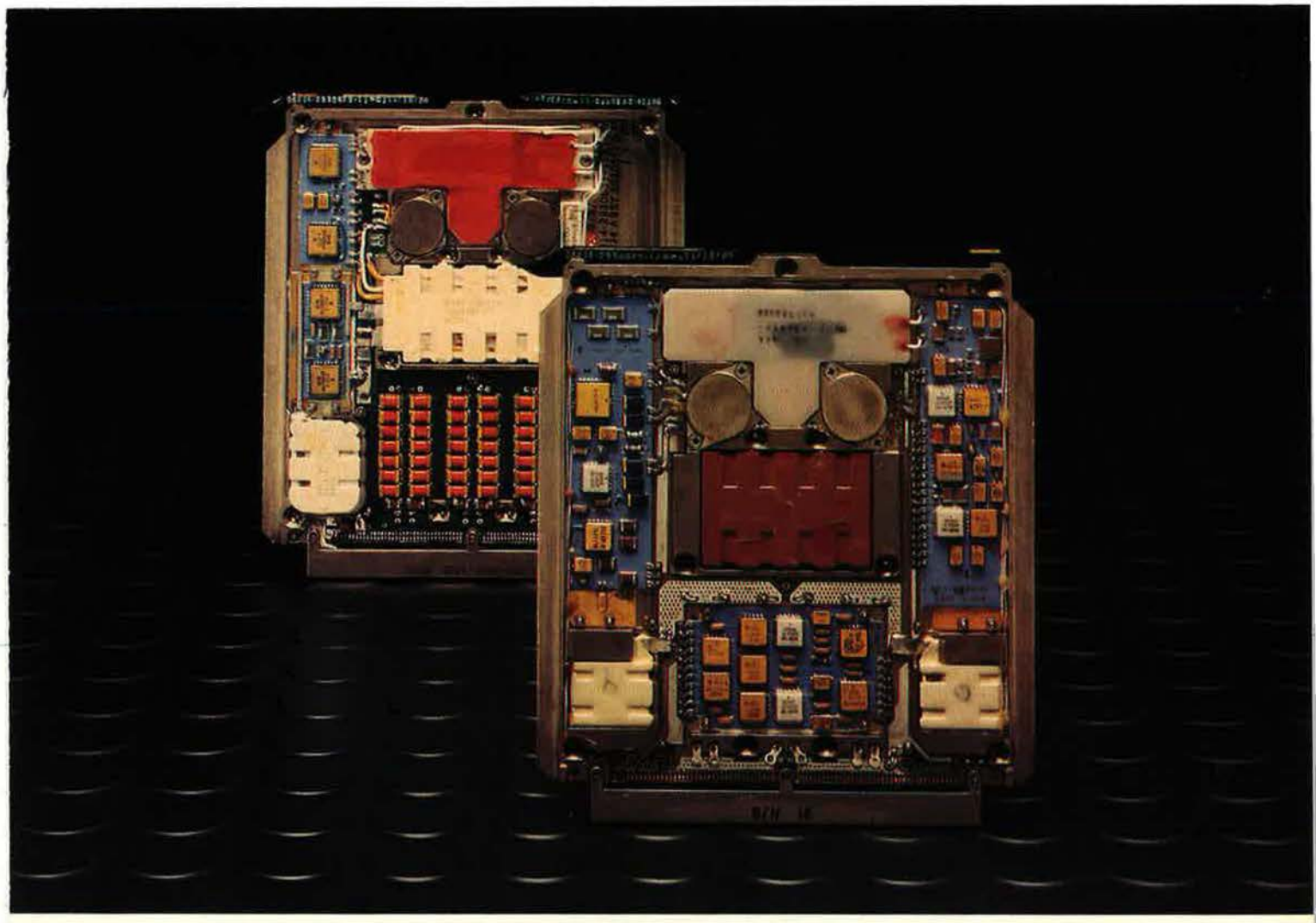
★ **DIED**—Retired **Brig. Gen. Harold R. Harris,** the first person to bail out of a disabled plane. Later Chief of Staff of Air Transport Command during World War II, General Harris died July 28 of pneumonia at Falmouth, Mass. He was ninety-two.

On October 20, 1922, General Harris became the first member of the Caterpillar Club, an organization of people whose lives have been saved by a parachute, when he had to jump from a crippled Loening monoplane over Dayton, Ohio. After flying bombers in World War I, he became a test pilot and chief of the Flight Test Section at McCook Field in Dayton. At one time he held thirteen speed, endurance, and altitude records. He resigned his commission in 1926, but was recalled in 1942. Between the wars and after World War II, he worked for a variety of commerical aviation firms, including a stint as Senior Vice President of Pan American-Grace (Panagra) Airlines.

Retired Marine **Brig. Gen. James Patrick Sinnott Devereux,** who commanded the 400-man Marine garrison on Wake Island in December 1941. He died August 5 of pneumonia at a hospice in Baltimore, Md., at the age of eighty-five.

His handful of defenders successfully held off the Japanese invasion of Wake Island for nearly two weeks and, in the process, downed at least twenty-one aircraft, sank two destroyers and a submarine, and damaged eight other ships. When asked if there was anything he needed, he allegedly replied, "Send us more Japs!" Finally forced to surrender by overwhelming Japanese forces, he was sent to the Hakodate prison camp. After the war, he was awarded the Navy Cross. He later served four terms in the House of Representatives, bred horses, and did volunteer work.

Anatoly Levchenko, Soviet test pilot and cosmonaut closely associated with the Soviet space shuttle, of a brain tumor August 8. He was forty-seven. Last December, he was part of a three-man crew launched to relieve the crew aboard the Soviet *Mir* space station. He spent a week in orbit and, immediately upon his return, piloted a plane from Kazakhstan to Moscow as part of a shuttle experiment. ■



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TEXAS INSTRUMENTS

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The alliance is not in a crisis yet, but leaders are choosing their steps with great care to preserve unity.

New Fissures in NATO

BY ROBERT S. DUDNEY
SENIOR EDITOR

ABOUT to turn forty, the Atlantic Alliance is laboring to preserve what its creation so vividly dramatized: unity against Soviet power.

A review of the forces that the North Atlantic Treaty Organization is now facing points to a troubling conclusion.

The conclusion is that America and its West European partners confront an unprecedented challenge to the integrity of the military alliance.

On one crucial issue after another, the US is plunging into contentious debate with its allies—on building up conventional forces, bolstering nuclear deterrence, and reshaping NATO's power structure.

While disagreement has ever been NATO's fate, the discord today is viewed as different from any since its founding in 1949.

It reflects fundamental shifts in the strategic bedrock. The perception—not the reality—of the severity of the Soviet threat is waning at the same time that Europe's political weight relative to that of the US has soared.

Thus Europe is less convinced of a need to come to terms with its security guarantor and demands a larger voice in NATO policymaking.

What's more, the discord involves an issue that goes to the core of NATO—countering Soviet power. Western nations increasingly disagree about how, where, and even with what weapons this must be done.

Many officers express worry about what these underlying currents might produce. In the words of Gen. William Kirk, head of US Air Forces in Europe (USAFE) and wartime air commander in NATO's Central Region, "I think that we are at a crossroads. I think we are in very critical times in NATO. And I think we need to be very careful with the next few steps that we take to shape the direction we go."

If NATO takes a wrong turn, he adds, "then we'll see the Alliance start to break up"—not right away, but eventually.

Neither General Kirk nor many others write off NATO. Far from it. The consensus holds that the allies have strong incentives to try to stick together in light of Europe's reliance on Washington for its ultimate secu-

Two issues on NATO's front burner: Building up conventional forces and reshaping the alliance's power structure. Here, an MBB Bo-105 helicopter, equipped for tank-fighting, swoops down on a West German Leopard II main battle tank.


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rity and in light of the vast US economic stake in the continent.

Whatever the long-term outcome, Allied Command Europe is sure to remain unsettled until NATO forges a new political consensus.

What is forcing Alliance troubles out into the open is a combination of glaring conventional force weakness relative to the Warsaw Pact and an onrushing obsolescence of its nuclear deterrent, plus fear of a breakdown in Alliance management.

In the cold light of the US-Soviet Intermediate-range Nuclear Forces (INF) agreement, which will strip Western Europe of America's prime theater nuclear forces by 1991, military men discern an urgent need for a compensating buildup of conventional power *(see "Why NATO Needs a Conventional Defense," by John T. Correll, August '87 issue, p. 38).*

Differences on Defense Policy

The need to plug the conventional gaps, far from unifying the Alliance, has revealed sharp differences on defense policy.

The allies exhibit a marked reluctance to support the Reagan Administration's proposition to embark on significant, immediate strengthening of NATO's force of fighters, missiles, tanks, and other nonnuclear arms. Most West European allies agree in principle with the plan, but they manifest scant inclination or ability to execute it.

Three major factors are cited by experts to explain the lack of a major European response so far to the US effort.

One is the startling success of a Soviet peace offensive aimed at recasting Russia's image from menace to benign neighbor.

NATO officials report that, without reversing or even slowing force deployments against NATO Europe, the Kremlin under Soviet leader Mikhail S. Gorbachev has succeeded in convincing large segments of public opinion that the danger of Soviet power is remote.

In fact, maintains General Kirk, the most remarkable feature of the political landscape in Western Europe today is the "growing perception by the average citizen on the street" of a declining Soviet threat.

"Gorbachev has made many, many inroads in the public affairs business this last year," he reports, "and he has endeared himself [to the West] considerably. You see that bubbling up here in Europe."

While the authenticity of the new Soviet image is open to dispute, the reality of its anesthetizing effect is not.

"In the face of a sophisticated Soviet peace offensive," warns Defense Secretary Frank Carlucci, it is now that much harder for NATO's governments "to overcome the natural reluctance of its constituent democracies to devote increased resources to defense."

The second factor causing European unease about conventional force proposals centers on pivotal domestic economic and political factors.

Alliance officials report that European nations are loath to embrace the financial and social burdens of fielding conventional forces on a larger scale.

They note that entrenched demands of European welfare programs, coupled with slack economic growth and high joblessness, make diversion of more economic resources to defense politically difficult.

In addition, NATO experts say that demographic patterns on the continent foreshadow a steep decline in numbers of draft-age males—in West Germany, especially. The imputed "social costs" of expanding or extending the draft to alleviate this are seen as considerable.

As a consequence, experts conclude that the commitment of economic or human resources to a signficant buildup is probably not in the cards.

Finally, the possible strategic implication of conventional force expansion is a third factor and one that is giving European governments great pause.

All too apparent in Europe is the widespread concern that embracing strong conventional military forces may suggest unwillingness to use nuclear weapons—thus calling into doubt the heart of Alliance deterrent strategy and increasing the risk of Soviet aggression.

Aggravating the problem is Pentagon emphasis on weapons of obvious "warfighting" rather than "deterrent" value.

Not Up to the Task

Against this backdrop, Western Europe in word and deed conveys the impression that it may not be up to the task of putting its part of the NATO conventional house in order.

Experts note that the allies are making slow progress toward meeting goals for individual nations set forth in the 1985 NATO Conventional Defense Improvements Program, which proposes solutions to critical NATO gaps in air defense, mobilization, reinforcement, and other areas.

The problem is evident in plans for countering future Soviet air operations, viewed by NATO as one of its highest priorities.

Expansion of West European air defense is not likely. One recent NATO counterair force-structure study, for example, notes that the Alliance—for a "reasonable" three percent annual increase for five years in national air force budgets—could realize an increase of twenty-five percent in air-to-ground and multirole fighter capability, seventy percent in air-to-air capability, and seventy-three percent in electronic warfare capability.

What is the likelihood that the European nations will pursue a program such as this? The answer, says a seasoned Alliance observer, is "no chance" at all. "The one thing we're sure about is that there won't be any money for anything other than a bare minimum of modernization."

In virtually every major defense area, the story is much the same, from armor forces to artillery to naval units.

Even some approved plans are being scaled back. Economically strapped Belgium, for example, is at pains to abandon its plan to buy and deploy advanced Patriot surface-to-air missile units and will even dismantle existing Nike Hercules units by 1990—two years early—to save money.

Result: Critical gaps in air defense of English Channel ports.

Similar forces are threatening to undermine NATO's high-profile plan to develop the NATO Identification System, a technical scheme that aims for a common identification, friend-or-foe capability on its warplanes.

The system would be critical to helping Western pilots sort things

USAF presence in Europe is a vital part of NATO's force structure, but pressure is building in some countries for a reduced US component. USAFE boasts some 93,600 people and 700 in-place aircraft, such as this F-16C from Ramstein AB, Germany. Shorts C-23A Sherpa is part of the European Distribution System.

out in the confused early days of war when as many as 8,000 combat aircraft would be in action. The danger of "fratricide" among allies is high.

All is not bleak. NATO officers point to an Alliance-wide move to upgrade its eighteen E-3 Airborne Warning and Control System (AWACS) planes. Britain and France also are buying AWACS from the US. There are other gains.

But in most areas—for example, production of the airborne weapons and missiles to underpin NATO's innovative Follow-On Forces Attack concept—only the most modest progress can be discerned.

To put the matter in proper context, however, NATO officers—Americans included—hasten to make this point: The United States itself is not immune to forces working against a conventional buildup. They note that, after suffering a $33 billion reduction in its proposed 1989 budget, and with more austerity ahead, the Pentagon will be hard-pressed to hold on to its own programs.

At risk for the Air Force may be the proposed scale and pace of production of the F-15E fighter, AIM-120 Advanced Medium-Range Air-to-Air Missiles, and E-8 Joint STARS targeting aircraft, to name but a few items critical for European defense.

Tinkering at the Margins

Nor are there plans to increase the 93,600 USAF personnel now in the European theater or to do much more than tinker at the margins of the Air Force's 700 in-place aircraft and thirty-seven tactical squadrons.

That, however, may only serve to aggravate US perceptions of European foot-dragging. The assessment of strategic-affairs analysts is that differences over how to proceed on the conventional front has the makings of a serious dispute.

A senior allied military officer in Europe concludes: "Post-INF, [there is a need for] a transition to [a situation] where conventional weapons become dominant. Are we really willing to step up to that bigger conventional weapon capability? I don't know. Not doing so could lead, in my view, to a fracturing of the Alliance."

Just as conventional force weakness has exposed major strains between the United States and Western Europe, decline in NATO's theater nuclear deterrent poses a similar long-term challenge to unity.

NATO is greatly outnumbered in conventional weaponry, especially ground forces and equipment. Armor will be crucial in any future conflict with the Soviet Union, as it was in the World Wars. Here, US M60 Patton tanks rumble over the German countryside during a recent Reforger exercise.

Washington and its allies are increasingly at odds over this fundamental problem for Alliance defense. At issue is how to update and modify the stockpile of nuclear arms in Europe to enable it to continue serving as the backbone of deterrence.

Today, Western Europe is home to 4,600 nuclear weapons—missile warheads, bombs, artillery shells, and special types.

Some 400 of NATO's premier arms—all US Pershing II ballistic and BGM-109 Ground-Launched Cruise Missiles—are headed for the scrap heap under INF Treaty provisions. The nuclear remnant, moreover, is showing its age.

In the face of this, however, NATO's Western European members display sharp doubts about Washington's promotion of a two-pronged plan aimed at revitalizing the armory. There is no official opposition to either of the tracks—on the one hand, modernization of older systems and, on the other, redeployment of some. In practice, however, there is great agonizing about how quickly to follow through on either thrust.

The Intermediate-range Nuclear Forces Treaty will force NATO to begin modernizing the remainder of its nuclear arsenal. Europeans fear that the loss of missiles like this Pershing II will weaken the US deterrent, but express anxiety about deploying new US weapons.

The sources of the European divergence from the Washington line on this matter are many and varied, but a handful are viewed as basic.

NATO experts point first to the persistence of a social phenomenon termed "nuclear neuralgia"—fear of and contempt for all things nuclear. While America itself is not immune, the strongest and most virulent form of antinuclear sentiment exists in Europe.

European politicians thus are acting with great caution for fear of revitalizing the continent's fearsome antinuclear protests.

European critics raise a strategic question—the utility of nuclear "warfighting" capability in NATO strategy. The relatively short range of the weapons, they assert, makes US plans smack more of a preparation for nuclear combat than of deterrence, with Europe as battleground.

Finally, there is the arms-control factor. West Europeans, analysts report, see greater benefit in the arms-control process than does Washington. They are loath to risk future talks by appearing to circumvent INF Treaty provisions.

Taken together, these factors are setting the stage for a multiplicity of irritations, large and small, about the pace and scope of nuclear cooperation.

Evidence of Friction

The most worrisome evidence of friction is to be found in Washington's nuclear relationship with Germany—more so given Bonn's preeminent position in US strategic calculations.

The conservative West German coalition, under Federal Chancellor Helmut Kohl, is taking what is widely viewed as a standoffish position on US calls for nuclear modernization, despite Washington's vigorous drive to implement the so-called "Montebello decisions."

At Montebello, Canada, in 1983, defense ministers concluded that NATO could take the popular step of eliminating 1,400 nuclear weapons if—and only if—it kept the remainder modern. The 1,400 nuclear weapons are long gone, but the other side of the agreement is increasingly up for grabs.

The issue of Lance missile modernization lies at the heart of the West German standoff with Washington.

Bonn has been wavering. It argues that the basis of its agreement to allow introduction of a replacement for Lance—a shorter-range missile found mostly in Germany—has changed in light of the 1987 INF Treaty.

It notes that, well before the treaty was hammered out, it put Washington on notice not to go beyond the "first zero"—the elimination of longer-range theater missiles—and include a "second zero" aimed at taking out missiles of a medium, 500- to 1,000-kilometer range.

Bonn's point was that eliminating all but the shortest-range missiles, usable only on German soil, would be politically intolerable and spark German political calls for a "third zero," abolition of Lance as well.

Now, in the wake of US acceptance of the second "zero" as well as the first, German warnings are starting to look uncomfortably acute.

All signs are that Chancellor Kohl is under domestic political pressure to back down on the Lance upgrade. At the high-level "Wehrkunde"

("Defense Information") Conference of NATO experts last March and in the interim, the German leader advanced the idea that Lance modernization should be linked to new talks on reducing their numbers.

NATO officials insist that German fear of "singularization" is farfetched, given the presence in Germany of troops from seven allies and the existence of atomic weapons elsewhere on the continent.

But they recognize that West Germany's proximity to Soviet power infuses it with a special anxiety deserving of great patience.

The case is succinctly put by Gen. Eberhard Eimler, a senior German Air Force officer and a Deputy Supreme Allied Commander of NATO forces: "We should be fair enough to try to understand the man down at the corner in Frankfurt, and how he feels when he says, 'The threat is only 150 kilometers away, and it will all be on my head.'"

However justifiable, West Germany's stance is troublesome—not only for the US, but for other NATO nations. Great Britain and France, in particular, back Washington's position that NATO at present has no need of more nuclear "zeros" and that talks on short-range nuclear missiles should be shelved until progress is made in talks aimed at reducing Warsaw Pact conventional forces.

Coming to a Head

The issue appears to be coming rapidly to a head. The Supreme Allied Commander in Europe, Gen. John Galvin, USA, has nearly completed a Nuclear Weapons Requirement Study critical to the outcome.

In the study, which is dubbed "NWRS-88," General Galvin will set forth his military judgment on the number of weapons he requires for the next ten years, plus specific recommendations on modernization.

Reaffirmation of a need for a Lance replacement is a certainty. General Galvin adds, however, that this study will take the position that this improved weapon, if deployed, would make possible a "significant" new reduction in nuclear forces on German soil.

This, say Alliance experts, would strengthen Kohl's hand for neutralizing Germany's potent antinuclear and arms-control lobbies.

"Right now they say it is not the time to make the decision, today," notes General Eimler. "But soon it will be; not in 1988, but next year, the decision has to come up."

He adds: "I have no doubt that Bonn will stay with the Alliance on this." Others, such as General Kirk, certainly hope there is no third zero in store. "I can't imagine that we would get to that," says he. "If we go to a third zero, then we are vastly outgunned, outmanned, outranged, outequipped, and out-everything-else."

The political danger is even worse. The possibility—admittedly very remote—is that the US would be increasingly reluctant to maintain troops in Europe without protection of tactical nuclear missiles.

The German response on the Lance issue, while important in its own right, is also raising anxieties about its ripple effect. Outside West Germany, there is only slightly more enthusiasm for what Washington considers essential nuclear improvements. German equivocation may be stimulating antinuclear sentiment throughout Europe.

The allies also exhibit great caution in restructuring nuclear forces in light of the looming loss of American theater weapons under INF by redeploying additional US forces forward.

Currently, F-111 aircraft are deployed at two bases in Britain. Additional aircraft of this type are based in the US. These could be redeployed to Europe. Other proposals entail the reallocation of sea-based ballistic and cruise missiles or B-52 bombers.

The European allies appear to be in no rush, if the outcome of their April meeting of defense ministers in Brussels is any indication. While taking note of the various nuclear proposals, officials say, the body arrived at no specific policy decisions. It indicated that NATO should take a deliberate, step-by-step approach.

"There's no signed blank check from NATO saying there will be deployment of this, that, or the other once the systems are developed," comments one Alliance observer. "It is all very nebulous."

Bonn is under Soviet—and East German—pressure to forsake the Lance. In addition, Moscow is vigorously promoting the claim—with some success—that any steps whatever to strengthen NATO nuclear forces amounts to circumvention of the INF Treaty provisions.

Thus, say NATO officials, the challenge for the Alliance comes down to this: How to counter European political forces that threaten to place NATO on a "slippery slope" toward eventual denuclearization of the continent?

The Stakes Are Immense

The immense stakes for the Alliance, as it struggles to keep this problem within bounds and devise an adequate solution, are summed up bluntly by former Assistant Defense Secretary Richard Perle:

"Denuclearization would leave the Western Alliance without any plausible defense. I don't know how we could in good conscience leave 325,000 American troops in Europe hopelessly unprotected."

The forty-year-old political structure that is grappling with these controversies is itself increasingly controversial—and a source of transatlantic tension in its own right.

Washington's current dominance of Alliance policymaking, born of its preeminent contribution to Western defense in the postwar era, has existed ever since NATO's formation, even as the fourteen-member European side of NATO has grown in stature.

Now, say NATO observers, there exists a strong sense, on both sides of the Atlantic, that the old system has grown not only outdated but perilous. Even so, the need to reshape NATO has become a source of tension in the Alliance.

Western Europe is resisting the US notion that it should pay for greater policymaking influence by first shouldering a bigger share of the defense burden. The allies, while agreeing that more effort is desirable, are bent on asserting themselves in advance.

Fueling Western Europe's sense of strong assertiveness on Alliance affairs, Western experts report, are a number of fundamental elements.

One is a far-reaching shift in the superpower strategic balance. The dramatic buildup of Soviet military power has left the US at parity in strategic arms and in an inferior

position in most categories of conventional forces—particularly in the European theater.

As a consequence, the Europeans display less confidence in the credibility of the US military umbrella and more willingness to try to impose their own security views to protect European interests.

A second factor is a shift of the political center of gravity within the Alliance itself.

In military terms, Western Europe is no longer a dwarf to the American giant. In fact, notes a recent Pentagon study, Western Europe maintains 3,500,000 personnel on active duty, compared to 2,100,000 for the US. In a war, the allies would provide sixty percent of NATO ground combat power and fifty percent of NATO's air combat power. Britain and France also maintain sizable nuclear forces.

In economic terms, Western Europe's combined $3 trillion output matches that of the Soviet Union and rivals the prowess of the United States itself. The spectacular long-term growth of Europe's economic strength not only increases its sense of prestige but feeds a desire to capture a larger share of the defense market.

NATO officers say this reality became most glaringly apparent in Europe's rejection of Pentagon calls for NATO to purchase a version of the US F/A-18 (the so-called Hornet 2000) warplane. Instead, West Germany, Britain, Italy, and Spain held firm on plans to build their four-nation Eurofighter.

Increasingly Annoyed

Whatever the validity of the European view, Americans—especially members of Congress—appear increasingly annoyed by what they take to be blatant "free riding" on the part of the allies and the perceived unwillingness of the allies to do much about it.

US displeasure was signaled unmistakably in recent remarks from Deputy Defense Secretary William H. Taft IV. He pointed out to a European audience that "increased influence means assuming an increased share of the risks and responsibilities within the Alliance."

Washington has long promoted more equitable burden-sharing in the Alliance. The idea has been that West Europeans should contribute more to their own defense while leaving Alliance leadership to the US.

Progress, however, is not satisfactory by American standards.

The most recent American calculation of the relative defense burden shows that, while the US continues to invest nearly six percent of its Gross National Product in defense, the comparable figure for Western Europe is far lower—about 3.7 percent.

Adding to the American sense of grievance is the fact that some allies—such as Spain and Greece—are less willing to tolerate sizable US forces on their soil, while others, such as Portugal, demand higher amounts of assistance in return for their cooperation.

There is no obvious solution to the conflict. Against the backdrop of US unhappiness, Western European nations give faint signals that they are ready to pursue an alternative to the *status quo*.

They are demonstrating a revival of interest in cooperation on defense and even integration of certain European defense functions.

The movement to form a "European Pillar" of NATO, comparable to the "American Pillar," is not a new idea in the West. But the current effort may actually bring some concrete results.

The reason is that France, long the maverick of the Alliance, is finally showing a readiness to cooperate with other Western European nations.

France's steps toward bilateral cooperation with Europe's two key powers—Germany and Britain—have raised eyebrows.

- *West Germany.* Plans for an integrated French-German infantry brigade numbering 4,200 men are moving forward. It is to be operational next year and deployed in West Germany. Command of the unit will alternate between French and German generals. The brigade falls outside the NATO military structure.

Though small, the brigade carries heavy symbolic meaning for Europe. For one thing, say analysts, it will reestablish a French role in the forward defense of NATO.

Kohl speaks of the brigade as the basis for a future European Army—a statement that must be taken skeptically on the basis of the record. But it does seem likely to anchor West Germany more firmly in the Western camp.

- *Britain.* Over the past year, France has been holding extensive discussions with Britain on expanding bilateral defense ties. Since these nations are Western Europe's only independent nuclear powers, cooperative ventures focus primarily on nuclear-arms issues. But the talks have covered the entire security relationship.

Paris already has proposed a plan to work jointly on a new air-launched nuclear missile. And an Anglo-French effort is under way to coordinate overhaul schedules for French and British ballistic missile submarine fleets.

In the conventional field—and despite its position outside the NATO military command—France has agreed to allow the use of its ports and roads for reinforcement of British troops in Germany in wartime.

In the cases of both Germany and Britain, analysts are quick to make this point: What is important is not the size of the French moves, which is modest, but the fact that France is moving at all.

There are, however, limits to France's willingness to cooperate with its rivals. Paris's eagerness to promote the "European Pillar" does not mean it will return to the NATO command structure.

The problems of building a European Pillar are sizable. Even tougher—and more dangerous—problems would come in trying to devise a true power-sharing arrangement with the US.

The major problem in the view of Alliance observers is that Washington, finding a stronger, more integrated, and more independent Western Europe, might also find the incentive or rationale for reducing, or even eliminating, its military presence in Europe.

The situation as yet is far from a crisis. But the fissures within NATO confront the Atlantic partners with a formidable foreign policy challenge: How to reverse a drift toward disunity in military affairs that could turn into a destructive midlife crisis. ■

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Two developments—the East Asian economic boom and the growing importance of the USSR's long eastern flank—create both risks and opportunities for the United States.

Imperatives of the Pacific Frontier

BY ROBERT S. DUDNEY
SENIOR EDITOR

SOMETHING of a new strategic frontier, offering the US major opportunities mixed with sizable risks, is opening up on the far side of the Pacific.

Asia's vast Far Eastern rim no longer takes a secondary place in superpower assessments. The region has been steadily gaining on Western Europe and the Middle East in importance.

Now, there is conviction that the Far East, long a sideshow in the Soviet-American rivalry, has become a front-rank commitment as well as a pressure point to be exploited by the United States.

"There was, in the past, a feeling that we were in a bit of a 'Camp Swampy' over here," observes Maj. Gen. Michael Kerby, Vice Commander in Chief of Pacific Air Forces (PACAF), from its headquarters in Hawaii. "Now, that has disappeared."

Transforming traditional perceptions of the Pacific region are two developments that have gathered force throughout the decade.

One is the spectacular East Asian economic boom that looms ever larger in America's view of its political future. As the Kremlin pursues a major buildup in the Pacific, Washington's role in the defense of this vital region assumes new significance.

The second factor is a controversial shift of strategic thought. In calculations of how to protect its interests elsewhere in the world, US attention focuses increasingly on Russia's long Pacific flank.

Military men assert that the ability to open a "front" in that area can help deter or defeat Soviet aggression in Europe.

The sum of these factors, in the view of former Secretary of the Navy James H. Webb, is that the United States is "becoming increasingly tied to Asia, and it is imperative that we match those ties with the military capability to protect our interests."

The implications of this development for US security policy, say many strategic affairs analysts, are becoming clear even now.

- In military terms, the Pacific

—USAF photo by TSgt. Daniel C. Perez

The vastness of the Pacific offers unique opportunities as well as considerable risks. To counter the Soviets in the area, the US counts on support from allies such as Australia. These Australian Mirages and US RF-4s from Kadena AB, Japan, take part in a recent Cope Thunder exercise.


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Far East seems destined to exert a stronger claim on US forces, weapons, and budgets and leave a far deeper imprint on worldwide defense planning.

- In diplomatic terms, cooperation with allies and friends—in particular, Japan—on forces, bases, intelligence-gathering, logistics, trade, and investment is bound to become even more critical.

The Pacific rim has already been transformed into a vital American interest on par with any other area.

Asia's Economic Emergence

At the heart of this phenomenon lies Asia's economic emergence during the 1980s. While no one minimizes the US stake in either Western Europe or the Mideast, the Far East is seen as the pivot of America's long-term economic future.

In sharp contrast with the sluggish economic performance of US allies in Europe, nearly every Far Eastern nation is enjoying dramatic and overpowering growth, emerging as a major potential market.

Attention at present focuses on Japan, South Korea, Singapore, Hong Kong, and Taiwan. Even the less-developed economies in Indonesia, Malaysia, and the like are showing new vigor.

In a class by itself is the long-term economic potential of a modernizing China, with a largely untapped market of one billion.

For the US, the rising affluence and dynamism of the Pacific rim have fueled a major economic reorientation. By a big margin, two-way transpacific trade now surpasses trade with Western Europe.

In 1987, US-Asia commerce totaled a staggering $257 billion—thirty-five percent of the US world total. That dwarfs US business with any other global region, including Europe with twenty-one percent.

There is pain, too, as Pacific nations have proved to be tough competitors, piling up huge trade surpluses. This, however, is widely viewed as a transitory phenomenon that nations will adjust to in time.

In light of the nation's mushrooming economic stake in the Pacific rim, US officers and diplomats maintain that expansion of the US security role is inevitable.

Heavy US military involvement in the region is not new. In fact, five of Washington's eight military security treaties are with Far East nations—Japan, South Korea, the Philippines, Thailand, and Australia.

In reality, says a Pacific military officer, the United States until recently evinced "a fairly myopic view in the Pacific"—that is, Washington tended to focus not on Soviet power but on a succession of smaller, local threats.

After the end of the US war with Vietnam, he says, "most of the focus in the Pacific was on the Korean peninsula, and most of that was on the immediate threat to the north." Lacking, he adds, was a sense of "the importance of the Pacific theater, period."

That attitude is fading fast. US military assumptions are being transformed by Russian pursuit of a Far East arms buildup that has propelled Moscow toward the top rank of Pacific powers.

In what General Kerby describes as "a very deliberate, smart, and calculated strategy," the Soviet Union has gone far beyond its earlier, limited garrison force to construct a "rather remarkable" sea and air presence, posing a serious challenge to US and allied interests.

Soviet Far East Buildup

The problem, as it is viewed at US Pacific Command (PACOM) headquarters in Hawaii, is not so much Soviet land power. The ferocious Sino-Soviet feuding in the 1960s triggered a huge Far East buildup of the Red Army, and most of the USSR's fifty-seven divisions there remain tied down on the Chinese border.

Rather, it is the Soviet capability to project air- and seapower over long distances that now preoccupies most American planners.

This is a relatively new phenomenon, intensified, say most experts, by the two-sided restoration of diplomatic relations in the late 1970s between the US and China, on the one hand, and Japan and China, on the other. The perceived development of a Washington-Beijing-Tokyo confederation fueled Soviet fears.

The result: Between 1980 and 1988, Moscow has put in place the means to attack not only China but also US and allied forces in an arc stretching from Alaska and the Aleutians in the north down through Japan and South Korea to the Philippines in the south, and far out to sea as well.

In terms of naval power, the Soviet Pacific Fleet is shedding its coastal-defense focus to become a blue-ocean warfighter.

US Navy Adm. Ronald Hays, the recently retired commander of American forces in the Pacific, estimates Soviet fleet strength at more than 300 major combatants, an increase of one-third since 1975.

More important than numbers is the quality of the new warships. These include two small V/STOL carriers, the *Kirov*-class nuclear-powered guided-missile cruiser, and two new classes of guided-missile destroyers.

Of greatest concern, the Pacific is now home to some 120 Soviet cruise missile and torpedo attack subs, among them the stealthy, extremely quiet *Akula* boat.

Equally impressive has been the emergence of Soviet airpower. PACAF officers point out that Soviet Pacific air forces, now estimated to total some 2,000 combat aircraft, boast virtually all the newest and most modern Soviet aircraft. With MiG-31 Foxhound and Su-27 Flanker fighters on hand, the interceptor force has come far.

The greatest threat, however, is posed by Soviet medium- and long-range offensive aviation. US intelligence concludes that more than 200 advanced Su-24 Fencer fighter-bombers—the USSR's answer to the USAF F-111—are now deployed in the Pacific area.

Long-range striking forces include all Soviet Bear-G bombers, plus a significant number of Bear-Hs armed with AS-15 air-to-surface missiles. Dozens of Backfire bombers are assigned to naval aviation.

All told, say PACAF intelligence officers, the Soviet capability to deliver ordnance with aircraft has increased fourfold since 1980, and no letup is in sight.

"Five or six years ago," notes one military officer in the Pacific, "PACAF would have described Soviet tacair power in Northeast Asia as primarily defensive in nature. But now, they have an obvious offensive capability. We believe that it's an intentional move."

The implications are many and uniformly troubling. The Soviets have been observed using their Bear-H bombers with AS-15 cruise missiles to simulate strikes against Alaska. Shorter-legged Bear-Gs undertake mock attacks against US facilities and naval vessels throughout Far Eastern areas. There are coordinated naval and air tactical operations.

Overall, concludes a military planner, "We perceive that the Soviet threat has increased a great deal. We see a more active role for our forces simply because of the Soviet ability to project power."

Keeping Perspective

Worrisome as the Soviet buildup is, strategic affairs analysts say it should be kept in perspective.

Few believe that the Soviet Union has overtaken the United States as the preeminent Pacific power. Analysts maintain that the US, with its long tradition of seapower and combat aviation, enjoys a natural advantage over Moscow in the Pacific arena's sea and air environment.

That conclusion is underscored by Admiral Hays himself, who flatly asserts that "a net assessment of the Pacific theater favors us."

A prime source of American confidence these days is the clear superiority of the US Pacific Fleet. With more than 300 major warships—half the entire US Navy—the fleet is at no disadvantage to the Russians in numbers. For sheer firepower and quality of its weapons, moreover, the US Navy far outclasses its Soviet competitor.

The Soviet Navy, for example, can deploy nothing comparable to the seven big-deck aircraft carriers, with their multipurpose air wings, that the US could deploy to the Pacific in a major crisis. US attack submarines still are superior in combat capability.

Equally impressive are the five tactical fighter wings of Pacific Air Forces. With only 275 combat aircraft, the force is not large, but it would weigh heavily in the balance of any major shooting war in the Far East.

The Soviet air forces have nothing to match the modern, sophisticated F-15C interceptors and F-16C multirole fighters, all of which have taken on upgraded avionics and weapon systems. Better US pilots and more realistic training are viewed as an additional edge.

Japan is a linchpin in almost every scenario foreseen for the Pacific area. Here, two members of a US rifle squad maneuver through the snow in northern Honshu during a Northwind exercise. Northwind is held annually to improve interoperability with the Japan Ground Self-Defense Force.

All five wings, two each in Japan and South Korea and one in the Philippines, are strategically located on the Pacific rim, giving them fast response capability. In fact, these wings represent Washington's most responsive and flexible power in the region.

The US Fifth Air Force, with 14,000 personnel manning and maintaining two wings at three major US installations in Japan, rates as the makeweight of the fighter fleet. Largest of the three numbered US air forces in the Pacific, the Fifth can call on two squadrons of hard-hitting F-16C multirole fighters based at Misawa AB in northern Japan, three squadrons of F-15C air-superiority fighters at Kadena AB on Okinawa, southern Japan, and a squadron of RF-4C reconnaissance craft.

In South Korea, the US Seventh Air Force, with 10,000 personnel at five major installations, deploys two full squadrons of F-16Cs for interdiction, two squadrons of F-4s, and a squadron of tank-killing A-10s.

Rounding out the PACAF force is the US Thirteenth Air Force, headquartered at Clark AB in the Philippines. Its 8,000 Air Force personnel are responsible for two squadrons of F-4s, one performing the Wild Weasel radar-suppression mission, the other in the air-to-ground role.

Backing up the tactical fighters is a formidable force not directly assigned to PACAF. Other major Air Force commands control about one-third of the 60,000-strong Air Force complement that is in the Pacific.

Tactical Air Command, for example, flies some of its E-3 Airborne Warning and Control System sentry planes out of Japan to support the theater in its entirety. Similarly, the Strategic Air Command has authority over SAC B-52 heavy bombers assigned to Andersen AFB on Guam. Military Airlift Command keeps its C-141 and C-5 airlifter crews in constant motion throughout the Pacific region.

All signs are that the US forces have kept pace, at least, with Soviet technological advances. That seems destined to continue.

Big Steps Forward

For PACAF, the biggest step forward in the next few years will be introduction of advanced F-15E multimission fighters into the Pacific. At present, PACAF is scheduled to receive significant numbers of the F-15E, a potent new version that will be equipped to carry out long-range interdiction while losing little of the F-15's prowess in air-to-air combat. The aircraft is expected to add greatly to PACAF's ground-attack capabilities.

Apart from their receipt of advanced fighters, the combat wings in the next few years will start fielding the AIM-120 AMRAAM and the LANTIRN (Low-Altitude Navigation and Targeting Infrared for Night) ground attack system.

In the Navy, recent years have brought introduction of modern systems such as the *Ticonderoga*-class Aegis air defense cruiser, the F/A-18 strike fighter, the Tomahawk land attack cruise missile, two battleships, and more destroyers.

In PACOM's relatively small contingent of forward-deployed land forces—two Army divisions, one in South Korea and one in Hawaii, and a Marine Expeditionary Force on Okinawa—both firepower and mobility have been improved.

Apart from the contribution made by US national forces, the Pacific military equation includes another factor that tends to favor the United States. This is the air, sea, and land forces of major allies.

Though frequently criticized as a piker on defense, Japan is applauded by military officers for having come far in a very short time, especially in airpower.

The Japanese Air Self-Defense Force, formed around ninety-six Mitsubishi-assembled F-15Js, today can put aloft more combat aircraft than the US has permanently based in Japan, Korea, and the Philippines combined.

Similarly, Japan's Maritime Self-Defense Force has more than twice as many destroyer-type ships, critical for antisubmarine warfare, as the US Seventh Fleet that patrols the Western Pacific.

South Korea, too, can discharge major military power with its professional and highly trained force of 615,000. Primarily oriented to land combat, Seoul is now improving its air arm and has taken on most of the local air defense burden.

Other allies, such as the Philippines and Australia, make more modest but still important contributions to regional defense.

Offsetting these factors, somewhat, are the huge militaries of Soviet allies Vietnam and North Korea.

China studiously maintains its independence of both superpowers in pursuit of its own interests. However, Beijing's primitive but vast armed forces sharply limit Soviet options in the Far East while imposing few constraints on US freedom of maneuver in the most critical areas.

All in all, in Admiral Hays's assessment, the United States at present finds itself in an "adequate" position to defend its vital interests in the Pacific rim from Soviet and Soviet-backed military challenges.

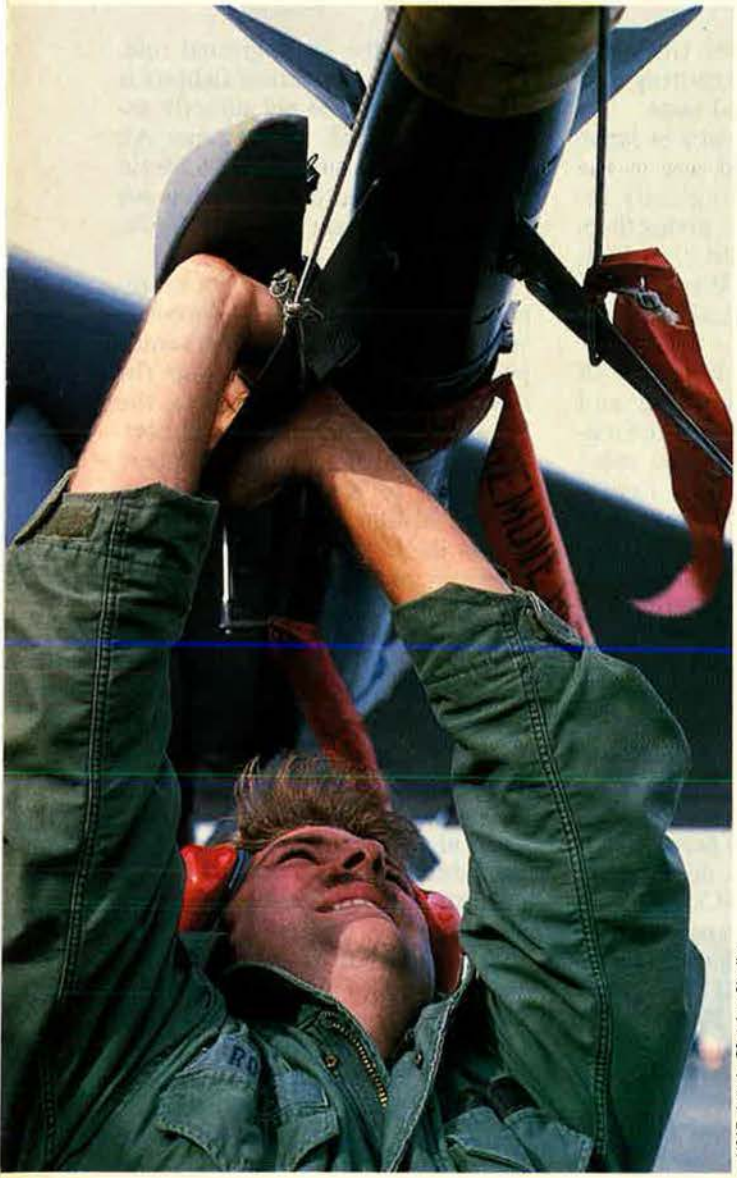
He warns that Washington will be compelled to work harder in years ahead to maintain a favorable strategic position in a region that already is of critical, and increasing, importance.

It is not only the perceived Soviet menace to growing American interests in the Far East that is attracting the attention of Pentagon military planners to the Pacific rim.

The region is now taking on added importance in American eyes for a second, and most ironic, reason. It is this: The enormous, thinly populated Pacific flank of the Soviet Union itself, though it is the site of formidable military power, has increasingly come to be viewed as something of a Soviet Achilles' heel—not in the Pacific but thousands of miles away in Europe or the Middle East.

The USSR's use of its preponderance of forces in those regions, military leaders insist, can be deterred or diluted by US willingness, and demonstrated capability, to launch a devastating air and sea offensive aimed at opening a second front in the Soviet Far East.

Thus, US power in the Pacific is viewed as having military utility that goes far beyond narrow, theater-defense considerations.



With only 275 combat aircraft in five tactical fighter wings, PACAF's force is not large, but it would play a big role in any shooting war in the Far East. During a Cope Thunder exercise, SSgt. Jeffrey Rogers from the 18th Tactical Fighter Wing at Kadena AB, Japan, works on an AIM-9 Sidewinder air-to-air missile.

—USAF photo by TSgt. Lee Shading

Under this theory, the Soviet Union would seek at some point in wartime to shift surplus land and air forces westward from the Far East to overwhelm NATO defenders in a decisive European battle.

The idea now is that, by intensifying Moscow's insecurities about its sensitive eastern border, the US could prevent the Kremlin from transferring forces to the European battle. Instead, the thinking goes, the Soviet Union would opt to keep them in place, and perhaps even be compelled to reinforce its Far East frontier with European units.

In this view, destruction of Soviet forces arrayed against the Pacific theater would represent an ancillary benefit.

The US Navy's role in the Pacific is unquestioned. More than 300 warships—half of the US armada—are stationed in the Pacific theater. With seven carriers available to operate in that area, the Navy's reach is very long. These F-14 Tomcats are part of VF-41 aboard the USS Nimitz *(CVN-68).*

"Horizontal Escalation"

This concept of "horizontal escalation" is not new. It has been developing since the mid-1970s, primarily within the US Navy. Military men, however, are more outspoken than ever in their support of it, at least in the Pacific.

Typical of the comments of many officers is this explanation from General Kerby:

"Our first responsibility is to deter aggression. If the National Command Authorities approve our participation, the best contribution that can be made in the Pacific theater, should the war begin in the European theater, is to tie down Soviet forces deployed in the Far East, to prevent their redeployment to the European front. It gives us the capability to take some pressure off of Europe."

In short, the idea would be to make certain that the Soviet Union would not be able to ignore a threat in its Eastern region.

As many see it, the question of who opens the second front is of purely academic interest, given what they view as the likelihood of Soviet attack worldwide.

Others aren't so sure. Some officers can find little incentive for the Soviet Union to strike first in the Pacific. Whatever the pros and cons on this specific issue, this much is beyond dispute: Senior US military officers today consider direct US escalation of this form a legitimate, serious option in wartime, and they are training their forces accordingly.

"A major portion of our work here," reports an Air Force officer in the Pacific, "is to fix those [Soviet] forces here in this theater so that they can't be used to augment the Western European front. That's a kind of cornerstone of our strategy here in the Pacific theater."

Naval officers report that the notion of employing the Navy as a strategic counterweight to Soviet military power in Europe has become an even more crucial element in US naval strategy.

In assessing the plan, experts cite three fundamental and deep-seated Soviet concerns that US military planners seek to manipulate.

• **The Chinese Giant:** Russians are only too aware that China has never relinquished its territorial claim to parts of Soviet Siberia that lie just across the border between the two nations. Still primitive, but potentially rich, Siberia might yet be put under Chinese pressure—

—USAF photo by TSgt. Daniel C. Perez

The growing economic power of the Far East is another reason for the area's increasing strategic importance. No longer viewed as a "sideshow," Far East political and economic factors affecting missions in the Pacific call for more training. Here, Australian and US pilots are briefed before a Cope Thunder sortie.

particularly in a conflict that results in destruction of much local Soviet military power.

• **Insecure Borders:** In addition to its worries about a resurgent China, Moscow is viewed as harboring major concerns about the general security of its frontiers. "Why else would they keep half of their maritime forces deployed to the Pacific?" asks an American planner. "If we go in there and bomb Vladivostok and cruise three miles off their coasts at will, then we have made them naked and vulnerable."

• **Strategic Vulnerability:** The Soviet Union knows that its fleet of strategic missile-firing submarines (SSBNs) are put at risk by the US Navy's superior antisubmarine warfare capability. What's more, the Navy states explicitly that it would target Soviet SSBNs in the Far Eastern Sea of Okhotsk and try to sink them as quickly as possible. This type of close-in undersea campaign, pressed hard enough, could deprive Moscow of part of its strategic reserve force.

"I would want the risk of an unpredictable and creative US military attack to be a factor in the Soviet planner's mind, yes," acknowledges a Pacific officer. "I would love it if a Soviet planner were agonizing over this prior to committing aggression."

Controversial Strategy

The concept of horizontal escalation is controversial. Some claim that such an operation would lead to a rapid escalation of conflict, impede diplomatic efforts to bring the war to a close, and perhaps lead to nuclear confrontation, to name but a few of the charges critics raise.

Most serious, however, are questions about whether horizontal escalation would prove effective in a military sense. Analysts cite three imponderables.

First, they ask, could the United States induce its Far Eastern allies to provide the support that would be crucial to success?

Sustained, effective air and sea attack against the Soviet flank is considered inconceivable without the assistance of Japan, the Philippines, and China, the first two for logistical help and the third as a political counterweight to Soviet land power. China's response—supportive, neutral, or hostile toward the US—could well be the decisive factor in Soviet calculations.

The biggest question mark is Japan, a nation whose constitution permits only tightly constrained defensive actions. "The Japanese have to play logistically," maintains one US planner. "If they don't, then we're in a world of hurt."

In the face of what would surely be intense Soviet pressure in a crisis, would Tokyo stand behind Washington? Or would it buckle under Soviet threats? Reports one Pacific analyst: "It comes up in a lot of the exercises that we run. . . . There is a lot of feeling among some that they wouldn't give us permission to act. There are others who say they would be very supportive."

Second, would US forces actually be able to inflict a painful defeat on Soviet forces in the Far East?

Implicit in the strategy, say military men, is a belief in local American military superiority. While that is probably true in the Pacific generally, the doubt increases as US attacks move closer to Soviet territory.

Likely targets are heavily defended. Experts note that there are three big naval bases in the Eastern USSR—Vladivostok and Sovietskaya Gavan on the Sea of Japan and a third, Petropavlovsk, on the Kamchatka peninsula. All are surrounded by extremely dense rings of air and sea defenses that are certain to pose formidable dangers for ships and aircraft.

Finally, some critics question whether even a successful campaign is likely to have the desired effect on Soviet force deployment decisions. Strategic analyst John Mearsheimer put it this way in the journal *International Security:* "The Soviets could afford to absorb a temporary beating in the Far East while they were rolling up NATO's forces in Central Europe. A setback on the periphery would not weaken their European effort in any meaningful way, and later they could move massive force to deal with problems on their periphery."

Amid all the controversy, Pacific officers hasten to make a point that is often overlooked. Far from being a reckless and unsound dogma, such war-widening attacks are considered options that would only be put into play under workable circumstances.

"But we've got to work on it and train on it," concludes a Pacific planner.

Overall, the rising strategic importance of the Pacific, in its own right and as part of US global strategy, presents Washington with a challenge in several areas.

In military terms, say experts, the US will have to find a way to augment its Pacific forces to cope, in the future, with what shapes up as a permanent and growing Soviet presence.

For example, the Pacific Commander's so-called "Integrated Priority List," a classified summary of defense priorities, outlines a broad array of requirements in the near future. They include better antisubmarine-warfare capability, improved area air defense of the region, and long-range strike aircraft. On the latter score, Pacific military leaders continue to press for assignment of F-111 long-range interdiction aircraft.

Apart from better weapons, the Pacific Command has need of better staying power—munitions stockpiles, war reserve spares, and the like.

In light of current budget austerity, analysts note, finding the funds for such improvements will be increasingly difficult, as will any possible shift of US assets from other parts of the world to the Pacific.

In diplomatic terms, the challenge appears even stiffer. All too apparent is the growing political and economic conflict between Washington and its key Pacific allies. Tension with Manila, for example, is raising severe questions about continued US naval and air access to the key Subic Bay naval base and Clark AB in the Philippines *(see also "Bases in Jeopardy," by Jed C. Snyder, on p. 64 of this issue).* Washington's efforts to persuade such economically powerful allies as Japan and South Korea to assume a larger share of the common defense rapidly are also viewed as politically difficult.

Finding solutions to these problems, however, is regarded as a necessity if the US is to exploit the possibilities and minimize the risks now emerging on the Pacific frontier. ■

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Our forward air bases in Europe have become plump targets. The Air Force is looking at new ways to defend them, ride out an attack, and get back into action.

Fighting Under Attack

BY JOHN T. CORRELL, EDITOR IN CHIEF

AMERICAN air bases in Vietnam were harassed periodically by sapper raids and mortar fire. During the Tet offensive of 1968, Tan Son Nhut and Bien Hoa stood off enemy ground forces attacking in battalion strength. That was the worst of it, though, and even the Tet attacks were limited affairs, lasting less than a day.

Until recently, the Air Force did not worry much about operating from bases that were under all-out attack. There was some concern about forward locations in Germany, but those installations, too, were relatively secure. Before the era of the Su-24 Fencer and other late-model weapon systems, Soviet forces did not have the range or the accuracy to mount a serious deep-interdiction threat.

For a combination of reasons—including the longer reach of Soviet airpower—the Air Force has begun to think a great deal about the vulnerability of its bases. More than anything else, it was a 1985 exercise called "Salty Demo" that riveted official attention on the problem.

Salty Demo ran for two weeks at Spangdahlem AB, Germany, and simulated a bombing attack of moderate severity on the installation. Planners calculated the toll that NATO interceptors and missiles would take on the Soviet bombers and what those that got through would be able to do to the base. "Damaged" signs were hung on buildings and equipment that were struck in the simulation. "Casualties" were taken out of action. Utilities lost in the scenario were no longer available for use in the exercise. For a special bit of realism, twelve craters were opened in the Spangdahlem alternate launch runway with explosives.

The results were a sobering demonstration of the synergistic chaos that ensues when everything goes wrong at the same time. Thirty-one percent of the base's personnel were casualties, half of them killed and nearly a third of the wounded unable to return to duty. There was considerable destruction and heavy damage to aircraft, vehicles, buildings, communications, and power and systems.

In the simulations, fires burned all over, and unexploded ordnance lay about everywhere. It was difficult to assess the damage accurately. Repair teams were shorthanded and in some cases did not have the equipment and supplies they needed. The runway craters were a bigger problem than had

The Salty Demo exercise at Spangdahlem (above) created explosions in more ways than one. It delivered the message, loud and clear, that the air base, ground equipment, and such people as MSgt. Larry Dixon and SSgt. Fermin Zoilo of the civil engineers (right) are first-string members of the combat team.

—USAF photo by TSgt. Kit Thompson

been expected. Unlike clean-dug holes, they were jagged and surrounded by buckling. Chunks of debris had caused secondary damage.

The Lesson Sinks In

To address the shortcomings that Salty Demo revealed, the Air Force intensified its Air Base Operability program and intends to improve the ability of its combat bases to defend themselves, ride out an attack, recover from it, and get back into action.

Air Base Operability sections are being formed, all the way from the Air Staff down to bases in the European and Pacific combat theaters. New equipment is in development. Initiatives include such active and passive defenses as camouflage, concealment, deception, hardening and protection of facilities, explosive ordnance disposal, and the training of base personnel to augment the security police, civil engineers, and firefighters in an emergency. At a recent Air Base Operability roundtable put on by AFA's Aerospace Education Foundation, Tidal W. McCoy, Assistant Secretary of the Air Force for Readiness Support, said the priority of this problem has progressed from "urgent" to "critical."

The most significant change may be in the thinking of leaders and planners. Many of them now talk about "fighting the air base," a concept that regards the installation as a warfighting asset akin to a weapon system instead of as incidental real estate. The new thinking also reconsiders traditional assumptions about how war in Europe might unfold.

The war may be five days old before the United States is aware that it has begun, Richard L. Kuiper of PSC, Inc., a former US air attaché in Moscow, told the roundtable audience. The opening step of the conflict could be introduction of biological or chemical substances into the water supply. Maj. Gen. George E. Ellis, USAF's Director of Engineering and Services, agreed. He said that bases generally pipe in their water from the outside community and may not know if enemy agents have tampered with it.

Soviet *Spetznaz* commando forces would put additional pressures on base defenses early in the fighting.

Mr. McCoy said there is growing opinion that the Soviets may employ airpower in the move-and-shoot style of Red artillery. Fixed facilities at Soviet air bases are austere, but tactical units are long on portable equipment and big trucks. This suggests their intention to keep moving the air base setup around, both for survivability and for operational advantage, as the attack proceeds.

"They plan on using our bases," Mr. McCoy said. "They don't really want to destroy them."

Increasingly, the Air Force trains the way it would have to fight in wartime. This includes the sweaty realism of uncomfortable chemical suits. Exercise scenarios cover what happens on the ground as well as in the air.

"Worst Case" in Perspective

At the same time, Mr. McCoy and other Air Force leaders point out that the Soviets stand little chance of delivering the full blow that "worst-case" estimates, taken in isolation, might predict. By concentrating their air strikes, sabotage, commando raids, and other measures, they could probably bring selected air bases to their knees. But wreaking sudden devastation on the entire theater would be much tougher.

"We don't operate one base—we operate a series of bases," Lt. Gen. Michael J. Dugan, USAF Deputy Chief of Staff for Plans and Operations, said at the roundtable. "I'm not ready to give the Soviets credit for getting away with all this against the whole system of bases."

Moreover, the Soviets would pay in lost efficiency if they used shoot-and-run tactics. "Their modern airplanes look like ours, are equipped like ours, and have to be maintained like ours," General Dugan said. This equipment requires care "that you're not going to get by hauling it through the woods. They certainly aren't going to get many sorties a day." The aircraft "will be difficult to find, but they won't be nearly so well defended if they have them out in these remote areas and move them around. The most difficult [targets] to attack are the well-defended main operating bases," he said.

Assuming the Soviets did take the base-hopping approach, US aircraft would probably focus the counterattack on fuel supplies, infrastructure, and other targets whose loss would inhibit operations, no matter where the enemy is based or how many enemy airplanes survive.

The Air Force's Air Base Operability objectives group into four categories: defending the bases, surviving the attack, recovering from it, and restoring capability to generate sorties in the aftermath.

Both the US and its European allies have been working hard to improve their air defenses. The Soviet attack would have to penetrate an upgraded and layered system of interceptor aircraft, surface-to-air missiles, and antiaircraft guns. The bases will also be better prepared in the future for local defense.

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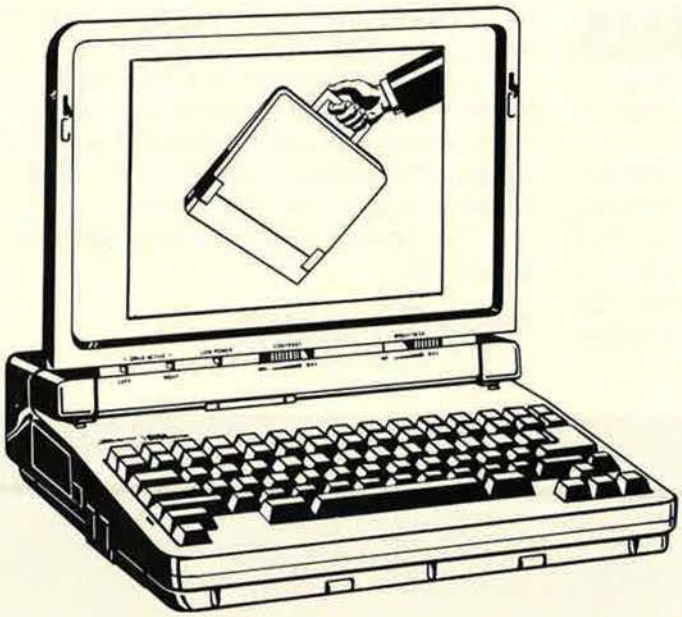

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The repair-and-recovery job, as brought to light in Salty Demo, was bigger than expected. The exercise also underscored that the primary response specialists—such as firefighters, security policemen, and civil engineers—must be augmented in their efforts to defend the base and put it back into operation after an attack.

our airmen are prepared to contribute to base recovery after an air attack and to defense of the base during ground attack," Mr. McCoy said earlier this year at an AFA Symposium. "We cannot afford to have the sortie generators standing around watching while fifty civil engineers fill holes in the runway or 150 security policemen repel a *Spetznaz* assault."

The bases will be better able to discover and track commando infiltrators when they get new sensors, now being developed. Some of these will be tested this year during the big Reforger exercise. "They've got visual lookers, sound lookers, heat lookers, and radar lookers," a headquarters officer in Europe says. "It's a whole integrated package."

Survival and Recovery

The number of casualties in Salty Demo made it clear that "you've got to get to a place for protection—not just jump in the woods and hide," says a planner working the problem. The Air Base Operability program envisions "defensive construction" of facilities, making them less vulnerable to chemical, biological, and bombing attack. This includes the Survivable Collective Protection System—dormitories sunk into the ground and covered with dirt and grass. Each will allow about eighty people to rest and sleep between shifts of damage-repair duty. Some of these bunkers will be specially outfitted for medical care.

Communications and power lines will be more protected and routed away from the most likely areas for an enemy attack. This should increase the probability that base services essential to air operations will be available.

New chemical masks, with improved visibility and filters that are easier to replace, are being issued. Unfortunately, chemical suits are still as uncomfortable as ever. Planners say that protective clothing of the future will bring some relief.

The camouflage, concealment, and deception effort will seek to confuse the enemy with fake landing strips, dummy airplanes, netting, smoke, phony electronic signals, runways painted in earth tones, and other decoys. These measures would not pass a close inspection, but may fool a pilot rolling in fast after a long, hard ride through fire and flak. The Air Force conducted some tests and found that ten times out of fifteen, pilots went after decoy aircraft instead of the real ones.

Today, the damage-control teams sent out after an attack to survey the base would report back by radio, a clumsy, trying process for people in chemical suits. The new way, now being tried, will be to punch numbers into handheld computers that contain a grid of the base and preformatted messages. This will be faster and much easier for the survey teams and has another advantage as well. The report goes to the command post in a data burst, which will be difficult for the enemy to monitor or jam.

Submunitions and unexploded ordnance would be strewn about in profusion after an attack. If disaster teams try to dispose of them one by one, giving them extensive individual attention, the job will consume too much time. Bases are receiving vehicles called ORACLEs (Ordnance Rapid Area Clearance). These are bulldozers with protected crew cabs and hardened blades. They push munitions off the runway so repairs can begin. An improvement, the MARV/SMUD (Mobile Armored Reconnaissance Vehicle/Standoff Munitions Disrupter) is on the way. The Air Force plans to buy more than 200 of these tank-like vehicles. Each mounts a .50-caliber machine gun that can detonate big bombs and unexploded ordnance.

Recovery efforts also include rapid runway repair—with big, precast concrete blocks that can be stockpiled or used as parking lots in peacetime—improved firefighting techniques, and better medical preparedness. Repair teams have new kits with the tools and materials they need—another change stimulated by Salty Demo.

Runway repair teams are getting more adept at their art, but planners still want every base to have alternate launch and recovery surfaces for backup. With portable equipment, aircraft could work from numerous "gas and go" sites in Europe. Tactical units have been exploring a variety of ways to taxi, tow, or haul aircraft to fields and strips that will do in a pinch.

The Air Force thinks it is on the road to improved air base operability and that hereafter it will be in better shape to handle a disruption like Salty Demo. The test comes in 1991, when a followup exercise called "Constant Demo" is scheduled to happen at Bitburg AB, Germany. ■

What happens if the Europeans succeed in their goal to establish a single, integrated market by 1992?

An Industry Without Frontiers

BY STEPHEN P. AUBIN

THE PLAN to establish an integrated European market in 1992 has captured the attention of businesses on the continent. But on this side of the Atlantic, US companies are just beginning to understand its significance—and its implications for the way they do business.

While some US multinational companies are closely tracking the European Community's moves toward establishing a single, integrated market aimed at taking on the United States and Japan, few US defense and aerospace firms have even begun to assess what the changes will mean for their industry.

In fact, when an official from one of the ten largest US aerospace firms was asked about the effect the European market of 1992 might have on the company's European operations, he admitted that he and others were hesitant even to talk about the subject because "studies are under way" and they are "very preliminary" and "in the embryonic stage." This spokesman did, however, recognize the importance of this "very complex" issue.

The internal market of 1992 is a complex issue, and even many Europeans are unsure just what the European business landscape will look like on the morning of January 1, 1993, when they awake from New Year's Eve revelry. From the administrative and legal standpoints, the European Community is supposed to be transformed into a single market "without frontiers." Trade barriers between EC member countries will no longer exist, and financial and tax structures will be unified on a European scale.

The real question that should be on the minds of American business executives, including those in aerospace and defense, is whether the European market will lead to the creation of what some have already dubbed "Fortress Europe." Now is clearly the time to assess strategies for ensuring access to the European market.

For US aerospace companies, the internal market of 1992 could have a number of consequences.

Some of the major questions that companies need to be asking right now are:

- Might European consortia find it more beneficial to cooperate among themselves instead of teaming with US firms?
- Will European joint research and development projects further erode US technological preeminence in aerospace?
- While Europeans claim that protectionism is not the aim of the internal market, will what many have termed the "psychological environment" lead to that ever-elusive thing called European nationalism and new, subtle trade barriers?
- Are a US firm's present alliances with European firms sufficient to ensure market access after 1992?
- Will joint ventures suffice, or should more attention be paid to direct investment and licensing arrangements with European firms?

A Changing World Market

The aerospace industry is a peculiar industry. While some lessons can be drawn from the nondefense sector, aerospace strategies will more than likely be quite different from those employed by other industries. Unlike the Coca-Cola Co. and 3M, which are focusing on how to modify management, manufacturing, and distribution practices, or IBM, which has subsidiaries in all Community countries, aerospace companies, because of the special nature of their market—especially in defense systems—will not approach Western Europe simply as a market of 320,000,000 consumers.

The international defense market is quite unlike any other market. It's a market in which governments play a central role. The relationship between private, public, or quasi-public aerospace companies and governments is shaped most of the time by national-security considerations.

In recent years, however, the resources that governments direct into defense spending, and ultimately to defense industry, have dwindled. At the same time, more and more countries have acquired the ability to produce technologically advanced systems, making the international marketplace more competitive. These developments have spawned an era of international collaboration, not by choice but by necessity.

Because of the high cost of research and development, the aerospace industry is going through a period of transformation. A worldwide shakeout is taking place, characterized by consolidations, acquisitions of firms with strengths in complementary systems and technologies, and the entry of such non-US, non-European countries as Brazil and China into the aerospace market.

To cope with the transformation, aerospace companies have increasingly entered into joint ventures as a means of assuring access to foreign markets in the face of increased competition. The international joint venture, in many respects, has displaced such strategies as direct investment and licensing, which are frequently employed by nondefense industries to enter foreign markets.

"Aerospace companies do not commonly face the conditions that induce foreign investment in other industries, such as resource- or labor-intensive production or formal trade barriers. The foreign investments that do occur in aerospace are usually related to gaining access—either to technology or markets—and this explains why the vast majority of aerospace investments occur within the major industrialized nations," explains a recent study by the Aerospace Industries Association (AIA) on the internationalization of the aerospace industry.

The study also notes that "joint ventures permit companies to expand markets while maintaining selective control of their technological assets—more so, for example, than is the case in licensing."

Gone seem to be the days when large US aerospace firms could go their own way and be assured of the resources needed to produce their advanced weapon systems and the ready-made government markets in which to sell them.

"For this industry," the AIA study concludes, "the marketplace has changed, and there is no going back. Success for most aerospace companies requires more attention to world markets."

The study also finds that for the United States, "success in the international marketplace in the future—and the ability to benefit from international business arrangements—will depend on maintaining the industry's financial health and a margin of technological superiority.

"As other nations with strong aerospace capabilities increasingly form consortia among themselves," the study says, "the United States will more often be in the position of playing a minor role."

That is a role that the US aerospace industry is not used to filling. For many years, the US aerospace industry dominated the international market. Then, in the 1970s, the US share of the aerospace market fell steadily from seventy-nine percent to a low of sixty-three percent in 1980. By 1985, however, the industry had rebounded to capture a seventy-three percent share of the market.

According to AIA's Aerospace Research Center, the gains in US market share have come primarily at the expense of European countries, whose share peaked at thirty-two percent in 1980, but declined to twenty-one percent in 1985. Movement toward a unified internal market is one way the Europeans hope to regain a competitive position on an international scale.

A New Regional Competitor?

In a 1985 White Paper, the European Commission, the Community's executive body, laid out its plan for a European internal market. That document made it clear that one of the EC's main goals was "increasing the prosperity of the Community as a whole."

The need to push forward with the internal market seems to have breathed new life into the staid Euro-bureaucracies that are too often crippled by the political

squabbling among the twelve Member States of the EC. In fact, a recent EC document suggests that the Europeans are more aware than they ever have been of the harsh realities of the international marketplace. For many, creating an internal market is no longer a matter of political convenience. It is a matter of survival.

"At the heart of this renewed impetus," the document states, "is the recognition that, unless it can make full use of the potentially vast single market that the twelve Member States constitute, the Community will continue to lose ground and markets to its main competitors, the USA and Japan."

One of the aims of an internal market is to improve industrial cooperation among EC Member States.

According to the EC's 1985 White Paper on the internal market, "The absence of a Community legal framework for cross-border activities by enterprises and for cooperation between enterprises of different Member States has led—if only for psychological reasons—to numerous potential joint projects failing to get off the ground. The Community is now, for the first time, setting the stage for a new type of association to be known as the 'European Economic Interest Grouping' that will be governed by uniform Community legislation and will make it easier for enterprises from different Member States jointly to undertake specific activities."

"The first steps [toward facilitating industrial cooperation]," says a more recent EC document ("Europe Without Frontiers: Towards a Large Internal Market," published last November in *European File*), "have already been taken, with the launching of European research programmes . . . involving firms from different Member States and with the decision to allow the formation of European economic interest groups."

A Profile of Two Markets

The United States vs. the European Community

	United States	European Community
Population	243,800,000	323,000,000
Land Area (sq. mi.)	3,618,000	870,000
1987 Gross Domestic Product*	$4.430 trillion	$4.226 trillion
GDP Growth Rate		
1985	3.3%	2.5%
1986	3.1%	2.6%
1987	3.1%	2.2%
Unemployment		
1985	7.1%	11.6%
1986	6.9%	11.7%
1987	6.1%	11.8%
Inflation Rate		
1985	3.6%	5.9%
1986	1.9%	3.7%
1987	3.6%	3.1%
Civilian Labor Force		
1985	115,500,000	136,600,000
1986	117,800,000	137,900,000
1987	119,900,000	(not available)
Per-capita Gross Domestic Product**		
1985	$16,592	$7,679
1986	$17,390	$10,683
1987	$18,299	$12,921

*Similar to Gross National Product (the total output of goods and services) but slightly lower because of different calculations for inventories and depreciation of fixed assets.
**Based on dollar exchange rates for each year.

SOURCES: European Community Office in Washington and US Department of Commerce. This chart appeared in the Atlanta, Ga., *Journal & Constitution* for June 5, 1988, with an article by Maria Saporta, entitled "1992: What a unified Europe will mean to the U.S. economy," and appears here by special permission.

Taking on the US Technologically

European joint research and development projects are an important part of the European strategy designed to make Europe more competitive in the world marketplace. One such program, ESPRIT (European Program for Research and Development in Information Technology), has been considered a great success by EC Research and Industry Ministers.

According to Jonathan Todd, a British reporter, "The specific aim of ESPRIT when it was first set up in September 1984 was to create a pool of technology to allow EC firms to catch up, and even overtake, the US and Japanese firms.

"ESPRIT has succeeded in bringing about a dramatic turnaround of the situation by providing the money and the infrastructure to allow companies in different EC countries to join forces and cooperate on research and development, instead of duplicating their efforts."

ESPRIT has led to progress in the areas of minisupercomputers and microchips, among other technologies, according to Mr. Todd. The program is considered so successful that the European Commission is now preparing to launch ESPRIT II, a project that will cost nearly $4 billion between 1989 and 1993.

Another program, which is called SPRINT (Strategic Program for Innovation and Technology Transfer), is designed to facilitate technology transfer among European companies. This project, too, is intended to make European firms more competitive with US and Japanese firms.

Michel Carpentier, who runs the EC directorate responsible for technology, was recently quoted in a report about SPRINT by Clive Cookson of the *Financial Times*. He said that "the first priority must be to stimulate the exchange of ideas inside Europe, rather than with Japan or the US."

These programs, along with related efforts, indicate that the Europeans are serious about narrowing some of the technological gaps that exist between Europe and the United States. They also seem poised to compete in areas where the United States was once, or still is, dominant.

Daniel Stanley, manager of corporate plans for McDonnell Doug-

las, points out that European technology and manufacturing in aerospace have been steadily improving. The United States and Europe, he contends, are at the leading edge in the aerospace industry. So while US-European collaboration will continue, he thinks that there clearly is a nationalistic desire among Europeans to produce European weapon systems.

Take, for example, the European Fighter Aircraft (EFA) consortium. If the Europeans succeed in producing the EFA, that plane could become the staple of European air forces, displacing some US-produced fighters in the European market.

Joint Ventures

Whether or not the emergence of a European regional capability in aerospace will affect future joint US-European ventures is one of the most pressing issues surrounding "1992." While it is true that many joint US-European ventures in defense and aerospace are based on the technological assets each company brings to the project, what might a European company do in the future, if—all things being roughly equal between two companies—it must choose between a US firm and another European firm?

Part of the plan for the internal market does indeed focus on industrial cooperation among European companies. But Europeans seem to deemphasize any potential impact these measures might have on joint ventures between US and European firms.

A representative of the European Community explained that competition law and rules governing joint ventures will not be affected by the establishment of a single European market. She noted that an extremely well-developed body of law exists and will continue to apply to international collaboration between European and US firms.

Tony Lewis, the US-based military public affairs manager of British Aerospace, agrees. He believes that the strong international connections that already exist between US and European aerospace firms will not suddenly disappear after 1992. He thinks that the aerospace industry is by nature a transatlantic industry and may indeed be the "world's first global industry."

A spokesman for Italian Aerospace Industries (USA), Inc., while acknowledging that international competition in aerospace will become stiffer, likewise does not see a big change based on a single European market. As he points out, US companies have to team now anyway.

Jacques Gousse, vice president for communications of the French company Thomson-CSF's aerospace group, echoes these sentiments. He emphasizes that for European firms, markets exist outside of Europe now. While he insists that Thomson is always in favor of cooperative programs with other European companies, he acknowledges that it still must team with foreign companies.

Others are not so sure. Bill Dane of Forecast International believes that the changes brought about by the internal market might encourage European aerospace firms to work more with each other "except in areas of technology where they are weak." Mr. Dane also thinks that the internal market is part of a trend toward establishing a regional aerospace capability in Europe.

As part of that trend, European aerospace firms might supply a larger proportion of US programs in the future, according to Mr. Dane. In fact, some of the "guts and hearts" of new European systems, particularly in the electronics area, could be transferred to the United States. Such developments, he maintains, would probably drive down prices. It would also give the Department of Defense alternative suppliers when contracts call for more than one source.

In the end, Mr. Dane believes that there will be a lot of behind-the-scenes negotiations between US and European aerospace firms. US firms, he notes, are used to dealing with Europeans, but Europeans will be in a more competitive position than ever before. In his view, such negotiations could become "cutthroat."

New Form of Protectionism?

Another aspect of the internal market involves the question of European protectionism. Here, too, Europeans are quick to dismiss US and Japanese fears of protectionism.

Paolo Cecchini, a former deputy director-general at the European Commission who chaired a study on the internal market, stresses instead how the world will benefit from the additional growth of the EC economy and how foreign firms and their subsidiaries stand to profit from the removal of trade barriers within the EC.

While asserting that "what's good for Europe is good for the world," Mr. Cecchini inserts one qualifier, "even if, for some sectors and for some enterprises, the increased competitiveness of EC-based firms may well imply a lesser growth or even a loss of market shares within the EC or abroad."

A number of American observers, while somewhat apprehensive about the possibility of European protectionism, express a "wait-and-see" attitude. Many rightly claim that at this point it is difficult to know precisely how the internal market of 1992 will affect US firms.

James M. Murphy, Jr., assistant US trade representative for Europe, Middle East, and the Mediterranean, says that in theory the internal market should benefit US firms doing business in Europe. However, he contends, the EC's track record in terms of trade barriers is not good. His advice to US firms: "Be vigilant." He recommends that US companies follow EC developments, especially as more and more market directives are passed.

Some 300 directives must be passed before the end of 1992 to meet EC goals. To date, around eighty have been approved. At first, the going was slow, since in 1985 directives could not be passed without unanimous support. However, in July 1987, the Single European Act took effect. Under its terms, directives can now be passed by a qualified majority. The Single European Act could give the EC a fighting chance to meet its 1992 deadline.

A spokesman for the Office of European Community Affairs at the Department of Commerce explained that none of the directives specifically affects the aerospace industry. The big change that might make a difference for aerospace companies is the new "psycholog-

ical climate" that will exist among European businesses. As others have suggested, that climate could further encourage European cooperation.

International "Free-for-All"

The so-called "Westland Affair," which cost British Defence Minister Michael Heseltine his job in 1986, illustrates the complex and often paradoxical relationships among US and European defense firms and the unpredictable and dynamic relationships among the Europeans themselves.

Westland, Britain's only helicopter company, got into trouble in late 1985. Basically, there were two ways to save the company: a link with Sikorsky and its associate, Fiat of Italy, or a rescue operation by a purely European consortium. Heseltine favored action by the European consortium, something he felt fit in with his White Paper on the harmonization of European defense procurement.

Prime Minister Margaret Thatcher felt that the Westland Company's board and shareholders should decide the issue, based on the best offer. She also indicated she might even be willing to arrange for the British government to cancel its plan to buy European battlefield helicopters in favor of buying Sikorsky's Black Hawks if Westland chose to go with Sikorsky.

According to a report in *The Economist,* Heseltine led a behind-the-scenes, anti-Sikorsky campaign because he had arranged a deal to standardize a single European battlefield helicopter with three European partners.

The European companies in the consortium, GEC/British Aerospace, Aérospatiale of France, Messerschmitt-Bölkow-Blohm (MBB) of Germany, and Agusta of Italy, feared that the Sikorsky deal would be "yet another advance for American technological hegemony" in Europe. In European eyes, Westland would become little more than a US subcontractor if Sikorsky bailed out the company.

It is true that a Sikorsky investment in Westland might have strengthened Sikorsky's position in Europe. As *The Economist* pointed out, Sikorsky had collaborated with Westland for thirty-eight years and was looking to use Westland as a European base for the manufacture of the Black Hawk.

European helicopter manufacturers were not happy about that prospect. They even threatened to shut Britain out of future European helicopter collaboration, should the Sikorsky deal come off. There was also the implication that EFA contracts might be affected, according to *The Economist.*

In the end, Sikorsky did put a deal together to stave off the demise of Westland. Sikorsky was allowed to take a minority stake in Westland. Consequently, Britain's projects with other European helicopter firms have suffered, according to Mr. Dane.

Black Hawks for the Saudis?

Ironically, the British government did not end up buying Black Hawk helicopters. On the other hand, recent reports suggest that the Black Hawk, which Westland produces under license with Sikorsky, might be sold to Saudi Arabia as part of the arms deal Britain unveiled in July.

If the Saudi deal goes through, it will help fill a critical gap in Westland's production lines. In spite of the 1986 bailout and subsequent moves by the British government to shore up the company, its position today is as precarious as ever.

Westland's present health aside, the whole 1986 Westland episode seems to suggest that a kind of European regionalism may indeed play a role in US companies' future attempts to improve their position in the European market through direct investment in European firms or in setting up manufacturing plants on European soil. It also illustrates that other considerations, such as costs (the Black Hawk would have been cheaper than an all-European helicopter) and the need for complementary technologies, are sometimes just as important when it comes to international collaboration.

Given the nature of the international defense marketplace—which is rapidly becoming too crowded—the aerospace industry might find itself in the midst of a highly competitive international "free-for-all" for some time to come.

How the aerospace industry might be affected by the internal market of 1992 is certainly not a simple matter. As the Westland affair suggests, nationalism on either side of the Atlantic sometimes plays a significant role, but may not be enough to overcome compelling economic arguments for teaming with a European company over a US firm or vice versa.

Europeans know that "1992" is changing the way they do business. Even if some of the directives passed so far do not directly affect US aerospace companies, future business with European companies will be affected—the internal market will create a whole new dynamic, if nothing else.

There could be more direct effects. For example, one recent proposal that sent shivers down the spines of US defense executives involved a possible import tax on US military equipment coming into the EC. Such a move could be interpreted as either a simple restructuring of overly complex and outdated regulations, as Europeans have suggested, or a subtle form of protectionism prompted by preparations for "1992," as some US executives might be prone to think.

For European companies, "1992" evokes an immediate response—for some, fear; for others, anxious anticipation. Nevertheless, the march toward 1992 shows no signs of letting up. In fact, it should continue to gain momentum as European companies and governments prepare for, and adapt to, the changes being gradually introduced in the form of EC directives.

It is time for US aerospace companies to take stock of "1992," right now in 1988. Otherwise, January 1, 1993, might be quite a shocker—and it will not be the result of a New Year's Eve hangover. ■

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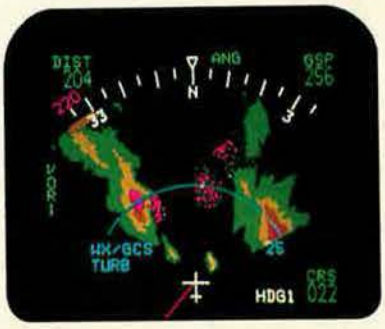

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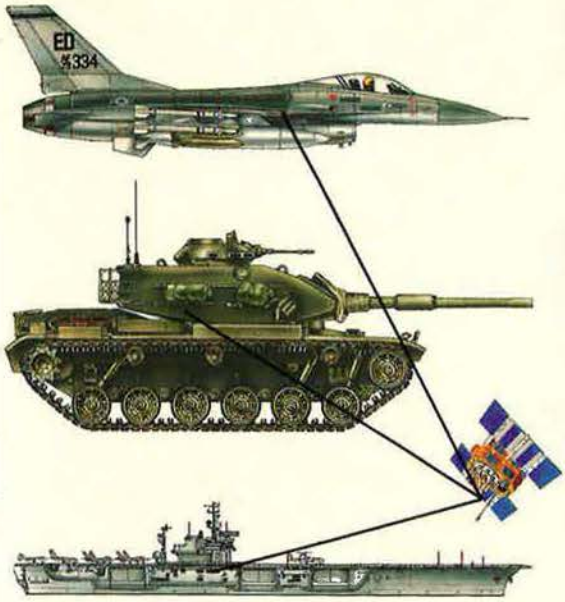

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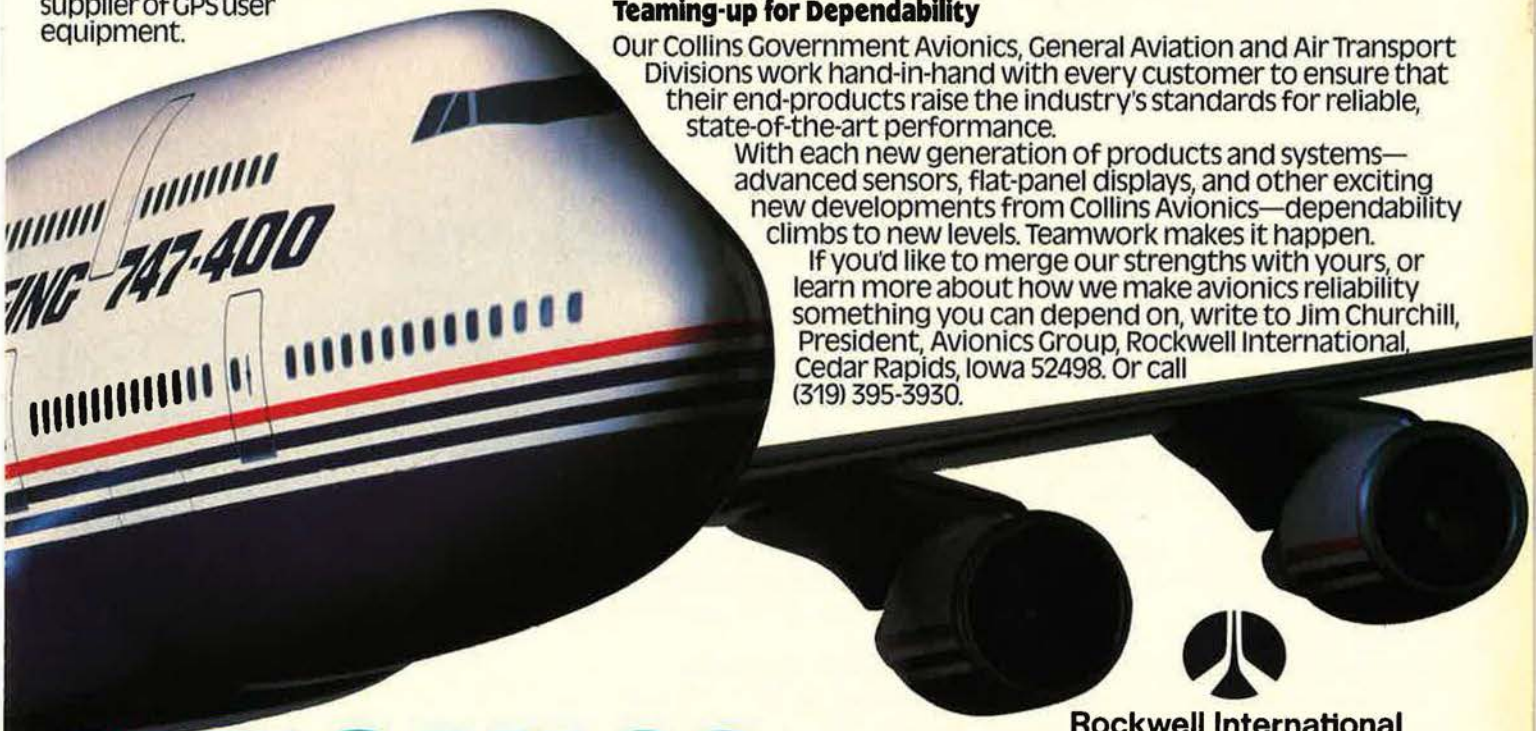

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Stretched thin in peacetime, the US overseas basing system might prove inadequate in war. And pressures are building to reduce the American military presence in both Europe and the Pacific.

Bases in Jeopardy

BY JED C. SNYDER

A RASH of problems—political, strategic, and economic—has touched off deepening concern that America's network of vital foreign military bases is in jeopardy.

Wherever one looks, it appears that US allies are finding it convenient to cry "Yankee, go home!" In every region, bilateral access or basing agreements overseas are being questioned.

From Greece to Spain, from Portugal to the Philippines, the next three years will find Washington forced by long-standing allies to accept painful renegotiation of base-rights accords—or worse.

The threat to stability of the overseas network is potentially most serious along Europe's southern frontier, site of five of the most vital basing countries in the world.

This network of Mediterranean bases in Italy, Turkey, Greece, Spain, and Portugal is pivotal to US action in Europe, the Middle East, and the Persian Gulf. In these five countries, however, American access is now seriously threatened in three—Spain, Greece, and Portugal.

The challenge is not confined to southern Europe. Facilities in the Philippines are in distinct danger of closure when the current US bilateral agreement with Manila expires in 1991. These are America's only significant military bases south of Japan and west of Hawaii, with the exception of lesser facilities on the US territory of Guam.

Loss—or even limitation—of access in any one of these countries could have a significant impact upon Washington's ability to project power in Europe, the Pacific, or the Middle East. Yet it now appears certain that some contraction will occur.

What accounts for this pressure on American bases?

First, allied publics in general are displaying impatience or even hostility toward US forces, which are increasingly viewed as an alien presence. Cutting the US presence is seen as Washington's price for keeping any access.

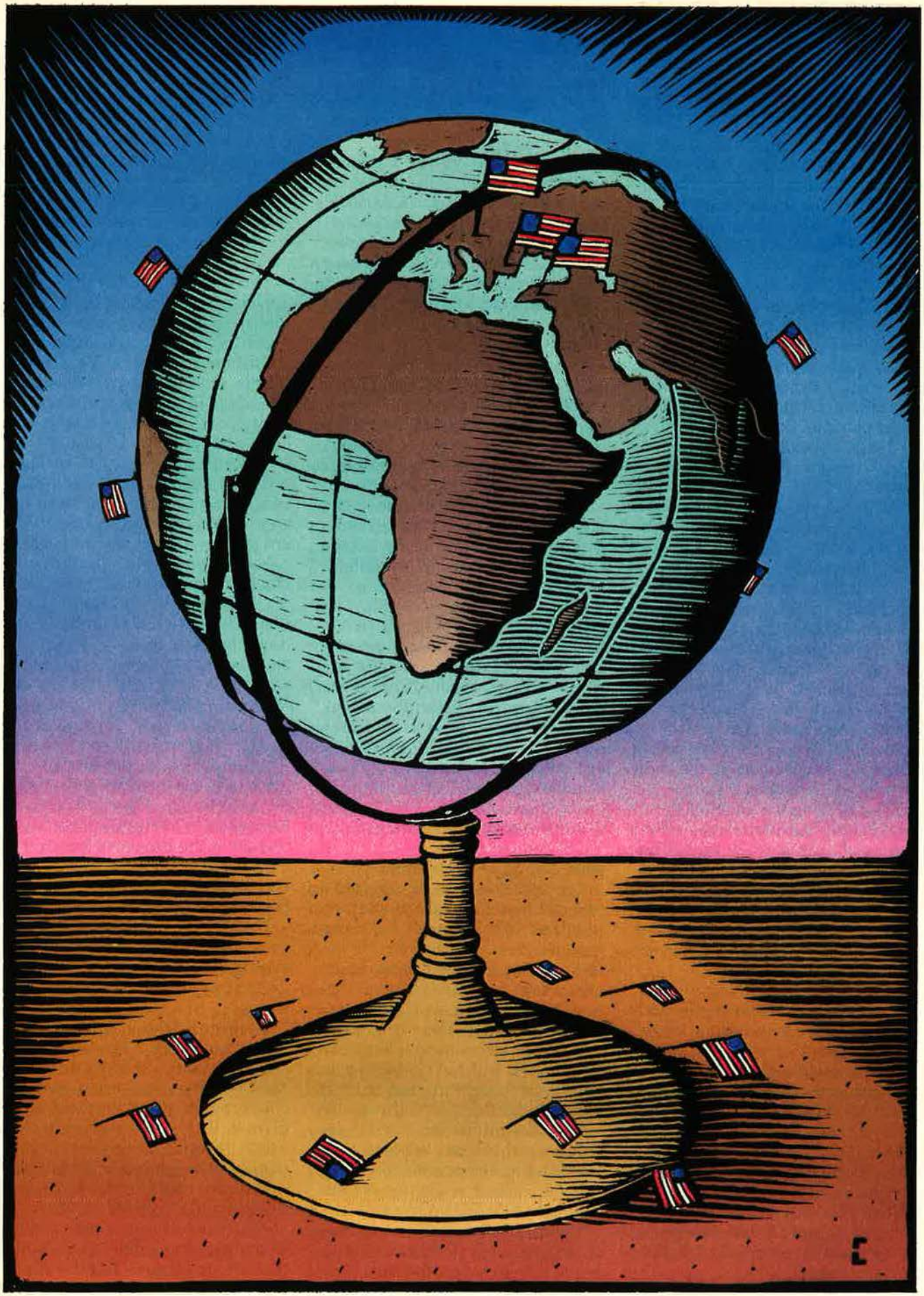
In addition, pressures stem from disagreements over US regional policies and the use of US forces in regional conflicts.

Finally, allied governments appear bent on forcing Washington to deliver higher levels of economic and military aid than either Congress or the Reagan Administration can be expected to countenance.

New Cuts in Prospect?

The sum of these conflicts, say experts, is the prospect of new cuts in the overseas structure. This

—Illustration by Randy Lyhus



comes on top of earlier reductions that have considerably weakened the system.

During World War II, Washington maintained some 2,000 facilities to support its huge effort. Today, only vestiges remain. Supporting the deployment of 507,000 US troops abroad is a base network of about 300 major installations in thirty countries. Three-quarters of these are concentrated in Western Europe, Japan, and South Korea.

Stretched thin in peacetime, the US basing system might prove inadequate in war. For a European war, for example, plans call for deploying to the continent an additional six US Army divisions, sixty USAF tactical squadrons, and a Marine brigade in the first ten days of a conflict. All would rely on limited bases in areas where conflict is most likely.

The consensus of analysts is that US overseas basing policy has reached a crossroads and that defense planners must begin to chart new strategies that take into account reduced access in the future.

New and troubling signs of decay within the US international basing system have focused attention on these issues.

By the late 1970s, because the United States had allowed its basing network to atrophy, it found itself dangerously dependent on a smaller network of overseas military installations. The most vital of these were in the Mediterranean. A review of the situation in key allied nations in that region points up a distinct likelihood that Washington will suffer a permanent reduction in its military profile.

Struggle With Spain

After years of relatively smooth military relations, Washington and Madrid now are locked in a struggle to decide whether, and to what extent, Spain will continue to cooperate with American regional and global strategy.

The current Madrid regime, under Social Democratic Prime Minister Felipe Gonzalez, agreed in 1986 to remain within the NATO Alliance, but only under a set of conditions that included a pledge to "progressively reduce" the US military presence in Spain.

The reason is clear. Historical anti-American elements persist within the Spanish body politic. US bases are regarded by many in Spain as vestiges of the repressive Franco era. The original bilateral access agreement was negotiated during the height of Franco's reign.

Spain has undergone a painful and slow process of democratization since Franco's death in 1975, and politicians on the Spanish left fear that the nation's political progress could be stalled by increased military contacts with the West.

The American presence is not large. The Pentagon maintains only about 9,000 servicemen in Spain.

Even so, Madrid is acting to make good its pledge. After nearly two years of difficult talks, the Gonzalez government has insisted that the US close down operations at Torrejon AB, near Madrid. Torrejon, headquarters for the US Sixteenth Air Force in Europe, is home for 5,400 US servicemen—mostly Air Force. Gonzalez declared that its closing would be a prerequisite for continuing US access elsewhere.

Loss of Torrejon is a blow. It means the transfer of the 401st Tactical Fighter Wing. These seventy-two F-16 multirole aircraft are NATO's principal land-based strike assets for use on the southern flank of the Alliance. In a crisis, they would disperse to airfields in Turkey and Italy to help provide a regional air umbrella for NATO operations in the Mediterranean. The US has until 1991 to relocate the wing.

New Range of Problems

The Torrejon issue has created a range of new political and strategic problems for the alliance. Last year, Congress amended the FY '88 defense authorization bill to forbid the expenditure of US funds in relocating the seventy-two F-16s elsewhere in Europe.

A series of exchanges between Washington and NATO Headquarters ensued; the Pentagon made it clear that, if these aircraft were to remain in Europe, the NATO governments would have to bear the full relocation costs, presumably using Alliance infrastructure funds. The estimated tab: $525 million.

Defense Secretary Frank Carlucci and then NATO itself officially asked Italy to accept the wing. Last June, the Italian cabinet approved the move of the F-16s to an Italian air base near Crotone, in southern Italy. The Italian Parliament also ratified the move.

But NATO officials concede privately that its infrastructure account already is overcommitted on other projects. It is not clear how NATO will finance relocation of the wing. NATO defense ministers considered the issue at their September meeting, but many questions remain.

There is concern that the loss of Torrejon may prove to be only the first salvo in a nationalistic feud between Washington and Madrid. If so, then it is likely that the US will further reduce its presence, weakening NATO's posture in the region.

One vital base is a major naval facility at Rota, near Cadiz, which functions as a crucial link in NATO's antisubmarine warfare (ASW) net, covering the western approaches to Gibraltar, the western Mediterranean, and the eastern Atlantic. Rota is also the site for a Defense Communications System (DCS) terminal providing connections with radar and microwave stations that link Spain and Italy. In addition, Rota facilitates communications for the US Sixth Fleet in the Mediterranean, contributing to a network covering an area from Greece to Morocco.

A third facility, the air base at Zaragoza, is a tactical fighter training base for the US Air Forces in Europe (USAFE). Connected to this site is the Bardenas Reales Firing Range, where a significant portion of Sixth Fleet and USAFE bombing training occurs.

Finally, the air base at Morón, near Seville, supports fifteen American tanker aircraft, whose missions extend beyond the southern NATO region.

Originally, negotiators had planned to reach a new agreement covering these other facilities by May 14, when the current base accord expired, or face the prospect of dismantling the US presence in Spain. That deadline passed with neither Washington nor Madrid taking official note of it, both preferring to maintain a discreet silence.

A new agreement is expected by year's end, but it may require further US reductions or restrictions on American operations.

One possibility is that Spain will insist on enforcing its declared policy of prohibiting the stationing of nuclear weapons on its territory or within its waters. This presents obstacles to the Navy, which presumably operates nuclear-armed forces in Spanish waters.

Problems With Portugal

A sudden rise in pressure on US bases is similarly apparent in Portugal, Spain's neighbor on the Iberian peninsula.

The existing bilateral executive agreement between the United States and Portugal, signed in 1951 and renewed in 1983, is scheduled for renewal in 1991. At that time, officials now believe, the Lisbon government probably will seek to renegotiate it.

This is a surprise. Despite Portugal's extremely weak economic condition—it has the second lowest per capita income of all NATO nations—and a series of radical political shifts in government, Lisbon generally has been counted among the nations most supportive of NATO.

Last year, however, the new Portuguese government of the center-right Social Democrat Cavaco Silva openly threatened to curtail US access to the key Portuguese air base at Lajes in the Azores unless Washington agrees to extend Lisbon a substantial increase in security assistance. The Portuguese leader's stance marks the first occasion since access was opened that Washington has had cause to include Portugal in the group of Mediterranean countries posing base-access problems.

Diplomatic observers maintain that money, rather than politics, lies at the heart of the dispute. Portugal believes that the US has reneged on its pledge to make a "best effort" to appropriate larger sums of security assistance. The FY '89 Reagan budget request for Portugal comes to $163,050,000—far short of Portugal's hopes.

Portugal is a critical link in the US base structure overseas. Lajes is among the most important of all staging bases for the US. It functions as a vital refueling station for Military Airlift Command (MAC) aircraft en route from the continental US to Europe and the Middle East. Portugal, it should be noted, was among the few NATO countries that allowed the US to use its facilities during the 1973 Middle East war. If access had been denied, the US would have found great difficulty in resupplying Israel.

Installations elsewhere in the Azores help the US perform vital ASW missions in the eastern Atlantic and western Mediterranean. These facilities can track Soviet submarines out to a 1,000-mile radius, monitoring vital Atlantic sea lanes.

Strained Relations With Greece

Ever since the eruption of the 1974 Greek-Turkish crisis over Cyprus, Greek-American relations have been acutely strained. With election of left-leaning Andreas Papandreou as Prime Minister in 1981 and his subsequent reelection, the strategic relationship between the two countries has greatly deteriorated.

The focus of tensions is the renegotiation of the 1983 bilateral Defense and Cooperation Agreement (DECA), which governs US access to four major military bases and twenty secondary facilities in Greece.

The negotiations are quite tense. In July, Athens formally notified Washington of its intention to shut down all US facilities in Greece when the current DECA expires on December 31. This does not mean that total elimination of the American presence will occur, but it is seen as a significant step that will make negotiations even tougher. A new accord now will have to be crafted from scratch, allowing the Greek government to redefine the arrangements under which US military operations are carried out in Greece. The new conditions are certain to be far more restrictive.

What facilities are the two sides battling over?

By far the most important installation in Greece is the naval complex at Souda Bay, on the northwest side of the island of Crete. This is potentially the most critical base for the Sixth Fleet in the entire Mediterranean. Its huge natural harbor can hold the entire collection of US warships in the area. It is irreplaceable.

Elsewhere, Washington maintains a presence at Hellenikon AB, near Athens, which functions as an important staging base for USAFE and as a key support installation for MAC. It also supports electronic reconnaissance sites. Electronic surveillance is also carried out at Iraklion AB on Crete and at the Nea Makri Communications Station near Athens.

Nea Makri, in particular, may have become nearly irreplaceable in the last decade as a communications station for the Sixth Fleet and as a listening post monitoring communications from Russia's Mediterranean Squadron (the Fifth Eskadra) and its Black Sea Headquarters.

Thinning out the US presence, however, seems to be a Greek imperative. It is likely that the Papandreou government will ask that the US cease operations from Hellenikon AB as the price for continued access to Souda Bay and other important facilities. Like Torrejon AB in Spain, Hellenikon is a highly visible base in a populated area near its nation's capital. US negotiators are said to be prepared to sacrifice Hellenikon in return for continued access to other facilities.

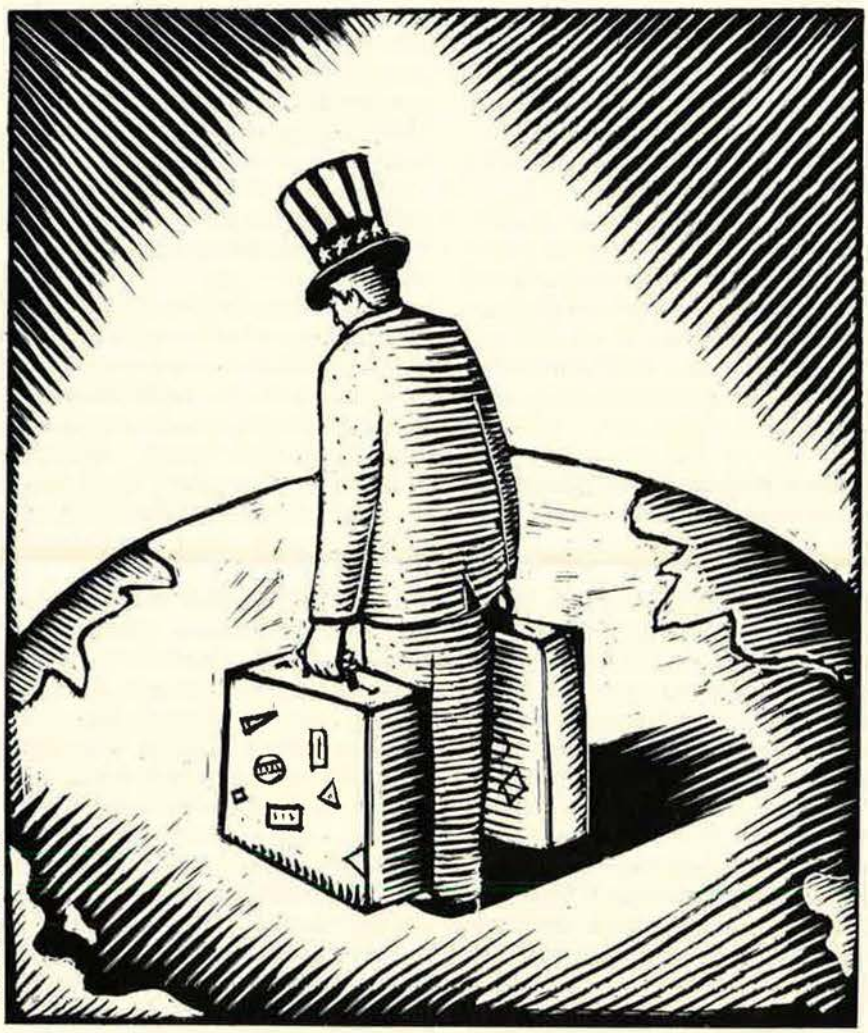
Like Spain, Greece is home to large pockets of anti-American sentiment, a result of what is viewed as unwavering US support for the dictatorial military junta that ran Greece in the 1960s.

Increasingly, Greece's position in NATO is being described in public discussion as antithetical to Greek national interests. Sixty-five percent of the Greek public, according to credible polls, appears to agree. That means that anti-Washington sentiment is likely to continue and increase, even after Papandreou has left the scene.

But politics is not the only source of disagreement with Athens. Greece—unlike Spain, whose government is willing to forfeit future US security assistance—is insisting that more US money be given regardless of how the DECA is modified. Greece currently receives about $350 million in economic and military aid annually.

There is little chance that any major increase will be forthcoming. Quite the contrary. Available US assistance is steadily declining.

Greece even disagrees with the US over the identity of the major



—Illustration by Randy Lyhus

military threat. While Washington directs its efforts toward deterring Soviet power in Europe, Greece appears concerned only with the threat posed by regional archrival Turkey. Soviet power is characterized by the Greek regime as relatively benign.

The challenge to maintaining a viable complex of basing facilities is not limited to southern Europe, however.

At Risk in the Philippines

American facilities in the Philippines—among the largest, most modern, and most strategically located bases anywhere—now are at risk. The bilateral pact between Washington and Manila governing access to the bases expires in 1991, and negotiations are already tense.

Few US overseas bases outside Western Europe are deemed by the Pentagon to be vital. Two in the Philippines, however, fit the bill. They are the Subic Bay Naval Base and Clark AB.

The Subic Bay/Cubi Point installation is one of the largest naval facilities in the world. Subic supports the US Seventh Fleet's two carrier battle groups. Its deep, protected harbors provide a unique facility for rapid power projection in the South China Sea and Indian Ocean. The quality of the ship repair facilities at Subic is unequaled anywhere in that part of the Western Pacific.

The second key installation, Clark AB, is the largest US military facility outside the continental United States and functions as headquarters for the US Thirteenth Air Force, its 3d Tactical Fighter Wing, and a tactical airlift wing of C-130s. Clark is able to accommodate more than 800 combat aircraft at a time.

The current basing agreement with the Philippines will expire in 1991, and a review had been under way. The government of President Corazon Aquino already has signaled its intent to insist on larger levels of security assistance—approaching $1.2 billion annually. The current 1989 request comes in at $269.7 million.

Money is a difficult issue. In late July, the government in Manila briefly suspended the base negotiations after the US offered an annual compensation package of nearly $500 million. This move by the Philippines came only two weeks after Secretary of State George Shultz had visited Manila, hoping to pave the way for smoother talks on the bases. Talks now have begun again.

Further, Manila already has put Washington on clear notice that it intends to impose significant new restrictions on the movement of US nuclear weapons at Clark and Subic—a factor made unavoidable by the new Philippine constitution's prohibition on nuclear weapons in Philippine territory.

Secretary Shultz has declared that such restrictions could force the US to "part company" with Manila. The Shultz statement was made immediately after the vote by the Philippine Senate in June overwhelmingly approving a bill to prohibit nuclear weapons or nuclear-powered warships from entering Philippine waters. US policy worldwide refuses either to confirm or deny the presence of nuclear weapons on ships or aircraft.

Despite Manila's long association with the United States, anti-American sentiment in the Philippines appears to be on the rise. Evidently, the Aquino government is unwilling or unable to do much about it. Manila has announced that the future of Clark and Subic Bay will be determined in a public referendum. The expectation is that Philippine voters—if actually permitted to vote on the issue—will reject continuation of the US presence at the bases.

US Basing Woes

Current US basing woes did not appear overnight. The system has been shrinking steadily. Although the existing web of American overseas facilities remains impressive compared to that of any other nation, it has declined sharply from its zenith at the end of World War II.

By 1947, the overseas basing network was already reduced substantially. Several factors contributed to the contraction.

One was an almost immediate impulse to demobilize and thin out a network of facilities that had supported nearly 6,000,000 American troops.

In addition, after victory, wartime allied cooperation became less necessary. Thus, the presence of US military installations on British and French colonial possessions soon became a source of tension between allies. As a result, many US bases in the Middle East and Asia were transferred to Britain, North African bases to France.

Further decline of the structure can be traced to the evolution of East-West relations and shifts in US regional strategies. One principal cause was the abrupt shift in the strategic environment. The immediate postwar imperative of military occupation in the defeated Axis countries—Germany, Japan, and Italy—evolved into a Euro-centered strategy to contain the growth of Soviet military power, requiring a sizable US garrison only in and around Europe.

As part of a new containment strategy, the US modified a number of overseas facilities to accommodate its long-range bomber force, which during the late 1940s and 1950s constituted the heart of the US deterrent. The strategy of massive retaliation designed by Secretary of State John Foster Dulles relied almost entirely upon these air bases.

But as the range of US strategic and transport aircraft increased—due to such technological innovations as turbofan engines—the need for a global network of intermediate staging bases to support strategic air operations was significantly reduced.

With the shift of the geographic focus and the revolution in air transport technology, it was more difficult for military planners to develop a strategic rationale for maintaining a sprawling complex of military bases on foreign soil.

With the deemphasis of the strategic nuclear mission, overseas bases again functioned principally to support US combat forces abroad, much as they had during World War II. It was argued, however, that America's peacetime overseas force could be sustained from a smaller base network (one-third the size of the wartime complex) concentrated in Western Europe and Northeast Asia.

Projecting Power

As the Soviet Union's military power expanded and as its ability to project its power improved, the character of US strategic planning shifted slowly to adjust. A robust US basing network in the Mediterranean and the Middle East became more critical as support for Israel became a pivotal requirement. Projecting power from the Mediterranean became a key component of US policy in the Middle East.

Regional politics makes the continuation of that effort a problem. Also, US budgetary restrictions, brought about by deficit-reduction legislation, are reducing the available pool of security-assistance funds useful in winning foreign cooperation. Since 1985, available funding for US security assistance has been reduced by twenty-five percent, while the basing nations of southern Europe have seen their annual aid appropriations slashed in half.

While budgetary stringency has played a large role in creating this situation, an additional factor has exacerbated the problem. It is the congressional practice of earmarking funds for special allies.

Since 1979, US Congress has set aside larger and larger amounts of assistance for Israel and Egypt, ensuring that regardless of other budgetary pressures, these two nations would receive a guaranteed level of military and economic assistance. Smaller amounts are earmarked for southern flank countries, Pakistan, the Philippines, and others.

The guarantee of funding for Israel and Egypt, in truth, is strangling the security-assistance program. The levels continue to increase, even as total available funds decrease. For example, in 1988, Israel will receive thirty-one percent of the total assistance budget, Egypt twenty-two percent, NATO Europe twenty-eight percent, the Near East and Southwest Asia eight percent, East Asia/Pacific three percent, and other areas eight percent.

In the FY '88 budget, Congress protected Israeli and Egyptian funds so effectively that, when all earmarked funds were allocated, less than twelve percent of the entire security-assistance budget remained. The trend continues in the proposed spending for FY '89.

How can Washington, confronted with seemingly intractable strategic, political, and economic pressures, continue to maintain some semblance of a base structure overseas?

Current problems seem to demand that the US take a new approach. Some strategic analysts cite four principal changes that could help ease the difficulties.

One would be to make Washington's security-assistance appropriations an integral part of regional defense planning, requiring a shift of budget authority from the State Department to the Pentagon.

Secondly, the US might reduce security-assistance funding for Israel and Egypt—especially in light of the fact that these states do not permit a permanent US presence. That would free substantial amounts of money for states, such as Turkey, that have been shortchanged.

A third step, experts say, would be for Washington to prepare to reduce or end its presence in nations where there is strong domestic opposition. The signaling of this intent might allow the US to help create a more beneficial long-term political climate in these nations.

Finally, there is wide support for obtaining access agreements, rather than long-term basing pacts, in sensitive areas. Existing agreements with Kenya, Somalia, and Oman are examples.

The pressures of the 1990s will require Washington to undertake innovative and imaginative steps to maintain a workable overseas base structure. Unless they are pursued, the US is likely to see its power-projection capabilities reduced. ■

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Budgets, politics, and arms-control expectations have sidetracked coherent planning. Maybe it's time for a "Scowcroft II" Commission.

The Dangerous Lull In Strategic Modernization

BY JAMES W. CANAN, SENIOR EDITOR

ARE the Air Force's land-based ICBMs past their prime as players in the US strategic triad? Is their importance on the wane in deterring nuclear war? Will Peacekeeper turn out to be the last of the line?

The answers to these questions may well be affirmative. For the first time in memory, USAF lacks a roadmap to its ICBMs of the future, and its research on them is drying up.

Through the years, the Air Force has always known where it needed to go and how to get there with its ICBM force. From Atlas to Titan through the Minuteman family and now into Peacekeeper, USAF has constantly looked ahead to the next ICBM, even while producing and upgrading the one immediately at hand.

Now such continuity is being disrupted. Budgets are tight, and money for ICBM modernization is harder to come by. Strategic defense is more seductive in some circles. Arms control is beguiling, and the Strategic Arms Reduction Talks (START) presage a sharp drawdown of the numbers of nuclear warheads.

The impact of all this on strategic modernization was discussed at the Air Force Association symposium entitled "The Elements of Strategic Deterrence: Status and Prospects" last June in Omaha, Neb. Addressing the symposium, Brig. Gen. (now Maj. Gen.) Edward P. Barry, Jr., Commander of Air Force Systems Command's Ballistic Missile Office, declared: "We've always had a master plan of where we thought we were going, and we've developed the technology to support that master plan. We don't have that today—going beyond rail-garrison Peacekeeper."

General Barry asserted that the downward trend in funding for BMO's work on the technologies of advanced strategic missile systems looks to him like "a going-out-of-business curve." He is "very worried" about this, he said, because "technology is our future, and the outlook is not particularly bright."

Other AFA symposium speakers were: Gen. John T. Chain, Jr., Commander in Chief of Strategic Air Command; Lt. Gen. Michael J. Dugan, Air Force Deputy Chief of Staff for Plans and Operations; Lt. Gen. Claudius E. Watts III, Comptroller

of the Air Force; and Lt. Gen. Aloysius G. Casey, then-Commander of AFSC's Space Division.

Also speaking were Robert A. Moore, Defense Advanced Research Projects Agency Deputy Director for Systems and Technology; Vice Adm. Clyde R. Bell, USN, Vice Director of SAC's Joint Strategic Target Planning Staff; and A. Denis Clift, Defense Intelligence Agency Deputy Director for External Relations.

There was general agreement among the speakers that US strategic forces will remain adequate but that much remains to be done in modernizing them and in arriving at their optimum makeup.

Generals Chain and Dugan agreed, for example, that the US may well need a much larger bomber force than the one now planned. Admiral Bell and Mr. Moore, among others, pointed out that the warhead reductions implicit in the strategic arms talks and resulting from the INF Treaty will force the US to make do with far fewer warheads in its strategic targeting.

Continuing Threat

All speakers warned that the Soviet threat will not go away, despite START and other pacific-seeming trends, and that the US cannot risk pulling back from its strategic deterrence responsibilities and forces.

In this context, General Barry expressed misgivings about what he sees as a dangerous lull in the modernization of US ICBMs beyond Peacekeeper and the Small ICBM (SICBM), a mobile single-warhead missile that USAF decided it could no longer afford to develop.

Until now, ICBM modernization had marched right along. As far back as the mid-1960s, while the Minuteman II single-warhead ICBM was still in production as the follow-on to the single-warhead Minuteman I, the Air Force began developing Minuteman III as the first ICBM to carry multiple independently targetable reentry vehicles (MIRVs).

Minuteman I had been test-launched for the first time at Cape Canaveral, Fla., on February 1, 1961. It was only about seven and a half years later, on August 16, 1968, that Minuteman III lanced skyward from Canaveral on its maiden test.

The Soviet threat will not go away. The US cannot risk pulling back from its strategic deterrence responsibilities.

On that same day, the Navy's new, MIRVed, Poseidon submarine-launched ballistic missile, successor to the single-warhead Polaris A-1 SLBM, underwent its first test in a launch from a submerged ballistic missile submarine.

Four days later, the Soviet Union and four other Warsaw Pact nations invaded Czechoslovakia. The London *Economist* made an important connection, prophetically reporting that the invasion "almost certainly swept away the last doubts" that the US would indeed make its new MIRVed missiles operational in reaction to the renewed evidence of Soviet aggression.

At the time, something else was happening in US strategic modernization as well. In a program called WS-120A, the Air Force was laying plans for an ICBM that would be burlier than Minuteman and would hurl many more RVs farther and more accurately.

That ICBM went into development in 1973 as "Missile System X" or, more simply, "MX." At the same time, Gen. Samuel C. Phillips, then Commander of Air Force Systems Command, said that MX technologies, such as those of propulsion and guidance, were already well in hand. He predicted that AFSC's Space and Missile Systems Organization (SAMSO, from which AFSC's Space Division and Ballistic Missile Office subsequently sprang) could "come up with operational equipment within three to four years."

In 1974, the Soviet Union began testing fearsome new ICBMs—the SS-17, SS-18, and SS-19. The unprecedented accuracy and power that these missiles exhibited in launches during the next few years made it imperative for the US to control their numbers in the SALT II Treaty then in negotiation or to deploy MX to countervail them.

In 1979, the Soviets invaded Afghanistan, dooming SALT II and giving the US all the more reason to see to the capability of its strategic arsenal and to MX in particular. The upshot was the Reagan Administration's strategic modernization program of 1981 in which MX—renamed "Peacekeeper"—played a vital role.

Now, the Soviets seem to be on the verge of pulling out of Afghanistan, have signed the INF Treaty, are pushing ahead with START, and are apparently assuming a more peaceful posture across the board.

So what does all this mean in terms of the US strategic arsenal and strategic modernization? Some US military leaders are concerned that it may mean benign neglect, and BMO's General Barry is clearly one of them.

At the AFA symposium, the General posed some crucial questions: "Where are we going in ICBMs? Do we know what we want to do? What our future systems should be? What basing modes we should have? What types of technology we need to support all that?"

The answers are all too cloudy, General Barry said, amid "a lot of uncertainty" surrounding "the upcoming elections . . . START, the future of SDI [Strategic Defense Initiative], and the changing target base—the concern for the deep underground basing that the Soviets have. . . . "

Consensus Needed

General Barry asserted, "We need to build a consensus. Back in the 1983 time frame, we had a consensus. We had the Scowcroft Commission. But since then a lot of variables have come into play."

He was referring to the President's Commission on Strategic Forces, a bipartisan panel of defense experts headed by Lt. Gen. Brent Scowcroft, USAF (Ret.), who had served as National Security Advisor during the Ford Administration. In its report of April 1983, this so-called Scowcroft Commission reinforced and refined the rationale for the Reagan strategic modernization program involving ICBMs, SLBMs, bombers, and cruise missiles.

In strongly endorsing the Peacekeeper program, the Scowcroft Commission gave it enough impetus to get it through Congress, where its future had been in doubt.

USAF is now in the process of deploying fifty Peacekeepers at F. E. Warren AFB, Wyo., and is seeking congressional approval to deploy fifty more of the ICBMs on rail cars to make them more survivable in their mobility.

The fate of the rail-garrison proposal will be in the hands of the next administration and the next Congress, as will that of SICBM, a missile that USAF says it cannot afford and that the present Congress has nonetheless refused to agree to cancel.

At the AFA symposium, General Barry came down strongly in support of rail-basing Peacekeeper and producing SICBM, too—if only there were enough money available to pursue the smaller missile.

When asked if the nation needs another study comparable to that undertaken by the Scowcroft Commission, General Barry replied, "I'm not sure that we don't have to look at the whole triad. To my knowledge, that's not happening, and I don't see it happening."

The Ballistic Missile Office Commander deplored the lack of funding for—and lack of emphasis on—a wide range of ICBM technological areas. All such research comes under BMO's program for work on advanced strategic missile systems (ASMS)—and "without ASMS we have no future," he asserted.

The next administration and the next Congress will determine the fate of both the rail-garrison missile and the SICBM.

ASMS areas now underfunded and deemphasized include penetration aids, guidance, boosters, propellants, materials, basing, and testing, the General said.

He sounded an alarm about the ICBM industrial base in this country, too, noting that "one of my pet peeves" was the need to turn to companies in France to supply lightweight carbon/carbon material for SICBM nozzles.

"There's got to be a message for us in that," General Barry told the AFA symposium audience of military and industry representatives. "We're not doing enough on new materials for boosters. We're also not doing much in optics, and we're not doing anything on propellants."

General Barry described as "wonderful" the guidance system developed for Peacekeeper and its derivative developed for SICBM. He noted that the system showed its stuff in a long run of highly successful Peacekeeper test launches.

But the cost of the system's long-term maintenance is "horrendous," he said. "We need to be working on new guidance systems and concentrating on their producibility and maintainability. And yet we have no money for that."

Find a Pound to Save

The General also said, "Look at our boosters. These are *big* missiles. On the first [Peacekeeper] stage, one pound is one mile. On stage three, it's five miles per pound. I think we ought to be able to find a pound to save here and there—but we're not doing enough on new materials to let us find those pounds."

The BMO Commander expressed regret that "some very interesting work on earth-penetrating weapons," including "two very successful demonstrations where we took Mark II [RVs] and drove them into the earth," may be wasted because of a lack of funding to pursue such testing as far as necessary.

This problem also pertains to BMO's work on penetration aids, he said.

As to research on ICBM basing, General Barry had this to say: "Have we reached utopia in basing modes? I can't believe that. We built very hard silos—supersilos—down in Yuma, Ariz. Relatively inexpensive. Fantastic hardness. Then somebody in Congress wrote it into the law: 'Get out of the silo business.' We closed Yuma.

"We were doing some deep-basing work. It was promising. Somebody in Congress wrote it into the law: 'Get out of deep basing.'

"At the moment, we're doing no basing work at all that looks downstream. I'm troubled by that."

He is also troubled, he said, by the prospect that BMO will have to give up space-testing reentry vehicles and ICBM subsystems for lack of boosters to conduct such tests. BMO has "hardly any" Minuteman II boosters and will have expended all of its thirty-one remaining Minuteman I boosters by the early 1990s, he said, adding: "Somebody wrote into the INF Treaty that we can't use the Pershings [intermediate-range ballistic missiles] as test-launch vehicles."

Instead of "taking perfectly good missiles and destroying them," the

US should have "worked something out with the Soviets" by way of verification procedures to assure them that the Pershings would be used for testing only, General Barry said.

"We're very proud of our testing record," he stated, but now, "we have a dilemma."

At the symposium, General Chain, who is also Director of SAC's Joint Strategic Target Planning Staff, made a spirited case for the future role of the land-based ICBM in the context of START. He noted that the proposed START agreement would leave the US and the USSR with 6,000 nuclear warheads each, and that, in the case of the US, "something less than 4,900" will be divided among the ICBM and SLBM forces, "each of which gives us a unique capability."

Without devaluing SLBMs by comparison, General Chain called the land-based missiles "very accurate weapons that provide what I call 'counterbattery fire'—shooting back at things that shoot at us. The quickest weapon we've got for this is the land-based ICBM, coupled with its accuracy."

He insisted that "I want to see a balance between the submarine- and land-based legs of the triad."

Noting that START will permit about 1,100 weapons on bombers, General Chain emphasized that "a bomber without cruise missiles counts for only one" such weapon.

This, he said, means that "I can put more bombs inside that bomber" and still have it count as only one. "So it will be a force multiplier to have a strong bomber force."

Strong Bomber Force

To carry out both strategic-nuclear and tactical-conventional missions, the US "needs 600 bombers," General Chain declared. As in the past, the SAC Commander made a strong pitch for assigning B-52Gs to conventional missions in support of NATO, declared that the B-1B bomber is a far better weapon than its critics give it credit for being, and predicted that the B-2 Stealth bomber will "revolutionize" war plans.

"The B-2 is coming along," he said. "I've seen it. I've flown the simulator. It will be a very good, expensive aircraft. We'll have to be judicious on how we bring it into the inventory.

"With its stealth, it is going to be to a conventional aircraft what a jet engine was to a propeller-driving engine. It will present to the Soviets a capability that they'll have a hell of a time dealing with."

General Chain declared that such modernization "has served us well, not only in carrying out our deterrent but also in getting on with arms control"—and must be continued.

Within a month of the AFA symposium, General Chain's drive to give B-52Gs a conventional role rather than to retire them yielded results. The Air Force and the Joint Chiefs of Staff approved his concept in principle, and studies were begun on how best to put it into practice.

As to ICBMs, the SAC Commander in Chief stressed that his "first priority" is the deployment of fifty Peacekeepers in the rail-garrison mode, following the emplacement of the first fifty in silos at F. E. Warren AFB.

"Arms control is not a substitute for modernized, highly capable strategic forces. The threat does not go away."

"I still want the Small ICBM, but I can't afford it with the dollars being allocated for defense," he said. "From the warfighting perspective, I need them both."

General Dugan told the symposium audience that the Air Force's "best efforts are seriously focused on continuing the task of strategic modernization" in the environment of tighter defense budgets and arms control.

"I believe," he said, "that there is a growing perception among many that our modernization will have been completed as prospects for the signing of a strategic arms-control agreement improve. Nothing could be further from the truth. In fact, modernization becomes even more important.

"Arms control is not a substitute for modernized, highly capable strategic forces. The threat does not go away. . . . Failure to modernize also undermines strategic stability even if we do reach an agreement, because we begin to lose the flexibility of larger numbers as we reduce overall force levels."

General Dugan's message: The fewer strategic weapons there are, the more capable and efficiently deployed they must be.

The START agreement under consideration at the time of the AFA symposium would cause the US to lose nearly half of its strategic nuclear warheads. If the Navy proceeds to build its full complement of twenty Trident ballistic missile submarines and the Air Force follows through with deployment of 100 Peacekeepers, there will be relatively few warheads left over for Minuteman III ICBMs and for SICBMs, should that single-warhead missile ever come to pass.

Interservice Conflict?

General Dugan was asked at the AFA symposium whether this situation poses "a potential conflict between the Navy and the Air Force."

"If you strike the word 'potential,' the answer is yes," the General wryly replied. "There is an ongoing analysis of—and debate over—what the right mix will be. It's an important question for the country, and it's hardly a trivial question for the Air Force and the Navy.

"We've been looking at a whole range of numbers—SLBM numbers

and ICBMs in the couple of thousands down to the hundreds."

In judging "measures of merit" between ICBMs and SLBMs, comparative costs and "damage expectancy" come out "a wash," General Dugan said, "so we're looking at measures of merit that make a difference."

Among these, he said, are "how many targets" would be best covered by ICBMs or by SLBMs in the "different mixes" of such targets that may result from Soviet strategic plans in the aftermath of START.

At the symposium, General Chain noted that the Air Force is studying the advisability of reducing the number of warheads on its Minuteman III ICBMs, which now carry three MIRVs apiece.

General Dugan was asked whether he agreed with General Chain that the US could use a much larger force of bombers—600 of them—than it presently foresees in the 1990s and beyond.

"I'm all in favor of it," General Dugan replied, noting that the Air Force must now cover a much greater geographic spread of the globe with far fewer bombers than was the case during World War II.

Moreover, added the Deputy Chief of Staff, "there are lots of places in the world where 'Yankee, Go Home' signs are on the walls, and there will be a great advantage in being based on our own soil."

In light of this, "600 bombers may be a great bargain for us in the near future," he declared.

General Dugan claimed that the US must adhere to "two guiding principles" in working to attain arms control along with an adequate deterrent force. "First, completion of the strategic modernization program is essential, and second, the attributes of a balanced, flexible, and enduring triad will be just as necessary after a START treaty as they are today."

Addressing the symposium from the perspective of the Joint Strategic Target Planning Staff, Admiral Bell, the JSTPS Vice Director, claimed that the US will be able to cover all required strategic targets in the Soviet Union even with the warhead reductions in the cards in START.

The reason for this, the Admiral said, is the high quality of the weapons resulting from the US strategic modernization program. He cited the Navy's D5 Trident II SLBM, the Air Force's Peacekeeper and upgraded Minuteman III ICBMs, and the Air Force's B-1B bomber as examples.

Admiral Bell also noted, "Five years ago, we didn't have any air-launched cruise missiles. Now we have almost 1,500."

But he, too, warned against slacking off in strategic modernization, declaring: "The Soviets have more weapons to apply to our smaller target base than we have weapons to apply to their larger target base. We're going to have to become more efficient." And this means that "we're going to have to continue to modernize."

Earlier in the symposium, the Defense Intelligence Agency's Mr. Clift had presented a stark picture of the Soviet Union doing just that—continuing to develop mobile ICBMs and to position command control and communications (C^3) centers deep underground to make them survivable against a US nuclear counterattack.

"The Soviets have more weapons to apply to our smaller target base than we have weapons to apply to their larger target base."

Admiral Bell said that the targeting strategy of the US is built around assigning the Navy's D5 SLBM and the Air Force's Peacekeeper to "hard" targets in the Soviet Union and that those missiles "are probably not the right weapons to go after softer targets—ones that are easier to get to—that you have in the [Soviet] mobile ICBMs.

"On the other hand, while the accuracy and yield of the D5 and MX [Peacekeeper] are quite good, they cannot take on the deeply buried targets that Denis [Clift] talked about.

"Therefore, we need an advanced technology weapon—an earth-penetrating weapon of some sort—to put those targets at risk."

As General Barry pointed out, however, BMO's work on such weapons is on the wane for lack of funding, following some highly successful testing.

Survivability of SSBNs

Admiral Bell was questioned about the survivability of the Navy's SSBN ballistic missile submarines and their communications links with the National Command Authorities (NCA) in the event of a nuclear attack, and given the Soviet advances in antisubmarine warfare.

The Admiral responded that the US submarine force of SSBNs is widely regarded as the most survivable leg of the triad, but that it has "constantly lived under a cloud in Washington and some other places" because of its alleged "inability to have reliable communications" with the National Command Authorities under nuclear duress.

He called this allegation "a myth" in view of the advances in secure communications of recent years. "Communications associated with submarines are not too divergent from those associated with the ICBMs," and "the reliability of our communications lies mainly in their redundancy through all the legs of the triad," Admiral Bell asserted.

DARPA's Mr. Moore claimed that the greatest threat to the US in the near term may be an internal one—an unwillingness to continue the

strategic modernization program. He predicted that the Soviet Union "will continue to seek superiority" in strategic systems and forces "because that is very fundamental to them," arms control or no arms control.

He said that they may pursue such superiority in "new ways" and that the US should consider doing so as well.

For example, said the DARPA Deputy Director, the US may be well advised to seize "technological opportunity" in the development of "nonnuclear strategic systems." Citing his "best example" of such, he described cruise missiles that would be ten times more accurate than the current air-launched and sea-launched cruise missiles in Air Force and Navy arsenals.

Such a highly accurate cruise missile "would be able to kill many kinds of targets now killable only with nukes," Mr. Moore asserted.

The US needs to do better at finding mobile strategic targets, Mr. Moore declared. Referring to Soviet road-mobile and rail-mobile ICBMs, he predicted that "SAC is going to face an ever-increasing challenge of finding mobile targets in order to carry out a counterstrike."

Consequently, the US should give high priority to developing sensors and signal processors to be combined in airborne systems especially devised to detect mobile missiles even when they are "obscured by foliage or camouflage."

The US must also greatly improve its systems for detecting Soviet submarines, which have become ominously quiet, and Soviet aircraft, which may come to feature low-observable technologies, that are capable of launching long-range cruise missiles.

Such cruise missiles "pose great difficulties for our continental air defense" and are grave threats to SAC bases and US ballistic missile submarines "as they egress from their ports," Mr. Moore said.

He called Soviet cruise missiles his "greatest concern" on the strategic front. Even though the US defense establishment faces "tough times ahead in low-to-negative real growth" of military spending, it has no choice but to stick with the modernization of its strategic forces,

The US must greatly improve its systems for detecting Soviet submarines, which have become ominously quiet.

said the DARPA official, because "the Soviets could surprise us in many ways."

Prescription for Action

Mr. Moore's prescription for action: "We should demonstrate our options for response. We should develop the technologies and not put them on the shelf but build them into systems concepts and get those concepts ready, test them—perhaps through prototyping—and be prepared to deploy them when the threat calls for it."

General Casey, who commanded BMO prior to taking charge of Space Division, expressed "no doubt that SAC and the US Navy are fully up to speed in exploiting new technology in the ballistic missile area."

But he drew an analogy to "the heroes of the sports world," warning that "if you stand around too long admiring past successes, you soon find out that the dynamics of change will pass you by if you aren't ready to accept the challenge of the moment."

Noting that bombers and ballistic missiles usually dominate discussions of strategic modernization, General Casey declared: "I believe it is equally—or perhaps more—important that we upgrade the means of commanding and directing them." In this, space systems for command control communications and intelligence come heavily into play, the former Space Division Commander said.

General Casey strongly advocated the development and deployment of a space-based radar system for detecting enemy bombers and cruise missiles. He noted his disagreement in this matter with DARPA's Mr. Moore, who had expressed reservations about the ability of space-based radars to do their job against the stealthy bombers and cruise missiles that the Soviets may yet devise.

"The world is not made up of stealthy cruise missiles and stealthy platforms," General Casey declared.

He acknowledged that it is "difficult to start any new program in the budget environment we're in right now." But he claimed that space-based radar must be made an exception—"it is absolutely the most important new development that we can undertake in the area of worldwide surveillance."

Addressing the severity of the budget situation, General Watts emphasized a point that General Dugan had also stressed—the defense budget did not cause the federal deficit and should not be unduly victimized as part of the political effort to cut that deficit.

"As a nation, we have chosen to increase the risk to our national security in our attempt to reduce the deficit," General Watts asserted, "so we must redouble our efforts to guarantee that we buy this nation a first-rate military capability within the spending limits established by the President and the Congress."

The US capability for strategic deterrence must be preserved at all costs, said the General, because it "has brought us over forty years of freedom from global conflict," and "that alone makes it a worthwhile pursuit." ■

This is the "Year of the Alert Force" in Strategic Air Command.

ON ALERT

BY JEFFREY P. RHODES, AERONAUTICS EDITOR

PHOTOS BY GUY ACETO, ART DIRECTOR

"THE SAC alert crews may be the 'tip of the spear,' but there is ten feet of spear behind it," said 2d Lt. Terry Hesterman, a missileer with the 564th Strategic Missile Squadron at Malmstrom AFB, Mont. Lieutenant Hesterman was referring to the support force—maintenance and security people, cooks, weather forecasters, and many others—who keep the aircraft and missile alert crews operational and ready to carry out their EWO (Emergency War Order) tasking should the grim necessity ever come. He also meant the families of the alert crews, whose understanding and support is often forgotten.

This month, Strategic Air Command begins its thirty-first year of alert. Gen. John T. Chain, Jr., SAC's Commander in Chief, has declared 1988 the "Year of the Alert Force." For a firsthand picture of life on alert, AIR FORCE Magazine visited the 341st Strategic Missile Wing at Malmstrom and the 410th Bombardment Wing at K. I. Sawyer AFB, Mich., both typical SAC wings.

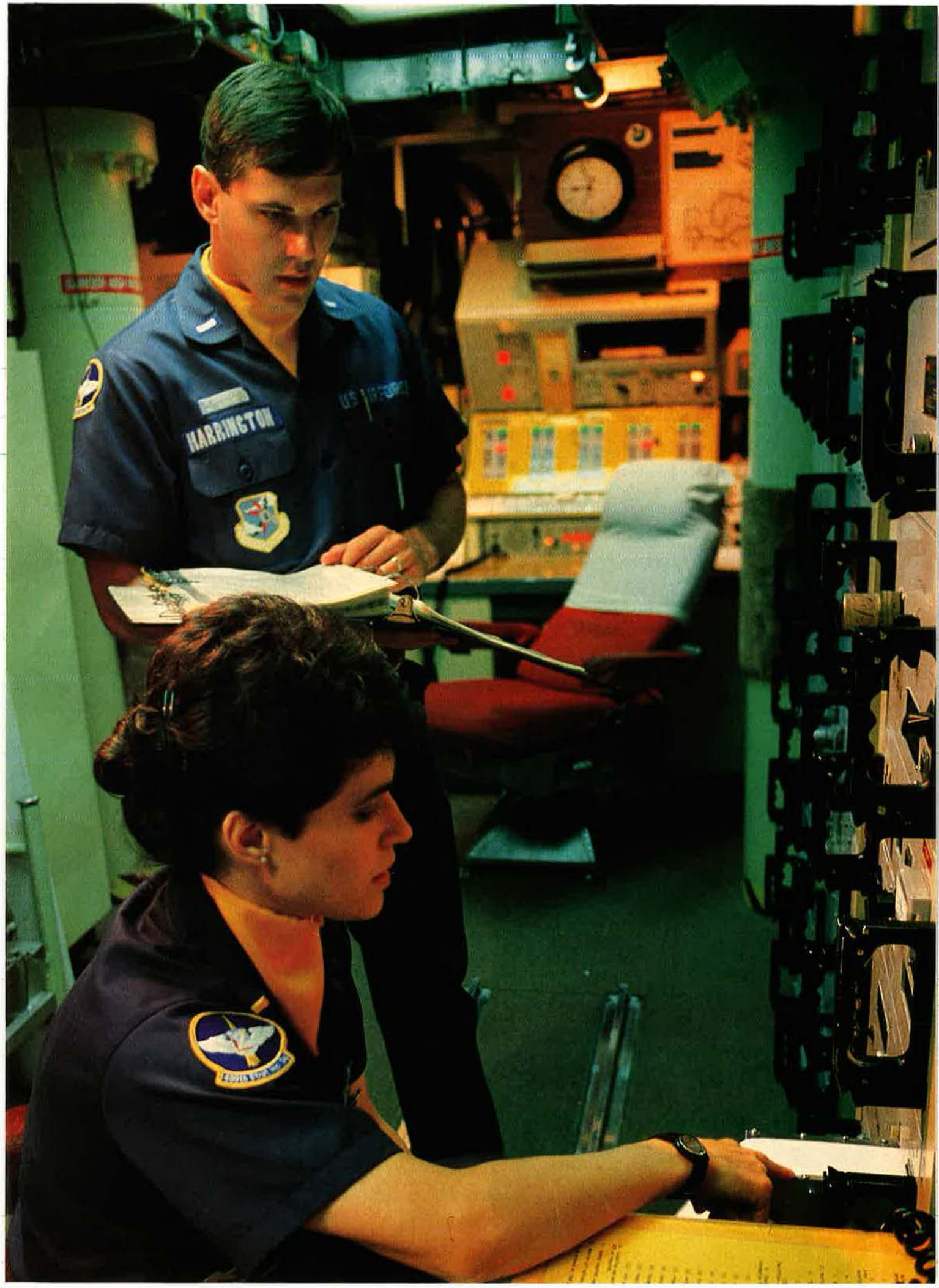
An Awesome Responsibility

"Nobody wants this much responsibility," said 1st Lt. Scott Patnode, a KC-135 aircraft commander at K. I. Sawyer. "But somebody has to do it. We hope we never *have* to do our jobs." Added 2d Lt. Kate McGraw, a deputy Minuteman II launch officer with the 490th SMS at Malmstrom, "The fact you might have to actually launch nuclear missiles is always in the back of your mind. But putting it into perspective, I'd rather be a part of defending the country than wondering if [an attack] will come and not being able to do anything about it."

The missile crews do know where their ICBMs are targeted. The planning and intelligence sections on the bomber side work together to assemble the "bags" (big, leather briefcases) with detailed route and target information, as well as the "go codes" that tell the crews that the order to proceed to the target is a valid one. The crews study these maps and routes and get full briefings while on alert.

Security is tight, including personnel security. Where control of or access to nuclear weapons is possible, the "two-person concept" is in force. No one works alone, which practically eliminates any opportunity for sabotage or an unauthorized launch attempt.

Strategic Air Command is winding up the "Year of the Alert Force" honoring SAC crews, technicians, and support force. On the front lines are "crew dogs" like 2d Lt. Kate McGraw (seated) and 1st Lt. Chris Harrington of the 490th Strategic Missile Squadron at Malmstrom AFB, Mont. Their job is to watch over and, if necessary, launch live versions of this inert Minuteman II ICBM (above). The missile and its suspension ring can be seen at the bottom of Malmstrom's T-9 training silo.


HARRINGTON

Each missile Launch Control Center (LCC) controls ten missiles, but also monitors another LCC's missiles. If one crew should attempt to launch when no order had been given, another crew miles away could prevent them from doing so.

There are positive control procedures for bombers, too, preventing the unauthorized "scrambling" of crews to their planes or, once airborne, from arming weapons or proceeding into enemy territory.

Basic to this security is the Personnel Reliability Program (PRP), started in 1962 by Gen. Curtis E. LeMay. It keeps close watch on bomber and missile crews, maintenance troops, security police, munitions handlers, and everybody else who works around nuclear weapons.

One similarity between bomber and missile alert is the EWO certification process. Each member of every missile, bomber, and tanker crew must give a briefing to a senior-level wing officer. "We try to get the wing commander in for EWO certification to emphasize to the crew member how important the mission is," said Lt. Col. Chuck Masonic, the 410th BMW's chief of operations and plans.

Much of the equipment, especially in the communications area, is the same in the missile launch capsules and in the command posts of the bomber wings.

There are several types of communications systems, ranging from voice (Primary Alerting System, or PAS), to low-frequency transmissions (Survivable Low-Frequency Communications System, or SLFCS), to satellite communications (AFSATCOM), providing redundancy in any contingency.

Another similarity is that missile crew members and alert command post controllers carry the same handguns. (SAC is switching from .38-caliber to 9-mm sidearms.)

Because Boeing built most of the Minuteman LCCs and all of the KC-135s (as well as the missiles and B-52s), the sliding seats in both the Launch Control Centers and the tankers are also quite similar to each other.

The crew force does not work alone. It is supported by thousands of dedicated people behind the scenes. The total team effort keeps the deterrent viable. Here A1C Todd Buchanan and A1C Todd Karl work in the newly refurbished jet-engine shop at K. I. Sawyer AFB, Mich.

But flyers and missileers are different breeds of "crew dogs" (as they call themselves). They kid each other whenever they get a chance. The missileers like to say that "bombers are fun, missiles are important."

Providing the Impact

"Sometimes the tip of the spear forgets to thank the people providing the impact," said Lt. Col. Brian Horst, Commander of the 46th Air Refueling Squadron at K. I. Sawyer. "The alert crew is only one cog on a very big wheel. For sure, you aren't going to go anywhere without maintenance."

Before the bombers and tankers are put on alert, they go through an intensive series of checks that lasts up to two days. On the B-52's Last Sortie Before Ground Alert (LSBGA), the plane's Offensive Avionics System (OAS) is given a final tune-up, and simulated weapons releases are made. Then the planes are moved to the Alert Aircraft Parking Area (AAPA), where they remain on five-minute alert for up to ninety days.

When the aircraft is on alert, the crew chief (or the assistant crew chief) is on alert with it. The crew chief preflights "his" aircraft every morning by powering up the plane, checking systems and equipment, and doing any maintenance that is required. "It is amazing to me that just sitting there, things on the aircraft break," said A1C Anthony Uranger, a B-52H keeper at K. I. Sawyer.

If the crew chief working alone can't fix a broken system or part, a specialist technician can be called in to help. The problem has to be corrected in four hours, though, or the airplane will be pulled off alert.

"A storm comes in, the missile sites go down, we go out," said A1C Timothy Mouchi, a field maintenance technician supervisor at Malmstrom. "When we start servicing, we never know when we are coming home, if we'll need cops, or when we're going to have to RON [remain overnight]."

The biggest problem for both missile and airplane maintainers alike is that their equipment is old, creating some reliability problems. "Thirty-year-old aircraft tend to break by themselves," said SrA. Andrew

On occasion, Minuteman III crew members like 2d Lt. Chris Sharpe (right) have to use the services of Detachment 5 of the 37th ARRS and its Bell UH-1N helicopters (below) to get out to their Launch Control Facility. Mostly, though, the crews drive out to the field, and the helicopters are used for "cop swaps" and assisting in priority maintenance.

Neher, a KC-135A maintainer. "We've run so many sorties on them that something has to give sooner or later. You've got to pay more and more attention to them."

Spare parts are often a problem, especially with the missiles. "A lot of items are just not available," said SSgt. Dean Wells, a technician with the 341st Organizational Maintenance Squadron. "To get spares for the T/E [Transporter/Erector—how the missiles are transported and put into their launch facilities], we have to cannibalize from one of the others." Added Col. Edward Burchfield, the 341st SMW's Vice Commander, "When I was on alert, we couldn't touch anything. Partly because spares are short, now we have crews bringing [equipment] drawers back from alert so we can fix them."

Supply squadrons spend a lot of time on the phone tracking down spares from other bases or from the depots. To improve parts availability for aircraft, SAC adopted the Readiness-Oriented Logistics System (ROLS). Supply is located near the flight line so spares can be obtained quickly. For routine maintenance, mechanics can use the Parts Store's drive-through or walk-up windows. Parts for the alert aircraft are delivered.

Missile maintainers don't have a Parts Store, but priority maintenance at Malmstrom is greatly aided by Detachment 5 of the 37th Aerospace Rescue and Recovery Squadron. These Military Airlift Command UH-1N helicopters take parts and people to the silos, which are spread over Malmstrom's 23,000-square-mile complex. The helicopters also perform "cop swaps," ferrying security policemen to and from the LCF (Launch Control Facility, the topside building at a missile site).

The security flights guard the area around the LCF and control access to the Launch Control Center. "We'll get an OZ [Outer Zone—the area between the fence and the actual missile silo] alarm in the capsule, and we'll have to send cops out to check," said Capt. Bill Molter, assistant operations officer of the 564th SMS. "Nine times out of ten, it will just be a gopher, but the cops have to go out and check it."

Other security police, or SPs, working out of campers in two-man teams, guard the Launch Facilities (LFs) when the intruder-detection system breaks down. The campers come complete with a gas stove for

cooking. "A lot of people want to stay out there," said CMSgt. Jesse McMurtry, the 341st SMW's senior enlisted advisor. "They are their own bosses out there. Surprisingly, that's where some of our youngest troops are."

SPs working around the alert aircraft see less of the countryside. Even though the AAPA is fenced in and has closed-circuit TV surveillance and a pressure alarm system outside the fence, the SPs still set up an inner security zone around the aircraft. There is also a rifle squad in a Peacekeeper armored vehicle stationed in the compound. The SP force is usually tested once on every eight-hour shift.

"If it's snowing outside and nobody can move, the SPs will come and get us," said SSgt. Allan McFerran, the food-service supervisor in the alert facility at K. I. Sawyer. "It shows how important we are." Chief McMurtry agreed. "The cooks set the whole tone at the LCF. The first thing the SPs do when they get out there is ask, 'Who's the cook?' They know who the good ones are."

The traditional image of the bomber alert is of crews making a mad dash to the planes or the trucks that will take them to their aircraft when the klaxon sounds. Above, one of the 410th Bomb Wing's B-52Hs sits on the alert pad.

Off to Work

At a bomber wing, about 1,300 people directly support thirteen alert aircraft. In a missile wing, nearly 2,100 people support 200 missiles. It is only a matter of degree, but the missile folks seem to have a greater sense of urgency—once launched, a missile can't be recalled.

"This is a stressful job. You're always under the microscope," said 1st Lt. Chris Harrington, a combat crew commander with the 490th SMS. "If you screw up on this job, you are screwing up with nuclear missiles." Or with nuclear bombs, as is the case with the bombers.

"It is a lot harder on missile crews these days," noted Colonel Burchfield. "Getting message traffic used to be a big deal. Now there is so much message traffic to make sure they get the word, that the crews are busy all the time. The systems break down much more frequently, and they always have to watch for things like that."

The real addition to the bomber crew's work load, however, has come from the increased emphasis SAC has put on its conventional mission. "The crews have a good time with conventional ops," said Lt. Col. Dave Knowles, Commander of the 644th Bomb Squadron at K. I. Sawyer. "They get to play Red Flag, drop bombs, and get the benefits from lots of training. The challenge is tremendous, though, to be proficient at both nuclear and conventional operations."

"In previous years, before cuts in personnel levels, we had the luxury of extra people," said Col. Al Joersz, the 410th BMW Commander. "Now we don't have the luxury of all the people carrying their fair share. We're all hustling and doing the best we can to be a productive work force."

Going to the missile fields, the deputy missile crew commander usually picks up the truck, then heads to the operations building where crews first meet with their squadron (Pre-Predeparture), then with the rest of the alert crews from the other squadrons (Predeparture). Here they are given a briefing on conditions (road and weather), where the camper teams are, and other special interest items. There is a classified briefing as well.

The crews then take off for LCFs, which at Malmstrom may be anywhere from one hour (Alpha-01) to four hours (Oscar-01) away from the base. The crews put 6,000,000 to 10,000,000 miles per year on the vehicle fleet. Driving out to the LCFs, the crews pass several missile silos that are just off the road. One LF at Malmstrom is literally in the back yard of a convenience store.

Once at the site, the new crew checks the seals on the equipment and takes an inventory of the classified material before the other crew leaves. The outbound crew leaves by an elevator (the LCCs are between sixty and 115 feet deep). Then the 110-ton blast door is shut.

Sometime after assumption of alert, the deputy sleeps (conditions permitting) in the bunk in the LCC. About 10:00 p.m., the commander hits the sack, which is in a cubbyhole in the Minuteman II LCCs and has a good bit more space around it in the Minuteman III capsules. The commander usually drives back to the base when the alert shift is over.

The missile crews are on alert for twenty-four hours eight times a month. Briefings, travel, and swap-out add considerable time, so the crews are away from home for sixteen days a month. On other days of the month, they train or stand by to substitute as needed.

The crews have to get a prescribed number of hours in the Missile Procedures Trainer (MPT), an LCC simulator, every six months. "We give them problems not normally encountered in the field," said Capt. Larry Grundhauser of the Operations Training Division at Malmstrom. "They could [stand] 300 alerts and never have to replace a circuit breaker. They will likely never see an unauthorized launch attempt." The primary training emphasis is EWO procedures. At least annually, the crews go through an exhaustive evaluation.

The missile maintenance crews have their own simulator to practice on. The T-9 is complete, down to the heavy blast door covering the silo. Every phase of operations, including emplacing the training round and attaching simulated reentry vehicles (RVs), can be carried out.

Alert for the bomber and tanker crews is considerably different. At

K. I. Sawyer, assumption of alert is on Thursday. After swapout, the alert crews can leave the compound, but they are tied to the AAPA by a short leash.

The crews must sleep in the alert facility, but other than a morning briefing and their daily training schedule, they can go anywhere on base where there is a klaxon. However, they must go in government vehicles (rather than their own cars) so their whereabouts can be tracked.

Training for B-52 aircrews consists of EWO study, escape and evasion procedures, and, at many bases, time in the full-motion, six-axis Weapon System Trainer (WST), which is so realistic it can be "crashed." The whole six-man B-52 crew can train at one time in the WST. Tanker crew training is similar.

A relatively new area for SAC aircrew training is tactics. "Our crews had gotten in the mindset that if you had to go to war, you were as good as dead," said Lt. Col. Bill Barton, the chief of the 410th BMW's tactics branch. "They now think that they can take on the enemy, beat him, then go hit their targets." There are even tactics classes for crews on the unarmed tankers. "Tanker tactics are basically to run, but there are some real sneaky things they can do," noted Colonel Barton.

Key Ingredients

Initiatives in the "Year of the Alert Force" have gone a long way toward improving the conditions in the LCFs and alert facilities. There are game tables, big-screen TV sets, and VCRs. Most LCFs have a satellite dish, and the launch crews will soon be getting larger TVs (the ones in the facilities now can hardly been seen from the deputy's chair) and a splitter cable so the people downstairs can watch one show while the folks upstairs watch another. Weight rooms are set up in all alert facilities and are coming to the LCFs.

The launch crews have another pressure vent called the "Captain's Log." This notebook is filled with just about anything the crew member wants to say. There are cartoons with names and captions changed, anecdotes, and some general letting off of steam.

Alert crews can phone home, and airplane crews can see their families at visitation centers. The visitation center building, located near the alert compound, has a kitchen, a large den area with TV, and several rooms where families can dine in privacy.

"This place kind of defeats the purpose sometimes, though," noted Debbie LaPiana, wife of 1st Lt. Peter LaPiana, a KC-135 copilot. "Sometimes the stress builds, with kids running around, the noise, and not really being able to relax with everything going on here. Still, I am glad they have this place. It's good for the families to get to spend some time together."

Alert affects the families just as much as the crew members. "My son's first words were 'Daddy 'lert,' " said Elizabeth Danforth, wife of Capt. Steven Danforth, a B-52 pilot. "There is a period of adjustment every time he goes on or comes off alert."

Holidays are tough, too. "It was kind of lonely on Christmas," noted Candy Molter, wife of the 564th SMS's Captain Molter.

Despite the hours and conditions (K. I. Sawyer had 210 inches of snow in 1986), most of the people making up the alert force like their jobs. "I go out and get it done. I always feel real good when I go home." Added Airman Neher, "I get tangible results. That tanker goes up, and it's something I did. I put it there."

Women are very much a part of the alert force these days. There have been a few adjustment problems for the women, some from older hard-line chauvinists, but mostly in terms of facilities. Other than that, they have assimilated well into the tanker and Minuteman crew force and are regarded as "just another crew dog." That may be the ultimate compliment.

Change for the Better

"We are doing some little things that are generating a lot of payback for a minimal effort," said Colonel Knowles. Some examples:

- The tires on the SPs' Peacekeepers are being changed from solid rubber to regular inflatable tires.

Training plays an important role in the lives of both maintainers and crews. Here, Sgt. Bill Matthews (left) and Amn. Jonathan Wood (right) train topside at Malmstrom's T-9 facility. The 110-ton blast door covering the top of the silo must be closed with a hydraulic unit known as a "pipe pusher" that moves the door three inches at a time.

Tankers are an essential adjunct to the bombers. When a plane is on alert, its crew chief (or the assistant) stays on alert with it. Here, the crew chief, with some help from other maintenance troops, finishes preflighting one of K. I. Sawyer's alert KC-135As. The alert aircraft are preflighted every morning, regardless of weather.

The ride is much smoother, and the SPs are very happy.

- The crew vehicles for the missile alert crews are getting AM/FM radios, cruise control, and air-conditioning. Not that important until you drive 140 miles each way without them.
- The cooks at the alert facility at K. I. Sawyer are being rotated for duty at a nearby four-star restaurant. The extra experience they gain is making for a much higher quality program in the alert facility.

"The crew and the crew chief merge through the nose-art program," said Lt. Col. Mike Link, Operations Officer of K. I. Sawyer's 307th AREFS. This program has been a big morale booster.

Once a design has been picked by the crew and the crew chief and approved by the field maintenance squadron, it is advertised, and artists are found to paint it. The logo on the KC-135 "North Wind" was painted by an NCO out of the photo lab.

A major change for all squadrons was the addition of an adjutant who handles administrative and "additional" duties that the launch crews were previously required to perform.

Another major effort spreading through SAC is self-help.

"It became a competition among the alert crews to see who could get the most done to the squadron building in a weekend," said Colonel Knowles. The supply squadron at K. I. Sawyer added a second story to their offices, and the jet-engine mechanics saved $77,000 by redoing their floor with a light-reflective material themselves.

The ultimate self-help effort, however, has to belong to the 301st Air Refueling Wing. This new wing at Malmstrom, which was not to get its first KC-135R until October, built *everything* it needed to be an operational wing. The wing started with a condemned hangar and then built shops, offices, and conference rooms, finishing the job for less than $200,000.

The major changes to the alert force came from the crews themselves. As part of the "Year of the Alert Force" effort, the crews were given the opportunity to start an Airmanship Program. "I was astounded at the things they came up with," said Col. Bob Summers, Commander of the 564th SMS at Malmstrom.

Some of the changes that have already been implemented: elimination of gender-specific crews (which were a scheduling nightmare); changing crew selection for the annual "Olympic Arena" competition, including line crews at all SAC conferences affecting crew procedures; giving crews recognition with 100/200 alert certificates and pins and end-of-tour certificates; and getting issue glasses changed from thick, black, plastic frames to wire-rims.

The missile crews have also been influential in getting evaluations changed from numerical scores (anything below ninety percent was failing) to simply Pass/Fail. "This 'clean sheet' approach will see if the crews are combat-ready," said Lt. Col. Conrad Strickland, the 12th SMS commander at Malmstrom. "Not whether they are 97.7 percent perfect, but if they can fight the war."

Under one of the Airmanship Initiatives the airplane side came up with, both crew proficiency and Aviation Career Enhancement (ACE—a program in which copilots practice being aircraft commanders in T-37s) flights can now be made while on alert. The crews fly for a short time in an off-alert bomber or tanker in the area around the base. Since this is such a radical change, SAC is edging into this program slowly.

While changes are being made in alert, one thing won't change. As Lieutenant Hesterman says, "Alert is ordinary people doing an extraordinary job." ■

The Pentagon is putting up $2.5 billion in earnest money to develop UAVs. The Air Force is dead serious about employing them—but in addition to, not instead of, manned aircraft.

On the Horizon: Unmanned Aerial Vehicles

BY JAMES W. CANAN
SENIOR EDITOR

DURING the Vietnam War, an Air Force reconnaissance drone lost power, came down in the Gulf of Tonkin, and stayed afloat. A helicopter was sent out to retrieve the drone and the pictures it had taken of enemy targets. The chopper also failed, plopped into the drink, and began to sink.

Three crewmen clambered out of the foundering helicopter and clung to the bobbing drone until they were picked up by a US Navy ship. After they were brought aboard, a sailor who had witnessed their rescue asked them: "How did all you guys get into that little airplane in the first place?"

This story may be apocryphal, but it makes the point—people tend to think of aircraft as naturally containing humans.

Not necessarily so. Unmanned aircraft have been around a long time and have come in handy in wars, especially in the Middle East and Southeast Asia. Only now, however, are they beginning to emerge as first-team players at many positions in US military forces.

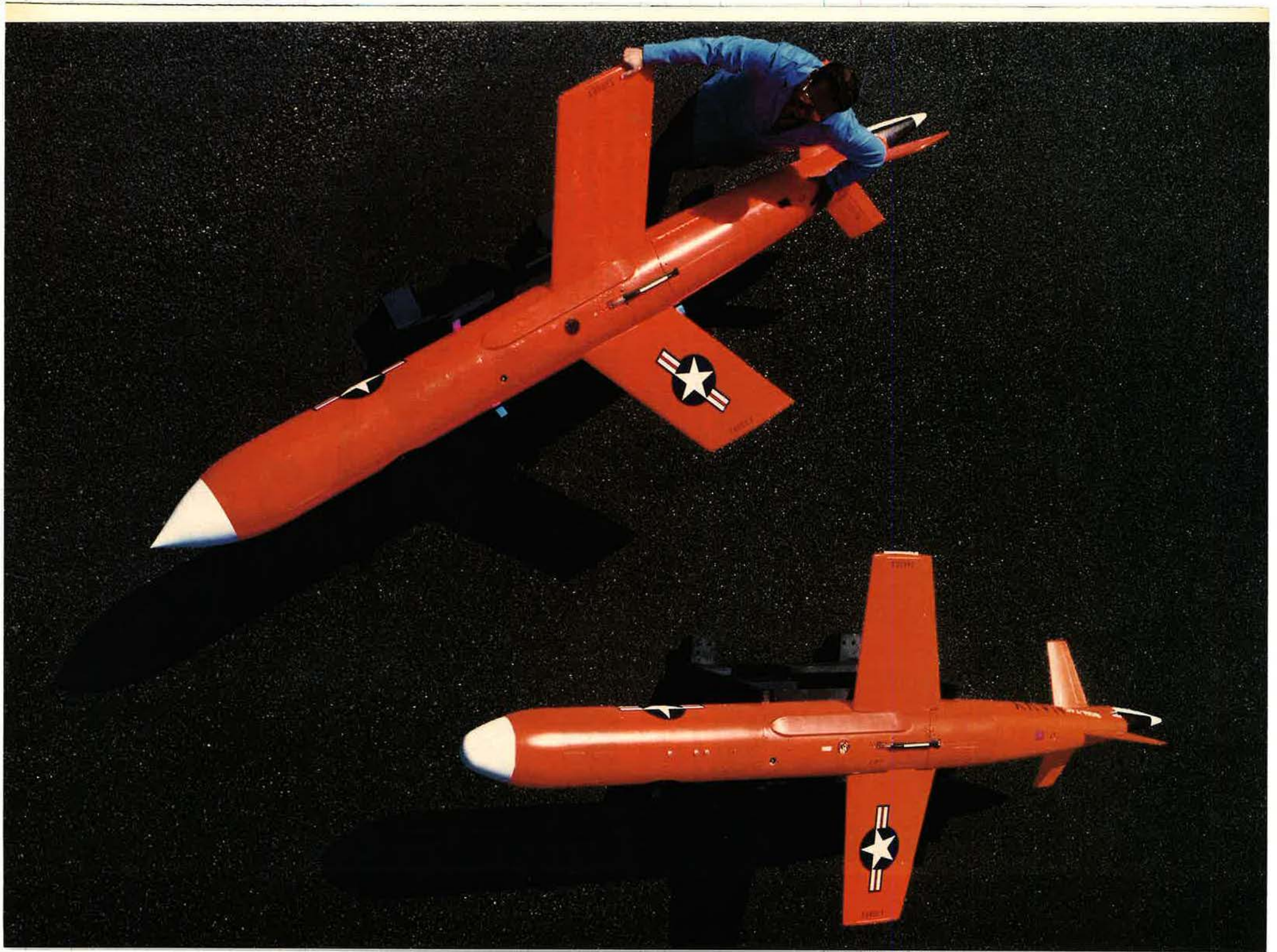
Under the guidance of the Defense Department's recently organized joint program office for "unmanned aerial vehicles," the Army, Air Force, Navy, and Marine Corps are coordinating plans for families of UAVs for a wide variety of missions. The office is headed by Rear Adm. William C. Bowes, who is also in charge of the Navy-Air Force joint cruise missile program.

The blueprint for all this is the "Department of Defense Joint UAV Program Master Plan" that the Pentagon submitted to Congress earlier this year. It was drafted by the services in response to sharp congressional criticism of their individual management of unmanned aircraft development programs.

A prime case in point was the Army's Aquila remotely piloted drone for reconnaissance, target acquisition, and target designation with lasers. Aquila was canceled, the victim of requirements-creep and cost overruns, but proved useful in teaching the UAV development community many valuable lessons about what not to do. Aquila drones will also be used for testing other UAV concepts.

Congress became exasperated with the Aquila program and, more

Unmanned aerial vehicles come in many configurations and can be flown on all sorts of missions, as set forth in the Pentagon's new "master plan" for UAVs. Shown here are the bellwether Northrop BQM-74C UAV, right, and a newer sweptwing variant.



broadly, with the tendency of each of the services to go it alone in developing—or in choosing *not* to develop—UAVs. The lawmakers decried such separatism as uneconomical and militarily unwise and demanded, with some encouragement from the Office of the Secretary of Defense, that the services unify their management of UAV programs.

The concerted effort that came of this is clearly not a passing fancy at the Pentagon, where $2.3 billion has been earmarked for the development of UAVs through Fiscal Year 1994.

Many major defense contractors are involved in the UAV program. It has also attracted a host of smaller companies, lesser known but with strong backgrounds in UAVs and attendant systems, such as data links and ground stations.

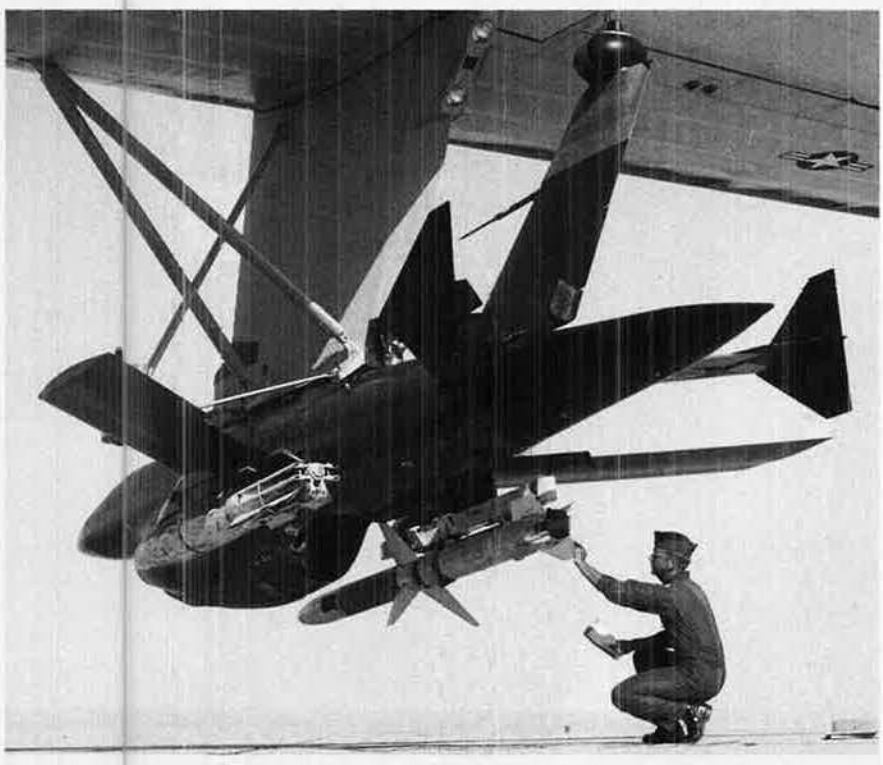
Unmanned Aerial Recon

The first operational UAV expected to ensue from the master plan is the Unmanned Air Reconnaissance System (UARS) being developed jointly by the Air Force and the Navy for tactical reconnaissance. Control Data Corp. recently won the Air Force contract to build the Advanced Tactical Air Reconnaissance System (ATARS) electronics suite for the biservice UARS program and for the tactical reconnaissance aircraft that will be chosen at some point to replace USAF's RF-4Cs.

The program to develop unmanned aircraft to carry ATARS is being managed by the Navy for both services and has captured the attention of such companies as Northrop, Canadair, Teledyne Ryan, and a Martin Marietta/Beech team. The Navy is expected to pick a winner by the end of this year.

As the master plan puts it: "UAV systems provide a technical alternative to manned aircraft and satellite systems." As the Air Force sees it, this is all well and good—but don't get carried away.

USAF acknowledges the increasing need for unmanned aircraft on such missions as targeting, reconnaissance, and suppressing the increasingly dense and ferocious air defense systems that its manned fighters and bombers would come up against in modern combat.



Armed with a Shrike antiradiation missile under its right wing and a bomb under its left, this Teledyne Ryan Aeronautical Model 234 remotely piloted vehicle (RPV) once served as an air-to-ground weapons launcher. Nowadays, such pilotless planes are full-blown weapon systems in themselves, not merely launchers. Whatever their missions, all such craft have come to be called UAVs, for "unmanned aerial vehicles." Many are capable of autonomous flight.

Even so, the service's sense of urgency in developing UAVs remains suspect in some circles where it is charged with having an ingrained, institutional bias against anything that threatens to put pilots out of work.

Air Force leaders deny this. They note that USAF has used unmanned planes for many years, that it joined with the Navy in the UARS program long before there ever was a UAV master plan, and that it is earnestly developing radar-homing drones—in its Tacit Rainbow and Seek Spinner programs—for defense-suppression missions.

Those drones, the ones designed to kill, are not covered by the UAV master plan and do not come under the joint program office. The plan and the office deal only with "nonlethal UAVs," the kinds designed to do reconnaissance, surveillance, targeting, and electronic warfare work, for example.

The Air Force says it has nothing against UAVs per se, but does not believe in buying them before their time. That time has come.

Almost three years ago, an Air Force general officer told Congress: "Air Force involvement in nonlethal unmanned vehicles is not new, but our interest in them has increased significantly."

Why? "We now believe," he said, "that technology can support an effective and affordable unmanned system to meet some of our more challenging fixed-target reconnaissance requirements."

The speaker on that occasion was Maj. Gen. John M. Loh, then the Director of Operational Requirements in USAF's acquisition and R&D establishment at the Pentagon. Now Lieutenant General Loh, he took command of Air Force Systems Command's Aeronautical Systems Division last August 1 and will have a lot to say about USAF's plans for and development of UAVs.

Drones Through History

Unmanned aircraft go back to World War I, when the "Bug," an unpiloted biplane stuffed with high explosives that was intended to fly off and crash somewhere near its target, was tested but never sent forth to do the real thing.

In World War II, the V-1 weapons

were quasi-drones. There were others, too, including the B-24 bomber that exploded and killed Navy Lt. Joseph P. Kennedy, Jr. He was to have bailed out after setting the bomber on a remotely controlled course to a high-value target in Germany, but something went wrong. The US also used some World War II B-29s on remotely controlled bomb runs in the Pacific theater.

After World War II, drones took to the air as target aircraft, nothing fancy. But they soon evolved into more sophisticated variants that could be electronically flown from afar on increasingly intricate surveillance and reconnaissance missions—which is why they came to be called RPVs (for remotely piloted vehicles).

Even before the Soviets shot down the US manned U-2 spy plane in May 1960, Ryan Aeronautical (now Teledyne Ryan Aeronautical) and Boeing were devising reconnaissance RPVs for the Air Force.

These birds came along smartly and soon constituted a growing family. USAF flew about 3,400 RPV missions over Southeast Asia through eight years of the Vietnam War. The Ryan RPVs in widespread use in that period evolved into more than twenty different configurations capable of carrying increasingly versatile and sophisticated payloads.

In the main, the RPVs of the Vietnam War were used for reconnaissance, electronic intelligence, and psychological warfare. They were effective, but there were problems of navigation, recovery, and mission reconstruction (*i.e.*, figuring out ex post facto where the RPVs had been when they did certain things) and their operations and support costs were awfully steep.

So USAF backed away from RPVs after the war. Defense budgets were shrinking and pilots were being RIFed. It was no time to overdo drones. Besides, the Air Force preferred to hold off on them until advances in electronics could solve some of their problems.

Already evident in the Air Force and Navy programs of the early 1970s to develop cruise missiles, those advances would make it possible to preprogram the flight paths, speeds, electro-optical enterprises, and other workings of the unmanned aircraft into their on-board computers and then to turn them loose, rid of remote controls, to do their missions on their own.

A Teledyne Ryan Model 324 Scarab UAV takes to the air from its ground launcher in the Mojave Desert. Egypt contracted with the US company to develop this remotely piloted jet aircraft. Twenty feet long with a twelve-foot wingspan, it can fly as fast as Mach 0.8 and deploys a parachute and an air bag to land.

This autonomy of flight in some modern drones is why the catchall designation "UAV" best describes all of them, including those that remain remotely controlled. Definitions are blurring or doubling up all over the place. For instance, the Tacit Rainbow unmanned jet aircraft being developed by Northrop to loiter on high and then swoop down on enemy radars could be called a UAV, a cruise missile, or even a standoff weapon. But it is most definitely not an RPV.

Israeli Use of UAVs

The Israelis made excellent use of UAVs (the RPV sorts) in combat against the Egyptians and Syrians in 1973 and against the Syrians in 1982. They deployed them as decoys on reconnaissance, targeting, and electronic warfare (EW) missions to draw the fire of surface-to-air missiles, fingerprint the radars of those SAMs, and jam and destroy them.

In the beginning, UAVs used by the Israelis were made in the US. But the great wartime achievements of these unpiloted aircraft spurred the Israelis to begin building their own and to move ahead of the US in the UAV operational arena. The US Navy has had great success in the Persian Gulf with "Pioneer" UAVs. Pioneers were first produced in Israel and are now built by a US company, AAI, as well.

Pentagon officials give the Israelis all due credit for this good work on and with UAVs but are quick to point out that the mostly sunny Middle East is much more conducive to UAV operations—and much less demanding of UAV designs—than is the usually cloud-covered European continent.

What with one thing and another, however, General Loh told Congress, "We believe it is now time to take a serious look at unmanned reconnaissance vehicles for the Air Force inventory. Our rationale for this decision is simple: We believe technology can now provide us with reliable and affordable engines, structures, precision navigation systems, solid-state sensors, and recovery systems."

Given all this, the Air Force looks forward to having "an unmanned option against some of our more challenging reconnaissance targets," the General testified.

The Air Force has broadened its plans for UAVs well beyond the UARS reconnaissance planes, even though those UAVs remain supreme in such plans.

Maj. Ken Thurman, a UAV operations specialist on the Air Staff who also represents USAF in the UAV joint program office, calls his service's moves toward unmanned aircraft a "watershed development. In the past, we've always emphasized unmanned air vehicles during wars, but deemphasized them after wars. This is the first time that something is getting done on them while we're not at war."

The Air Staff asked all USAF major commands to report on the requirements that they have or may have for UAVs. The majcoms responded with gusto. All said they do not expect to have anywhere near enough manned airplanes to do all the missions for which they are responsible and that UAVs would be most welcome—especially for missions now being referred to in UAV circles as "the three 'D's—dangerous, dirty, and dull."

Respective examples are photorecon missions 200 miles or so into heavily defended enemy territory, flying in an NBC environment (one that has been contaminated by nuclear, biological, or chemical weapons), and loitering at high altitude for hours or days on end in a surveillance mode.

These missions and more are covered in the multiservice UAV master plan. Its categories of unmanned aircraft, requirements, and performance characteristics are:

- *Close-range systems* for surveillance, target-spotting, target acquisition, disruption, and deception. These UAVs would be remotely controlled or tethered to the ground—for example, at an air base, where they would be used to patrol the perimeter in the manner of sentries, to sniff the air for evidence of contamination, to assess post-attack damage to runways, or even to act as air defense radars in replacing or augmenting the tall-masted radars that are now deployed from trucks.

The UAV master plan foresees a maximum range of about thirty kilometers for these close-range aircraft and describes them as "intended to satisfy the requirements of lower-level tactical units and small ships" in "investigating local-area activities," adding: "UAV systems in this category could be fielded in large numbers and therefore must be low in cost."

One close-range UAV in the Air Force's cornucopia of conceptual designs for all such vehicles looks and acts like a flying saucer.

- *Short-range systems*, all remotely controlled, ranging 150 to 300 kilometers from home and having many of the same capabilities as their close-range cousins, plus more. They could be used for target designation as well as target-spotting and target acquisition, for relaying communications, and for detecting NBC contamination.

These systems, says the master plan, are to be "relatively low-speed [and] moderate in cost and complexity" and should be capable of fairly protracted surveillance "from low and medium altitudes."

The master plan's description of short-range UAVs points up how the Pentagon is trying to avoid ridiculous extremes of multiservice commonality in unmanned aircraft even while making such systems as standard as possible across the services. It says:

"The UAV systems in this category will have different airborne components to provide the range, endurance, payload capability, and survivability required for mission performance. However, the launch and recovery, mission planning, mission control, sensor ground processing and exploitation, data links, and data-relay capabilities are expected to be very similar—if not identical—for all."

- *Medium-range systems*. Slated for the Air Force, the Navy, and the Marine Corps, these UAVs will provide the "capability to conduct pre- and post-strike reconnaissance in support of strike operations by unmanned aircraft." Seen as "relatively low-cost complements to manned aircraft," the UAVs in this category will be "increasingly attractive" in view of "the rapidly increasing lethality of air defense systems" and because they "do not expose aircrews to the risk of loss or capture," says the Pentagon's plan for UAVs.

The Air Force-Navy UARS vehicles fall squarely into this prescribed category. The master plan projects that all such medium-range unmanned aircraft will have a maximum 700-kilometer radius of flight and the ability to "fly to, between, and from observation areas at high-subsonic speeds."

No Loitering

Unlike their high-altitude brethren, these medium-range UAVs would not loiter. They could be preprogrammed to fly their routes from checkpoint to checkpoint or to be remotely guided along those routes—depending on the ranges and complexities of their missions. And they could be launched from land or from manned aircraft.

The Air Force subscribes to all this. "We believe that the unmanned vehicle has overcome its technical limitations and that it's time to get on with . . . a UARS to complement our manned systems," General Loh told Congress.

He described the UARS planes as flying at "medium- to high-subsonic speeds, at low to medium altitudes," and as having a combat radius of "at least 300 nautical miles."

The UARS aircraft will embody essentially the same type of small turbofan jet engine that powers cruise missiles. Their electronics and optics will be married in sensors, signal processors, and data processors capable of swiftly and selectively capturing images of targets and sending them to ground-control stations in the form of digital data in what USAF calls "near real time."

The UARS navigation system will have to be extremely precise, in the manner of cruise missiles, and the aircraft will have to be able to operate around the clock and be recoverable.

All this is a tall order. As one officer in the tactical community puts it, "We'll have to wait and see. If one of those drones goes a little bit off course—if it doesn't do what it's supposed to do at any point along its flight path—the whole mission is shot, kaput. But we need them, and they're certainly worth a try."

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A 4-foot-long sensor allows forecasters to more accurately predict storms that may become hurricanes and typhoons. Designated the SSMI, the Hughes Aircraft Company-built sensor can detect microwave energy emitted by rain, thereby allowing forecasters to "see" into the clouds to view the intensity of a storm. SSMI's earlier warnings will aid the merchant marine fleet by allowing ships' navigators to plot courses around the developing storms, and provide more time for those in the storms' path to make emergency preparations. In addition, the U.S. Air Force Global Weather Central will use the sensor's data for agricultural weather applications, aircraft routing and refueling, and effective communications concerning present weather conditions.

A new three-dimensional radar permits precise target designation and reduces the time it takes for a missile's radar system to lock onto its target. Using data from a Hughes TPQ-36A battlefield air defense radar, two Hawk surface-to-air missiles locked onto targets in one-third less time than it takes with the existing Hawk acquisition radar. Not only does the TPQ-36A radar reduce reaction time, it also minimizes crew requirements, improves overall reliability, and reduces total lifetime costs for the Hawk system. Both launches were part of a Norwegian Air Force exercise conducting live-firing evaluations of a new Hawk missile battery concept originated by Norway. Hughes is building the new generation radars for Norway's Adapted Hawk program.

A new printed wiring board (PWB) significantly reduces the manufacturing cost of large backplanes, or motherboards, while improving producibility, performance, and reliability of the computers they help operate. Developed by Hughes for military computer applications, the 18-layer PWB contains 7,500 fewer wires than the one it is designed to replace, and may be the most complex such board ever manufactured. The multilayer design of the new board minimizes the number of machine-wrapped wires, requiring only 2,500 such wires, compared to 10,000 on present PWBs, thus greatly simplifying assembly and inspection.

Hughes has designed and built a common set of core modules to reduce cost and increase reliability in U.S. military aircraft radar systems. Instead of using unique modules for each aircraft, a Standard Avionic Module (SAM) format is used, permitting the core modules to be interchanged in Programmable Signal Processors (PSPs) for the U.S. Air Force F-15's APG-70 radar and the Navy F-14D's APG-71. A SAM consists of two printed circuit boards mounted on both sides of a flow-through heat exchanger, with VHSIC-level integrated circuits in rows on either side of the SAM. Significantly fewer module types need be created and debugged, resulting in a more mature design and production base.

A new computer system provides accurate, timely reports at an annual cost savings of $152,000. Designed and built by Hughes, the Parts Logistics Analysis Network (PLAN) is used to track data on electronic components from their inception as engineering requirements through procurement, receiving, inventory, and the work cycle of Hughes satellite programs. PLAN "digests" requests for specific data banks, and promotes user control through "friendly" connections. PLAN also enables those who are most familiar with the data to manage the information, and requires minimal programmer intervention of system control languages.

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the catchwords in the Air Force-Navy UARS program. The unmanned aircraft being developed in that program will have the same sensors as the future tactical reconnaissance aircraft of both services, be they RF-4s, RF-16s, RF-18s, or whatever, and will be compatible with all Air Force and Navy tac recon ground and ship stations as well.

"We can no longer afford sensor packages unique to one platform that requires its own ground station," declares Maj. John Snider, a joint-requirements officer in USAF's advanced-programs acquisition division at the Pentagon. "In the master plan, we've cut out a lot of duplication in platforms, and we're trying to do the same thing with sensor packages and ground stations in the UARS program."

That program "gives us, for the first time, an unmanned vehicle that can talk to something besides the ground station that launched it" and also marks "the first time we've had an unmanned-manned crossover" in interoperability of systems, Major Snider notes.

• *"Endurance" systems.* These UAVs would have a range of about 300 kilometers over land or sea under remote control or preprogrammed guidance. They would be capable of loitering on high for up to thirty-six hours for reconnaissance, communications relay, target acquisition, weather observation, and NBC detection.

The master plan notes that the development of such systems will concentrate at first on making them capable of "wide-area surveillance using SIGINT [signals intelligence] and other sensors," says the UAV document. "Communications relay is a secondary but important capability, with EO sensors the next area of priority."

All four services are destined to deploy long-endurance UAV systems. Much work has already been done in bringing them about. The first of their kind is flying.

It is called Amber, the outgrowth of a program in which the Army, the Navy, and the Marine Corps teamed with the Defense Advanced Research Projects Agency (DARPA) to explore concepts for HALE (High-Altitude Long-Endurance) UAVs.

Amber unmanned aircraft have been wrung out at the Utah Test and Training Range at Hill AFB and have attained thirty-one hours of continuous flight at altitudes up to 27,300 feet. Their top flight duration is a world record.

DARPA Director Dr. Raymond S. Colladay claims that "this enhanced UAV capability" demonstrated by Amber aircraft "will add unprecedented flexibility to future military operations" and is only the start of something big.

Readying Amber

The Amber UAVs are being readied for deployment with the US fleet, maybe as soon as next year, and in Army areas outside Europe. But ideas for a second generation of such UAVs—already called Amber II—are being transformed into reality.

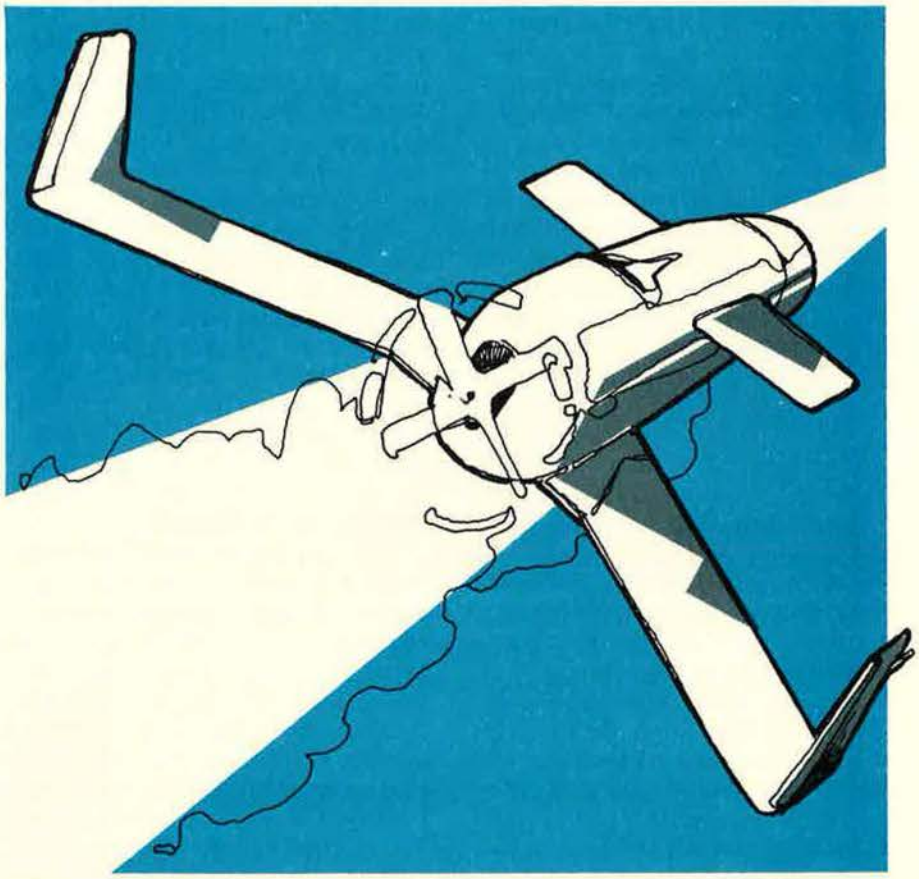
Amber II aircraft are expected to be better suited to the European theater because they will outfly their progenitors and be much more survivable. Meanwhile, the original Amber UAVs will serve as platforms on which to test MTI (moving target indicator) radar, communications relays, and SIGINT payloads being developed for deployment aboard unmanned aircraft in the years to come.

The UAV master plan mentions that Amber aircraft will be used in the testing of Skydancer, a classified SIGINT endeavor of the National Security Agency.

The Amber UAV program and the MTI radar program may well be paving the way for unmanned aircraft to succeed the Air Force's manned TR-1 and Joint STARS target-spotting airplanes in Europe some day—maybe sooner than anyone had thought possible.

The Air Force is keeping an ambivalent eye on this. It treasures its Joint STARS aircraft as the best things since binoculars for helping the Air Force and the Army look deep beyond the battlefield in the furtherance of the AirLand Battle deep-attack doctrine.

But there is much unspoken con-



This Brave 200 airframe has been the basic configuration of a succession of propeller-driven Boeing unmanned aircraft, including the Seek Spinner variant that the Air Force could someday deploy as a defense-suppression UAV. Boeing claims that its Brave-series vehicles are well-suited for a wide variety of missions, including reconnaissance, communications relay, and electronic warfare.

Air Force technicians secure Northrop jet-powered AGM-136A Tacit Rainbow UAVs in a B-52G bomb bay prior to a test flight. Preprogrammed to loiter on high and swoop down on enemy radars once they are turned on, Tacit Rainbow can be called a UAV, a cruise missile, or a standoff weapon—but not an RPV.

cern in the Air Force—and in other national defense circles—about the ability of those Joint STARS aircraft to survive while staying close enough to the forward edge of the battle area (FEBA) to keep their surveillance up to snuff. Precious fighter assets may have to be committed to protect the Joint STARS aircraft against enemy fighters bent on penetrating NATO airspace for just one purpose—knocking those surveillance aircraft out of the sky.

The UAVs' champions in the Air Force and elsewhere in the US defense establishment are careful not to class the unmanned aircraft as threats to manned aircraft. This would hurt UAVs in a hurry. Rather, the unmanned planes are always presented as complementary.

In telling Congress about the successful testing of "mini-RPVs" containing moving-target-indicator radar, DARPA's Dr. Colladay described the system as "an ideal complement" to Joint STARS "because of its local control, mobile penetration capability, and ability to get a higher-angle look at targets shadowed by terrain or foliage."

High-flying, long-loitering UAVs may also help some day in spotting Soviet mobile ICBMs that can be deployed over large areas, camouflaged, and covered and concealed by the natural landscape.

Robert Moore, DARPA's Deputy Director for Systems and Technology, told an Air Force Association symposium on strategic forces last June that the US should put a premium on developing the technology and the systems needed to spot and target those mobile ICBMs *(see page 50).*

Perking Up to UAVs

The US is hardly alone in its newfound fascination with UAVs. They are hot items in a growing number of nations in the Middle East and Southwest Asia. Egypt, for example, has been buying them in droves—from the very same US manufacturers who have never had much success in selling them to the Pentagon as peacetime staples.

European nations have perked up to the UAVs as well. NATO's military forces find them attractive for surveillance and for destroying and jamming enemy radars. Radar-homing systems being examined across the Atlantic are Northrop's jet-powered Tacit Rainbow, Boeing's propeller-driven Seek Spinner, West Germany's DAR (Drohne Anti-Radar), and Israel's Harpy.

Some NATO nations have expressed interest in Lockheed's Altair UAV—the "international" variant of the company's Aquila system—for surveillance behind enemy lines. The scaled-down Altair aircraft may well succeed where the more ambitiously sophisticated Aquila did not.

UAVs for electronic warfare are compelling but controversial. Brig. Gen. Noah E. Loy, USAF's Director of Electronic Combat Programs, says that the Air Force is "working with NATO right now on a drone jamming system" that shows promise.

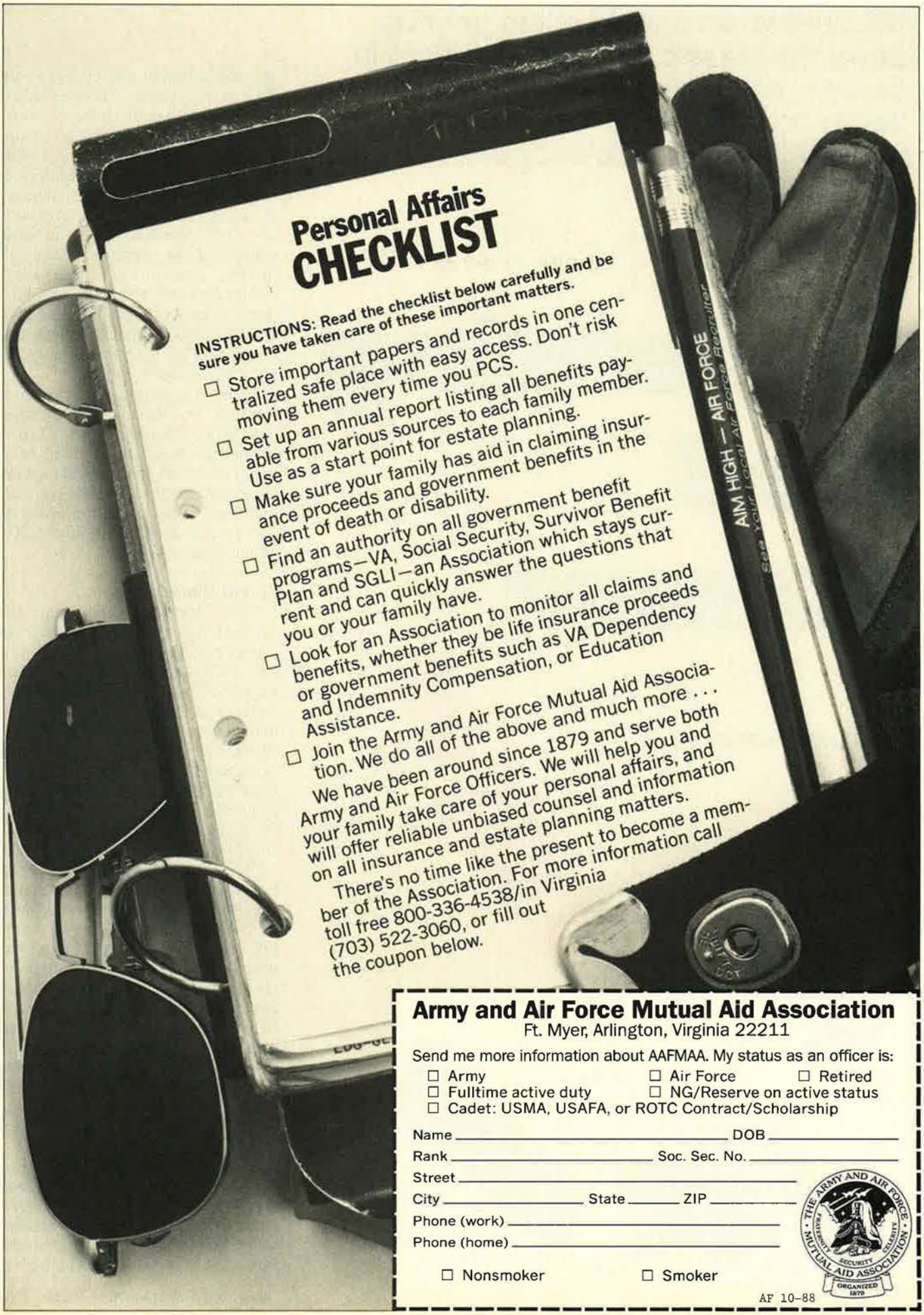
"But the big problem with drones is that they have to complement the existing force structure and be integrated into it," General Loy continues. "They've got to be over there jamming at just the right time, at the right moment. If they're not doing that, then they're not doing any good. On the contrary.

"The last thing I need is to have a jamming drone go in too early and blow the cover of the rest of the force or go in too late and enter a flight path that we're trying to go through to get to the target area.

"So drones have got to be coordinated with the rest of the strike force, and this can be a very difficult problem. Once the drones take off, if they're preprogrammed, you have no control over them except to shoot them down."

Col. Manny Garrido, Deputy Chief of Advanced Programs in USAF's RD&A establishment at the Pentagon, agrees that "integrating the UAVs into the total force" may be the toughest part of the task of bringing them to operational maturity in all their many forms and missions.

"We're in a situation with UAVs that's not much different from the time when Billy Mitchell and Hap Arnold were trying to introduce the airplane into the inventory," Colonel Garrido says. "We're excited about the technology but we have to proceed with caution, get more experienced with UAVs, and find ways to use them in the right numbers for the right missions." ■



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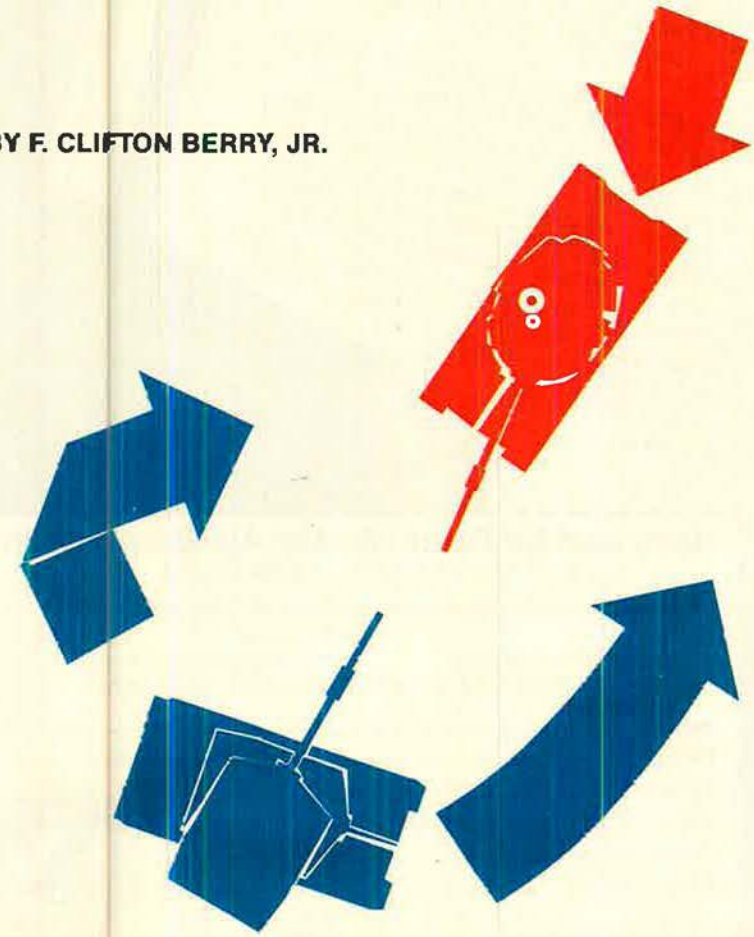
AF 10-88

If Soviet tanks should come pouring down the classic invasion corridors in Europe, allied air forces and armies had better be prepared to operate at the highest levels of efficiency and coordination.

Defeating Red Armor

BY F. CLIFTON BERRY, JR.



If conventional war comes to the Central Front in Europe, NATO forces can expect to be outnumbered and pressed hard by strong Warsaw Pact armored forces. The ability of the NATO defenders to delay and defeat the armor-heavy attackers will influence profound decisions to be taken by the political leaders of the western alliance. If the Pact attack succeeds, the western leaders will soon face awful options: whether to give up the Federal Republic of Germany and parts of other NATO countries or resort to tactical nuclear weapons.

Thus, to gain time for the political leaders to consult and decide, NATO combat units on the Central Front must be effective killers of all types of enemy armor. What sort of armor threats do they face, in what numbers? What are the weapons and tactics at NATO's disposal to defeat enemy armor?

Threat Dimensions

First, consider the threat: the available enemy combat power. In conventional weapons, Warsaw Pact (WP) forces have a numerical edge over NATO. According to the Defense Department, it is 2 to 1 in main battle tanks (53,100 WP vs. 25,900 NATO). The ratio is 1.7 to 1 in armored fighting vehicles (60,000 to 34,400). The advantage is greater in artillery and rockets, with the Pact fielding 44,000 pieces vs. 18,500 for NATO (2.37 to 1).

In the most likely scenarios, however, NATO forces will be defending. Against a strong defense such as NATO forces will raise, power ratios of less than 3 to 1 across the board are not enough to assure victory for the Pact. Also, numbers alone do not define the balance. Other factors such as weapons sophistication and technology advances also define combat capabilities. So does the disposition of units before hostilities begin, as does the speed of mobilizing reserve forces to commit to the battle.

In the Central Region, Warsaw Pact attacking combat power will not be distributed evenly. Rather, the attacking units will be concentrated at key points to force breakthroughs. Those gaps will be ex-

ploited by formations following close behind. At given locations, the attackers will mass force densely, in ratios over defenders that will approach 5 or 6 to 1. (Soviet doctrine aims for favorable ratios of at least 4 or 5 to 1 on major attack axes.)

For the air battles in the Central Region, the forces are nearer parity. NATO can fly up to 1,498 fighter-bombers and 586 fighters of all types on M-Day. On the same day at the start of hostilities, the Pact can fly up to 1,204 fighter-bombers, 1,130 fighters, and 535 interceptors. The gross ratio is Pact 1.37 to 1 over NATO in that region.

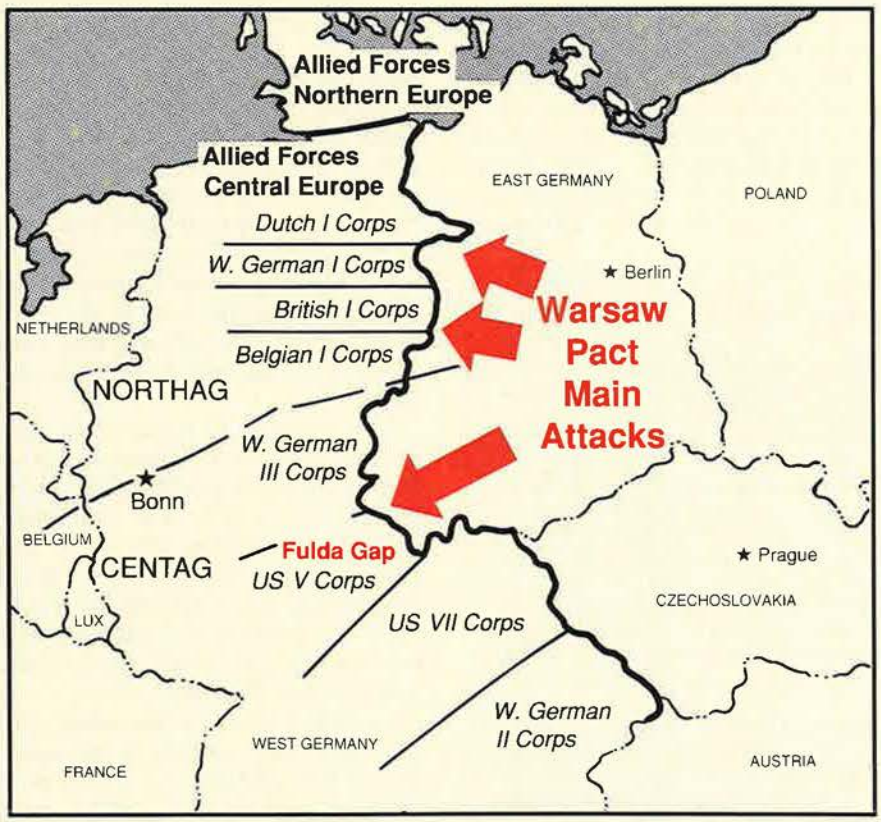
If war comes, the main attack on the NATO Central Front will be made by Soviet ground armies that are part of the Group of Soviet Forces, Germany (GSFG). In central Germany, opposite the US V Corps, the Soviet 8th Guards Army (GA) is likely to be the spearhead force. It will attempt to pour down the classic invasion corridor of the Fulda Gap and punch through the US defenders to open the gap for follow-on forces. Those forces will likely be the Soviet 1st Guards Tank Army, ready to exploit the breakthrough and roar onward to seize Frankfurt and then the Rhine River crossings.

The fighting elements of those Soviet armies are the tank divisions and motorized rifle divisions. Both types of divisions contain more than 300 main battle tanks, plus more than 1,000 other tracked vehicles such as armored fighting vehicles and armored self-propelled artillery.

At high command levels such as NATO's Northern Army Group (NORTHAG) and Central Army Group (CENTAG), the defenders' efforts will be directed at preventing those thousands of armored vehicles from concentrating at the forward edge of the battle area (FEBA). They will commit combat power far to the east and deep in the enemy's rear to break up Pact units before and as they move forward. USAF and allied air forces will fly air interdiction (AI) missions as deeply as possible. Army tactical, conventional surface-to-surface missiles allowable under INF Treaty criteria will also strike against critical infrastructure targets and movement nodes such as fuel stocks, rail yards, and bridges.

The idea is to knock out supplies, lines of communications, and control networks to hinder movement of enemy formations to the battle areas.

Specific Corps Designations and Assumed Corridors of Pact Invasion



Source: Congressional Budget Office, "U.S. Ground Forces and the Conventional Balance," June 1988. Adapted by Congressional Budget Office from Lawrence and Record, U.S. Force Structure in NATO (Washington, DC.: Brookings Institution, 1974) and from US Army material.

Warsaw Pact avenues of approach into West Germany. The Fulda Gap is the avenue into the area held by the US V Corps, and is the shortest route from the inter-German border to Frankfurt and the Rhine River.

Combat at Fulda Gap

Those long-range measures at high level will hinder, but not prevent, movement of enemy forces into the battle area. At lower levels (such as corps and division), friendly units will have to cope with armored forces already in contact or immediately reinforcing. That is the focus of this article. The tactical scenario depicted here is adapted from those used by the US Army's Training and Doctrine Command (TRADOC) to teach military operations.

Begin by focusing on the situation at the Fulda Gap. The NATO defenders consider it dangerous because it provides the shortest run from the East-West German border to the Rhine River, only 135 kilometers (eighty-four statute miles). Because the Fulda Gap is such a handy corridor for east-west movement in central Germany, it has been used by military forces many times throughout recorded history.

In near-future conflict, this is the likely avenue of advance of the Soviet 8th Guards Army. It is broad enough to accommodate an attack by up to four divisions. North of the city of Fulda are avenues of advance suitable for two to three divisions. Another division-size avenue of advance is immediately south of the city.

The 8th Guards Army can mass its forces to punch through the Fulda Gap. Its mobile striking power rests in three motorized rifle divisions and a tank division, just the right size for the gap. If those attacking divisions are neither sufficiently bloodied nor delayed, the 8th GA may be able to break a hole in the US forces defending there. Should a hole be made, then the 1st Guards

Tank Army will be able to exploit the breakthrough. It will follow through the gap and race to the Rhine with the shock power of three tank divisions and two motorized rifle divisions.

Given the enemy's strength, disposition, and probable avenues of advance, the US corps commander will likely conduct a forward defense aimed at destroying enemy forces early. Once the 8th Guards Army is destroyed, the US V Corps will be prepared to conduct offensive operations to kill the following Guards Tank Army. To accomplish those missions, the corps covering force will fight a delaying action. Then the fighting divisions of the corps will conduct the forward defense.

Knowing the numbers and types of divisions enables one to calculate the number of tanks that will have to be stopped. About 325 battle tanks are in a first-line Soviet tank division. A motorized rifle division of the first class mounts 306 battle tanks. Both types of divisions also contain hundreds of armored fighting vehicles and armored self-propelled artillery pieces.

Thus the 8th Guards Army fields at least 1,243 main battle tanks in its three motorized rifle divisions and single tank division (three times 306 plus one times 325). Following close behind, the 1st Guards Tank Army musters at least 1,587 battle tanks (three times 325 in the tank divisions plus two times 306 in the motorized rifle divisions). These are minimum numbers. Besides those major divisional formations, a few independent tank regiments and battalions are controlled at army level.

Add twice those numbers to account for the armored fighting vehicles and self-propelled artillery in the divisions. The total number of armored vehicles that must be stopped at the Fulda Gap is more than 3,700 in the 8th Guards Army and more than 4,700 in the 1st Guards Tank Army. In all, nearly 8,500 armored vehicles and double that number of trucks will be pushing into a gap only thirty-five kilometers wide. That creates a target-rich environment for the defenders.

The Defenders

Defending the Fulda Gap is the US Army's 11th Armored Cavalry Regiment. It is the covering force along the international boundary at this sector. In this scenario, the cavalry of the covering force will force the attacker to deploy his lead divisions. That will be done by destroying his lead regiments. In the course of the covering force action, the attacking enemy may penetrate up to twenty kilometers into the Federal Republic of Germany. As the covering force inflicts damage and falls back, the enemy's lead divisions will cross the Haune River and reach the Fulda River before penetration is stopped.

The covering force can be expected to suffer severe casualties in blasting the enemy's lead regiments and forcing him to deploy his first-echelon divisions fully. Up to seventy percent of its vehicles may be lost, but the covering force action will permit the US and German armored divisions in the area to accomplish two important actions: to mount a strong defense and then to counterattack. The object is to destroy the remainder of the 8th Guards Army before it can cross the Fulda River and to counterattack to stop the 1st Guards Tank Army before its force can be brought to bear.

The combat troops having stopped the attack and begun a counterattack across the former border, enough time may have been bought for the politicians in NATO and the Warsaw Pact to make momentous decisions. These decisions are beyond the scope of the fighting forces and this article. What is germane to this discussion is how the US forces will stop all those tanks and other armored vehicles.

How the Fight Develops

Killing tanks has the top priority. The tank is the centerpiece of the attacking force. Unless checked, its mobile protected firepower can carry the offensive to the Rhine River. If the tanks can be killed, the armored fighting vehicles and artillery can be dealt with more easily. But killing them can rob the tanks of protection and make them easier game.

Col. Thomas E. White, Director of the Army's A3 Special Task Force, puts the problem this way: "You want to give your opponent multiple opportunities to die." That means starting to kill enemy tanks long before they reach friendly positions, to prevent their movement into the battle, or to kill them if they finally reach the battle area.

At corps level in this situation, the commander can block the tanks of the 8th Guards Army's second echelon with weapons at his disposal. He can request longer-range weapons to be used against the follow-on 1st Guards Tank Army. His corps artillery has three battalions of MGM-52 Lance surface-to-sur-

Countering Reactive Armor

Reactive armor is the latest feature fielded by the USSR to reduce the vulnerability of its battle tanks to antitank weapons. It consists of small boxes about ten inches by twelve inches by four inches mounted on the outside of a tank or other armored vehicle. Inside the boxes are laminated "sandwiches" of steel and explosives. When struck by a projectile, such as the nose of an antitank guided missile (ATGM), the sandwich explodes. The outward explosion disrupts and destroys the integrity of the shaped-charge jet so that it does not penetrate the underlying main armor of the vehicle. It is especially effective against relatively slow-flying ATGMs, such as TOW, HOT, and MILAN. Their slow speeds (300 meters per second, or less) mean that the reactive armor explosives take effect before the shaped-charge jet can form.

Reactive armor was developed by the Israelis in the late 1970s. Israeli vehicles with reactive armor were captured by Syria in Lebanon in 1982, and the secret was quickly deduced by the USSR. By 1986, improved boxes began to appear on Soviet tanks in Germany, and by 1988 more than half the Soviet fleet in Germany was so equipped.

As Gen. Donn A. Starry points out, the addition of reactive armor atop glass composite or ceramic laminate armor on Soviet tanks will defeat the warheads of all deployed ATGMs in the world today. Unfortunately for the West, ATGMs with shaped-charge chemical energy warheads are a major part of the antiarmor arsenal. But reactive armor is less effective against kinetic energy rounds striking at high velocities, such as the tungsten-carbide and depleted-uranium kinetic energy rounds fired by the main gun of the M1 and M1A1 Abrams. Their velocity is nearly 1,600 meters per second. The combination of speed and high-energy metal penetrators defeats reactive armor.

Special Charter for A3 Task Force

Gen. Carl E. Vuono, the Chief of Staff, decided in mid-1988 that the Army needed a sharper focus on its armor and antiarmor efforts. To achieve that focus and to get results quickly, he established the Armor Antiarmor Special Task Force in early July. Nicknamed the A3 STF, the small group of fourteen officers received an extraordinary charter from General Vuono.

First, General Vuono established the task force as an element within his own office. He made the Director of the A3 STF responsible directly to him. Charging it with assessing "all aspects of the Army's A3 needs and ongoing efforts," the Chief of Staff expected the A3 STF Director to develop recommendations for key decisions. The object: "to establish an aggressive and comprehensive approach . . . that will enable Army forces to defeat the projected threats."

General Vuono appointed Col. Thomas E. White as Director of the A3 STF. Colonel White commanded the 11th Armored Cavalry Regiment along the German frontier for twenty-four months before taking up the post. Within the first month of operation, he and his small cadre illuminated key decisions for the Chief of Staff to make on the Army's 1990 budget submission. At the same time, they began the task of evaluating the Army's armor and antiarmor efforts across the board. Included in the scope of their evaluation: doctrine; force design; training; material systems; technology, both existing and emerging; and the necessary research, development, and acquisition processes to meet the objective.

That's a tall order. But General Vuono provided the authority along with the responsibility. He made the A3 STF the central Army agency for coordination, integration, and synchronization of Army A3 efforts. That includes such crucial matters as priorities, budgets, and reprogramming proposals across the Army headquarters and subordinate commands. He also vested Colonel White with the authority to coordinate with all Army and other US government agencies and all allied and other friendly foreign government agencies on A3 matters.

The A3 STF's final products will be an A3 Modernization Plan for the present and future needs of the Army and a plan for ensuring that the work will be continued effectively when the STF goes out of business before August 1, 1989.

Colonel White and his small band are armed only with brainpower and computers. However, given the extraordinary scope and power of the charter and backing by the Chief of Staff, their actions over the next several months will be profound. Their products will influence the course of Army spending, R&D, force structure, and doctrine right away. Looking further ahead, their recommendations in 1988 and 1989 will determine the outcome of armor battles for decades ahead.

face missiles. With a range of more than 100 kilometers and a warhead carrying more than 1,000 pounds of explosives, the Lance can destroy such key targets as fuel and ammunition supplies or bridges. By the early 1990s, the Army TACMS (tactical missile system), with double the Lance's range, will be available for deeper targets.

Present operational concepts call for most allied aircraft capable of air-to-air fighting to fly defensive counterair missions during the first couple of days. Thus, air interdiction missions deep in the enemy area will be flown by remaining USAF and allied strike aircraft such as the F-111, A-7, Tornado, and F-4. Their main weapons for interdiction strikes will be the AGM-65 Maverick missiles and smart bombs, such as the 500-pound Mk 82 and the 2,000-pound Mk 84. When air superiority has been attained, more air assets will be directed to the ground battle. When that happens, the surviving dual-role F-15Es and F-16s will add their weight to the interdiction effort.

Antiarmor Weapons

The corps commander focuses on the "deep battle" against enemy forces moving toward the battle area. He defines forward limits to the deep battle areas of the divisions to ensure coordination and prevent waste of scarce combat power. He expects the combat divisions in his corps to focus on destroying the assaulting divisions.

At division headquarters—the next lower Army command level—the commander employs his own organic firepower to break up the onslaught. He also calls on USAF power for battlefield air interdiction (BAI) and close air support (CAS) missions and corps artillery and missiles for reinforcement.

The longest-range missiles that are organic to the division are the Multiple Launch Rocket System (MLRS). The warhead of each MLRS missile delivers a swarm of 644 antiarmor shaped-charge bomblets at ranges out to thirty kilometers.

Tube-artillery support in the armored and mechanized divisions is provided by the 155-mm and 203-mm howitzers, capable of delivering precision fire out to twenty kilometers. Both howitzers can deliver high-explosive projectiles against area targets.

More important to killing armor are their "smart" warheads. Against armored targets, the 155-mm howitzer fires the Copperhead cannon-launched guided projectile. It is guided to the right point by an observer who designates the target with a laser beam. The Copperhead's electro-optical seeker locks on the target, even if it is moving, and blasts in with a 22.5-kg shaped-charge warhead. A number of ground and airborne lasers can designate targets for Copperhead.

The smart munition for the division's 203-mm (eight-inch) howitzers is called SADARM, for Sense and Destroy Armor. Each SADARM projectile carries three submunitions. The target is a concentration of enemy armored vehicles. In the target area, the three submunitions are ejected and begin a parachute-braked descent. When the sensor in each submunition detects an armored vehicle, the warhead shoots a self-forming fragment warhead vertically downward. This projectile punches through the thinner top armor of tanks and armored fighting vehicles rather than tackling the thicker front and side armor.

To force the enemy attackers to mass, the defending division supplements natural terrain obstacles and channels by creating obstacles of its own. In one armor commander's words, "You select the place you want the other guy to die." Potent weapons for that purpose are the family of land mines employed by the Army and Air Force. Some minefields will be emplaced at the most likely spots before hostilities start.

Cost-effective Minefields

Minefields and other barrier obstacles are cost-effective means of delaying enemy armor. Looking ahead to 1993, the Congressional Budget Office calculates that an extensive barrier system could cut by more than half the amount of NATO territory lost in the early days of the fight.

Once the enemy begins passing through the covering force area and

is fully engaged, then aircraft and artillery will scatter antitank (AT) and antipersonnel (AP) mines. The purpose: to impede enemy movement and create targets for direct and indirect fire weapons.

Dispersible mines all have a self-destruct feature. The mines are randomly laid and cannot be recorded individually, but the location of their sowing and the self-destruct time are known. Their immediate effect is to deny enemy movement. Once the scattered mines have self-destructed, friendly units can maneuver through the minefield.

Meanwhile, in the airspace immediately above the battlefield, Army helicopters and Air Force fixed-wing aircraft are knocking out tanks. The division commander's own AH-64 Apache attack helicopters search for enemy armored formations forward of friendly positions. Apaches carry up to seventy-six 2.75-inch rockets or sixteen AGM-114 Hellfire antitank missiles, or combinations thereof.

Apaches can swarm over the battlefield at low level, flying among the trees. Able to detect targets day or night, the Apaches are potent tank-killers. Targets identified as enemy are designated by laser beams; then Hellfire missiles lock on the beam and slam into the target. The Hellfire's range is six kilometers, and its warhead is a hollow charge weighing about nineteen pounds. For lighter targets, the Apaches use an M230 30-mm automatic cannon.

Air Force A-10 attack aircraft fly almost as low and slow as the Apaches. The A-10s are dedicated tank killers, armed with Maverick missiles and powerful 30-mm GAU-8 automatic cannon. Daily, a number of A-10 sorties will be committed to the defending division. They will engage targets close in front of division front-line units. Air Force forward air controllers (FACs) working with the ground units will control A-10 close air support. A-10 pilots, like their Apache counterparts, are able to listen on the ground commander's VHF-FM radio net to understand the tactical situation. They talk with each other and the FACs on secure UHF radio to divvy up targets and avoid enemy antiaircraft fire.

A-10 and Apache units and older AH-1 Cobra gunships are accustomed to working together and can provide mutual support in flying and fighting against enemy armor formations.

Air Force close air support sorties will also be flown by aircraft such as the F-16, A-7, and French Mirage V. They will use a combination of Maverick missiles and dumb and smart bombs. Forward air controllers ensure that the close air support effort is part of and gives support to the tactical plans of the division and its brigades. That is, the ground commander picks the targets and the Air Force knocks them out.

Tank and Infantry Task Forces

The fighting elements of the brigades are armor and mechanized infantry battalions. They are formed into task forces for the battle. An armor battalion forms a tank-heavy task force by receiving a mechanized infantry company. The mechanized infantry battalion that attaches a company to the tank battalion will receive a tank company and become an infantry-heavy task force.

In both types of task force, there are M1 Abrams tanks and M2/M3 Bradley fighting vehicles.

Two versions of the Abrams are fielded: the M1 and M1A1. Their major difference is in their primary armament. The M1 mounts a 105-mm M68 cannon and carries fifty-five rounds for it. M1A1 has a 120-mm M256 cannon and carries a basic load of forty rounds. Maximum effective fighting range for the tank cannon is 2,000 meters. Secondary weapons are a single .50-caliber machine gun and two 7.62-mm machine guns.

The Bradley fighting vehicle's main armament is a 25-mm fully automatic Bushmaster chain gun. The chain gun's high-velocity rounds are effective against lightly armored vehicles to a maximum effective range of 1,700 meters. To kill enemy armor and blast fortified positions, the Bradley mounts a BGM-71 TOW system.

TOW stands for Tube-launched, Optically tracked, Wire-guided missile system. A launcher for two TOW missiles is mounted atop the Bradley. Its gunner can locate, engage, and destroy enemy armor while remaining within the protection of the vehicle. Maximum range of the TOW is 3,750 meters.

If the mechanized infantrymen dismount and take up ground defensive positions, their main antitank weapon is the Dragon missile. It is portable, with an effective range of 1,000 meters.

When the enemy is close enough for the armor and mechanized infantry companies to engage, the battle is at its most intense. At this point, the Abrams tanks and Bradley fighting vehicles begin the fight from dug-in defensive positions, hulls protected by the earth and only turrets exposed. Both vehicles can fight day and night. The fire-control system on the Abrams, with laser rangefinder, gyros, and computers, permits first-round kills whether the tank is moving or stationary.

In this particular fight, the enemy tanks and fighting vehicles are engaged first at maximum range, then at successively shorter ranges as the surviving enemy armor units press forward.

Eventually the advance is stopped at the Fulda River. Fresh US armor divisions counterattack. Their tanks and fighting vehicles attack eastward to pinch off the remnants of the 8th Guards Army and to chew up the following 1st Guards Tank Army.

In this hypothetical battle, the defenders at the Fulda Gap gain time for the political leaders. Divisions of the Soviet first-echelon attack are effectively annihilated and the second echelon heavily damaged.

That's how the battle is supposed to unfold. Our side wins, at least at this time and in this place. But it will not always work out that way. And even in this optimistic scenario the defenders' ability to stem the tide for two or three days is not certain, nor is the battle without cost to the friendly forces.

For example, in its analysis of this scenario, the Army estimates that more than seventy percent of the vehicles in the covering force would be lost or disabled on the first day. The defending brigades and battalion task forces would expect to lose more than fifty percent of their vehicles on the first day of heavy fighting and fourteen percent more on the second day. Personnel losses would be lower, but still sizable. Are

replacement vehicles and men available in time, and can they be moved up to the battle area?

Aside from casualties, a major issue for tactical planners is whether the necessary logistical support could be maintained during the intense fighting. The smart weapons, both air-delivered and on ground vehicles, have higher kill probabilities than before. However, in a defensive scenario such as this they will be fired at prodigious rates. And the vehicles use prodigious amounts of fuel.

An M1 Abrams is most effective when it can move and shoot, whether on offense or defense. But let it run out of ammo or fuel, and it is simply a very expensive and highly visible metal foxhole. Recall that the M1A1 carries only forty rounds of 120-mm as its basic load. Those rounds can be used up very quickly against dense enemy armor formations. Army planners estimate that the basic ammo load aboard the tank will be used up in the first day of the defense. Of course, not all tanks will fire all of their ammunition. Some tanks will be knocked out, but their ammo will be retrievable. So ammunition redistribution during lulls in the fighting (if any) will be vital.

As for fuel, the Abrams carries 500 gallons for its gas turbine main engine. That is consumed in about six hours, whether the tank is moving or idling. So when the situation permits, the engines must be turned off to conserve fuel. Even with fuel conservation, a tank company of fourteen M1s thirsts for 7,000 gallons of jet fuel twice a day when it is fighting.

Somehow, heavy tonnages of fuel and ammunition must be brought forward to the units in contact with the enemy. The enemy will be doing his best to isolate the resupply and reinforcement operations, just as he will be trying to kill the defending US forces at the forward edge of the battle area.

Add in the normal operational confusion and the fog of war, enemy communications jamming, equipment breakdowns, wounds, and fatigue. Only then can one appreciate the complex and difficult task of defeating enemy armor. The challenge is to make sure that all elements of the joint antiarmor team are competent and work in concert. To that end, the US Army, Air Force, and allied ground and air forces train continuously and intensively.

Falling Behind

Even the most intensive training and strongest desire to succeed are insufficient to win the antiarmor battle. Also needed are weapons in the field that will kill the enemy's armor. In that respect, US and allied weapons are deficient. Thus the Warsaw Pact armor forces are less vulnerable, and the threat more severe than before. The current situation is one of Soviet superiority, both quantitative and qualitative.

In 1985, the Defense Science Board set up a task force to assess the status of the armor/antiarmor competition between the US and the Soviet Union. Gen. Donn A. Starry, USA (Ret.), was the chairman of the task force. He is a 1948 West Point graduate whose thirty-five-year career was devoted to armor combat from the lowest to the highest levels.

General Starry's task force concluded that the US was "behind the Soviets in armor/antiarmor systems and falling further behind at an alarming rate." His task force called the situation serious and approaching a matter of national urgency. Three years later, in 1988, he says, "We have crossed the threshold; the situation is now a matter of considerable national urgency."

In testimony before a Senate Armed Services subcommittee in April 1988, General Starry pointed to the reasons for the urgent situation. First, because of its decision-making process in development and acquisition, the US tends to find itself eight to ten years behind new developments fielded by the Soviets. The Soviets move their developments into the field faster and in greater numbers. Although the US may be ahead in some areas technically, it spends more time and money trying to add more capability. The consequence is marginally better capability at higher cost and much later.

General Starry said, "By the time we catch up, momentum on the other side has put the threat ahead of us once more. Worse yet, we are unable to achieve a modernization rate that can match or better the one on the other side. The end result is that the Soviets are outmodernizing us at a rate of about four to one. Every year, for example, they modernize a force the size of the total US heavy force; every two years they modernize a force the size of the total NATO heavy force." In fact, Soviet battle-tank production in 1988 is more than 300 per month, enough to equip a division. US production is about twenty per month, enough for one and a half tank companies.

The quantity equation is bad enough. As for quality, the armor on current Soviet battle tanks in frontline units and in production can defeat the warheads of all deployed antitank guided missiles (ATGM) in the world today. In General Starry's view, that is "the unhappy fact."

ATGMs rely on shaped-charge chemical energy warheads to punch through armor. Since the mid-1970s, the Soviets have developed and fielded glass composite and ceramic laminate for better protection against chemical energy rounds. With the widespread equipping of their fleets with "reactive armor" *(see box)*, they have an uncomplicated and inexpensive solution to the problem.

How the US Army and other services cope with this urgent problem today will determine the outcome of the real armor battles of the 1990s, if they should come. The urgency of the problem is clearly appreciated by the top Army and Air Force leadership and by key members of Congress. Whether that urgency can be translated into rapid development and fielding of armor/antiarmor solutions merits a close watch. ■

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Viewpoint

The Versatile Instrument

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

Thirty years ago, our inclination was to buy too many bombers. Today, it's to buy too few. Now, as then, we are transfixed by the Armageddon scenario and overlook other uses.

The Germans, for all their technical skills and clever preparations in anticipation of World War II, made one crippling mistake. When they set out to construct the Luftwaffe, their bombardment airplanes were not in the same class with their fighters. A lack of offensive airpower remained a Luftwaffe deficiency throughout the war. Whether sufficient offensive airpower would have made any difference in the end, given the Allies' immense advantages, is another question, but a larger and more effective Luftwaffe bomber force might well have made the Battle of Britain an even closer call.

As it was, that battle, in Wellington's words after Waterloo, was a near-run thing. If Hitler's devotion to missiles, V-1s and V-2s, had been spent on bombers, real military damage instead of random destruction might have changed the course of events prior to D-Day. As though to make the point, a British bomber force, in a shattering moonlight raid, delivered a severe setback to the German missile effort at Peenemünde.

Forty-five years ago this October, our own strategic bombers were under intense scrutiny, a decidedly endangered species. The morning of October 14, 1943, was a miserable one by any standard, and the ribbon on the briefing map stretched deep into Germany to a place called Schweinfurt. The target was the Kugelfischer ball-bearing works, which had been the object of a costly but not very effective attack in August. As we sat in our cockpits that dismal rainy morning, we hoped that the low ceiling and heavy clouds would cause reason to prevail in London and that we could go to Schweinfurt another day. Or, to be truthful, that someone else could go to Schweinfurt another day.

We went, of course, and after some confusion in assembling above the overcast, we set off for a sunlit continent. My little group of seven B-17s somehow ended up leading the pack and thus had the first look at a massive Luftwaffe welcoming committee.

Several hours later, we limped home. The bombing had been precise, but Eighth Air Force had lost sixty airplanes, almost twenty percent of the number that had left England. It was an unacceptable casualty rate, one that put in doubt the whole concept of daylight precision bombing.

Long-range drop tanks, together with a marvelous new fighter, the P-51, saved the day for strategic bombing; Schweinfurt, or anywhere else within the radius of a bomber, could now be reached with acceptable losses. That, in turn, made the convincing postwar argument for a separate Air Force. Make no mistake about it, bombers were the clincher in that hard-fought debate.

In fact, there was a period when bombers threatened to become the US Air Force. Nuclear supremacy seemed to make other weapons, and, indeed, the other services, almost superfluous. If we had enough bombers, we could blow an enemy off the face of the earth with no fear of retaliation.

Life on this planet is not that simple, however, and the need for soldiers, sailors, and fighter pilots soon became apparent once again.

A relic of the time when the bomber dominated both the force structure and the budget is still around: the venerable B-52. While B-52s still have considerable utility in certain roles—the maritime anti-ship mission for one—they can no longer be counted on to penetrate deep into Soviet territory. Like the B-17s and B-24s of those long-ago days, the B-52s are too slow and too visible to be effective against sophisticated present-day defenses. The B-52 was designed for high-altitude operation and is ponderous and rough riding on the deck, which is the only reasonably safe altitude in this era of surface-to-air missiles and supersonic interceptors equipped with long-range weapons.

It is curious that the arguments that swirl around the bomber issue always focus on the deep penetration role in a war that will presumably involve the all-out use of nuclear weapons. Since no one with even a few functioning brain cells wants to contemplate that kind of war, a bomber, in that context, is simply part of the deterrent—a machine, like the ICBM, we hope we will never use. Since there will be no second coming of a P-51 to ease the bomber's penetration run, technical gadgetry in the form of ECM and low radar cross section must do the job. If there is a fault in the ECM, the whole bomber concept comes under attack, just as a lack of fighter drop-tanks in 1943 put the daylight precision bombing concept at risk.

All this ignores the fact that bombers are an immensely flexible form of airpower, and not just at Armageddon. Their range and in-flight-refueling capability make basing a secondary matter. Precise navigation and bombing systems in modern bombers, even the elderly B-52, have eliminated darkness and weather as obstacles.

The bomber remains a versatile instrument of power projection, to borrow a favorite phrase from the US Navy. If any error has been made in maintaining the bomber force, it would seem to be one of numbers. Thirty years ago, we probably bought too many, at the expense of other things. Today, we are buying too few, again transfixed by the penetration task and the resultant technological cost. Perhaps we ought to back off a bit from defensive technology in favor of greater numbers of long-range bomber aircraft. With foreign bases posing an ever-worsening problem, such a reemphasis would be an effective way of letting the world know that we are still around. ■

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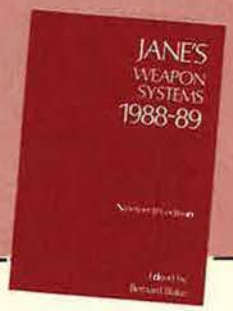

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The debate on close air support is misdirected. It focuses only on the aircraft to be employed.

Of Mudfighters and Elephants

BY MAJ. GEN. WILLIAM A. GORTON, USAF (RET.)

WE ARE again confronted with commotion from all quarters regarding what should be done about the Air Force's ability to conduct Close Air Support (CAS). This phenomenon, not unlike the emergence of cicadas, occurs about every seventeen years and is normally associated with the aging of the principal aircraft designated to perform the mission.

For those of us who have been around since the last cycle, the present chorus is familiar. Once again the loudest voices decry the aircraft the Air Force would have to replace, in this case the aging A-10. The backup singers offer familiar renditions—"The Air Force Doesn't Care About CAS," "Do It Like the Marines," and that favorite old standby, "Give It to the Army."

The problem with all this din is that it tends to focus on a few elements of a complex problem.

Concentrating excessively on what aircraft is best suited for the mission—without a clear understanding of the mission and its role in the total application of tactical airpower in support of the Army—one could easily conclude that a new, highly specialized CAS aircraft is required. Focusing on tanks as the primary target, without first gaining an understanding of the total target set, narrows weapons choices. Limiting the debate to CAS without considering the effect of Battlefield Air Interdiction (BAI) on the battle at the Forward Line of Own Troops (FLOT) is likely to dictate a different set of weapons platforms and weapons solutions. Finally, arguing about service roles and missions tends to elevate (lower?) the debate to an emotional level that may well preclude any rational conclusions about improvements.

A System Within a System

Emphasis on the aircraft may, in the final analysis, be essential. But to begin from that point may well produce solutions that will reduce, not increase, overall combined-arms combat capability. To examine the problem from the bottom up is analogous to the blind man holding the elephant's tail and concluding that an elephant looks like a rope.

Reasonable judgments must

The Air Force goes right to the ground in the debate over air support vs. battlefield air interdiction. Here, Sgt. Jeffrey Ferguson (left) and TSgt. Dennis A. LeVick call in an airstrike as part of a tactical air control party exercise.

come from a "top-down" perspective. How can the Air Force best assist the Army in winning the battle at the FLOT?

CAS is a complex system with many critical elements. Its command control communications and intelligence (C^3I) must be highly responsive, jam-resistant, and sometimes secure. It must interface with ground force command and control and fire-support nets. It must define targets and their location precisely and in near real time.

CAS requires aircraft that have compatible communications with ground forces—for voice, data, and target information. The aircraft must be able to survive in the intense air defense threat of a tactically deployed opponent, where the FLOT will invariably be fluid and ill-defined. It must be able to perform its mission in the daytime, at night, and during adverse weather.

Finally, CAS personnel require unique training (air liaison officers, forward air controllers, etc.) in unique units (Tactical Air Control Centers, Allied Tactical Operations Centers, Air Support Operations Centers, etc.) with unique equipment (digital communications terminals, OV-10 observation aircraft, etc.).

In part because of its complexity and apparent uniqueness, the CAS system is frequently viewed as an independent mission area. This is a mistake. CAS mission effectiveness will be determined, to a large extent, by the effectiveness of the Army forces at the FLOT and beyond and of the air interdiction and air superiority campaigns conducted by the Air Force.

Another different aspect of the CAS mission is how its requirements are developed. The Army, not the Air Force, develops the basic requirements for CAS. The requirements stem from the Air-Land Battle doctrine and, as such, tell the Air Force what the Army expects in terms of tactical air support. While these Army-developed requirements are general in nature (they do not tell the Air Force how to do the mission or with what systems), they clearly spell out what the Army wants.

Army requirements stress:

- *Flexibility:* Tacair must be able to support Army operations at the FLOT, cross-FLOT, and during deep operations.
- *Availability:* Tacair must be responsive—day, night, and during adverse weather.
- *Survivability:* Tacair must be able to operate in a dense and lethal battlefield environment.

These general requirements are supported fully by the Air Force and are basic to how the Air Force trains and equips its tactical forces. Yet many of those who seek to "help the Army" apparently are not listening to what the Army and the Air Force are saying.

—USAF photo by SSgt. Eric C. Baker

Although the Army does not tell the Air Force how to support ground troops, it does stress flexibility, availability, and survivability in its requirements for airpower. Before rolling this F-16 into its target, the pilot has ejected flares to decoy ground-launched, heat-seeking missiles.

Differing Points of View

In the current debate, those who advocate AV-8Bs, improved A-10s, and new, specialized CAS aircraft, so-called "Mudfighters," generally think only about the CAS mission. On the other hand, the Army and Air Force keep talking about CAS/BAI. The difference between these two points of view is critical to making the right resource-allocation decisions.

Battlefield Air Interdiction, or BAI, is a subset of AI (Air Interdiction). It defines more sharply those AI targets that could have a near-term effect on the battle at the FLOT. BAI targets are of great interest to the Army commander. In fact, their selection is largely determined by the Army. Once the targets are selected, they can be attacked by airpower, or possibly by ground-launched weapons, or, more likely, by a combination of both. Other AI targets are also important to the Army but have less immediate impact on the battle at the FLOT.

It follows that the effectiveness of the AI campaign can dramatically affect the battle at the FLOT. Conversely, the effectiveness of the forces engaging the enemy at the FLOT can dramatically affect the outcome of the AI campaign. AI and CAS are mutually dependent mission areas.

For example, during World War II when the Soviets went on the offensive on the Eastern Front against the Wehrmacht, the Junkers Ju-87 Stuka was arguably as responsive and effective a weapon as it had been in the past. But because the Germans did not have the capability to interdict Soviet forces before they became engaged at the FLOT, even ten, twelve, or more sorties per Stuka per day—closely integrated with the fire and maneuver of the supported ground forces—were insufficient to stem the Soviet onslaught.

Today, the Supreme Allied Commander in Europe could execute the

Follow-on Forces Attack (FOFA) concept and succeed in interdicting Soviet/Warsaw Pact second-echelon forces far in excess of what had been predicted, and it would matter little if the Soviet/WP first echelon reached Frankfurt in a day and a half.

Taking a slightly different slant on the last example, it is clear that success in the AI campaign is greatly dependent on the *need* for the forces being interdicted. The greater the demand for reinforcements at the FLOT, the greater the probability that the AI campaign will succeed. Effective AI increases the probability of success of the battle at the FLOT.

An example of this was the interdiction of the German units attempting to reinforce their front during the Allied invasion of Europe. The demand for reinforcements was so great that the Germans were forced to move during daylight, providing far greater opportunity for the attacking Ninth Air Force aircraft. The results are well known.

Because of the mutual dependence of CAS and AI, the Army and Air Force personnel charged with the responsibility of success on the battlefield view them as inseparable, mutually reinforcing missions. Moreover, both the Army and Air Force understand fully that the fight will be a total, coordinated combined-arms event—at the FLOT, in the rear areas, and well beyond the FLOT. That is what AirLand Battle is all about.

What About Air Superiority?

Some people believe the Air Force is resisting buying system X, Y, or Z because the Air Force is "not really interested in the CAS mission." They imply that the only thing that interests the Air Force is shooting down MiGs and painting red stars on its aircraft. It is difficult for me to dignify this uninformed claim with a reply. However, since it seems to be heard more frequently these days, a response seems required.

First, every type of mission for which the tactical air forces have responsibility ultimately supports the ground forces—including air superiority.

Second, there is no example in the history of modern warfare of an AI campaign succeeding without the interdictor possessing at least temporary air superiority. AI success will enhance the probability of success in the battle at the FLOT.

Third, either because of the effective application of airpower or by default (in cases when the enemy did not possess or chose not to use airpower assets), US Army and Air Force units have not been exposed to persistent air attack since early in World War II. Not surprisingly, many of the current participants in the debate have little appreciation for what it is like to be under persistent attack from the air.

Finally, the Air Force understands the effectiveness of modern aircraft and weapons on ground forces and air bases. It therefore understands the importance of air superiority in the successful prosecution of the land battle.

In the final analysis, the objective of all tactical airpower missions is support of the ground forces. All are interrelated and interdependent. None can be looked at in isolation.

Allocation of tactical airpower to its various missions will be made by a Joint Force Commander (almost invariably Army) with the advice of his air and land force component commanders. Therefore, the extent to which airpower is allocated to any mission will be determined largely on the basis of Army, not Air Force, requirements. This clearly requires a highly flexible Air Force fighter force structure—one that can shift between CAS and AI, based on the needs of the Army as dictated by the flow of the battle. That is why the two services have continually referred to CAS/BAI rather than to CAS alone.

—USAF photo by MSgt. Patrick Nugent

For purposes of argument, the Air Force's mission breaks down into air superiority, represented by the F-15 (foreground), air interdiction, as shown by the F-16 (right), and close air support in the form of the A-10. In reality, though, the roles are not so clearly drawn. Over a fluid battlefield, one day's air interdiction could become tomorrow's air support.

Staring at the Elephant

It is time to take off the blindfold and see the elephant for what it is—the sum of its parts. If we are intent on sharpening its tusks, we had better know to which end they are attached.

As I have contended throughout this article, the current debate is misdirected. It focuses on potential CAS aircraft solutions without first understanding the total problem. I see this as the failure of the current Department of Defense evaluations and the recent studies by the Institute for Defense Analysis and the

Air Force Scientific Advisory Board. The problem, for the most part, is that the study participants were asked the wrong questions. The current contractor studies directed by the Office of the Secretary of Defense (OSD) Close Air Support Mission Area Review Group (CASMARG) are a case in point.

The studies arose because there was disagreement within OSD about the Air Force's decision to replace the aging A-10 with a variant of the F-16, popularly called the "A-16." This prompted the Under Secretary of Defense for Acquisition to direct the Secretary of the Air Force to contract for feasibility studies "of a new CAS aircraft to replace the A-10." The charge to the contractor study teams, after much discussion within OSD and the services, is: "to provide the Under Secretary of Defense for Acquisition with the design, mission performance, and cost basis for an evaluation of USAF aircraft system design alternatives for [these] CAS/BAI missions."

Not surprisingly, a lot of time, effort, and money is being spent to develop aircraft answers. However, the contractors conducting the studies are finding that such factors as C^3I, precise target-location information, weapons, etc., have dramatic effects on CAS/BAI effectiveness, independent of the aircraft.

In retrospect, it would have been better to evaluate the factors that led the Air Force to conclude that the "A-16" was the best possible choice. That would at least have broadened the debate and would also have provided OSD with a framework for the prescribed "evaluation of USAF aircraft system design alternatives. . . ."

Survivability, Targets, and Mudfighters

Because of the lack of an overall view of a complex mission area, and because of the focus on aircraft, only a few of the factors involved in providing effective CAS are being addressed. Aircraft survivability, the "small-arms" threat, tank killing, and specialized "inexpensive" CAS aircraft seem to be the most topical.

Regarding survivability, concern has been voiced about the "vulnerable" area of the F-16 compared to that of the A-10. The claim is made that "the probability of shooting down an F-16, given a hit by a 23-mm, is greater than that of shooting down an A-10, given a hit by a 23-mm." While this may or may not be true, it is certainly not desirable to be hit by anything—period!

Flying around the battlefield looking for the target while soaking up hits isn't conducive to sustaining combat capability, not to mention pilot longevity. The objective is to reduce the probability of any hit! Arguing about which type of aircraft can look the most like a piece of Swiss cheese and still fly is irrelevant. In fact, aircraft survivability may have much more to do with knowing precisely where the target is *prior to* aircraft exposure to the threat than it has to do with how many hits the aircraft can take.

There is no question that the threat is significant and that facets of aircraft design (*e.g.*, performance, hardening, emissions signature, etc.) are important factors in aircraft survivability. The trouble is that some keep shaping the threat to suit their preferred aircraft solution.

It is a fact that "small-arms" fire has downed and will continue to down many aircraft. But to stress only the small-arms threat is, at best, misleading. At a hearing last year, Congress was shown a picture of Soviet infantry practicing individual air defense by *lying on their backs shooting their AK assault rifles in the air!* While it is true that such tactics are used by the Soviets on occasion, the utility of these tactics depends greatly on what's occurring on the battlefield. In a frontal attack against a determined opponent, it is hard to believe that Ivan is going to hop out of his BMP armored personnel carrier at the first sign of a CAS aircraft, lie on his back, and shoot his weapon into the sky! In any case, such tactics would be welcomed by the US Army as they would reduce the amount of steel flying around the battlefield.

There is, of course, a reason to stress the small-arms threat if you believe that "inexpensive Mudfighters" are the way to go: defeating all those infrared and radar missiles is expensive. Missile warning systems, radar homing and warning systems, jammers, auto flare and chaff dispensers, and the like all cost money—lots of it.

"Mudfighters" unquestionably have some appeal. The problem is that you'll need lots of them; and as the size of a specialized segment of a given force increases, the flexibility of the total force structure is reduced. As pointed out earlier, the ability to shift the weight of tactical airpower among CAS, AI, and Air Superiority is critical to the outcome of the battle at the FLOT.

Optimized Aircraft

I suspect, however, that the Air Force would like to have specifically designed aircraft, optimized for each of its missions. The obvious problem there is that it would require a tactical fighter force four or five times larger than planned. That is not affordable, practical, or needed. The announced decrease by two fighter wings will put a higher premium on aircraft that can perform more than one mission. The smaller the force structure, the more flexible it must be.

One final point on inexpensive CAS aircraft. Maybe you can find a CAS aircraft at $7 million per copy that can survive the threat and do the job at night and during adverse weather as well as in day, clear-weather conditions. Maybe, but I doubt it. However, I am sure that lots of inexpensive, simple aircraft will need to be flown by lots of expensive, complex pilots—people who tend to marry, have kids, incur dental bills, and eventually stay on to retire (although, regrettably, not often enough these days).

Regarding CAS targets, it seems Washington has gone tank-mad. Tanks are important. They represent shock, firepower, and mobility. The Soviet forces have lots of them, and they are good. But are they *the* target for CAS? I am not certain, and I do not think enough attention has been directed to that question.

We all know that modern Soviet tanks with reactive armor are tough nuts to crack. It is also known that the best way to kill a tank is with another tank. I have been told that a well-trained soldier armed with an effective antitank weapon is next best. Some say the AH-64 also rates high, and, of course, CAS aircraft will take their toll.

Focusing on tanks requires some

In training, the surface threat is simulated by unguided rockets called Smokey SAMs. In the real world, the surface threat is likely to come from missiles such as this new Soviet portable surface-to-air missile, the SA-16. Its launcher appears to be similar to that of the US FIM-92 Stinger missile.

rather specialized and expensive air-delivered weapons. Broadening the view, however, to encompass the total target base at the FLOT might well dictate a different emphasis.

Tanks stripped of their infantry can make one heck of a "statement" on the battlefield, but they will not win the battle. Maybe taking out the less-armored BMPs would eventually do more for tank killing. It certainly would increase the effectiveness of the Army TOW guided-missile teams. In fact, it may be better to increase Army tank-killing resources than to develop a new specialized flying tank killer.

What about tactically deployed POL and ammunition-support elements? Soviet Hip and Hind helicopters? Artillery? The current Army commander in Europe seems to think that artillery is a prime target for CAS. Yet artillery is twenty kilometers or more from the FLOT.

Whether this is a CAS or BAI mission is a moot point. But it certainly requires an aircraft that can survive in the heart of a thick air defense network.

One needs to address the total target set before one can make judgments about what is needed to do what. Tanks are an important target. But killing them is not only a matter of tradeoff between types of tank-killing CAS aircraft.

Do It Like the Marines?

Why doesn't the Air Force do it like the Marines? (This question comes most frequently from those who see the AV-8B as the preferred CAS aircraft.) The short answer is that the Marines have a different mission. They are a highly skilled and effective amphibious air/ground team. That is what they train for, and that is what drives their equipment requirements.

Marine divisions have less heavy firepower than most Army divisions do. They rely on naval gunfire and tactical air to fill the gap. The AV-8B is ideal in this role. In the Marine Corps, CAS is treated as an extension of artillery, and since the Marines are light in heavy artillery, this concept makes sense. However, the penalty paid to "operate off the beach, right with the troops" is that you trade range and payload to achieve a vertical takeoff and landing (VTOL) capability. This does not mean that the AV-8B cannot and does not do BAI. It simply means that its BAI capability is less than that of a non-VTOL aircraft.

Why not give the CAS mission to the Army? First, the Army does not want it. At least, that is what Army leadership says. Second, give them what? Where do you draw the line? As has already been suggested, CAS, AI, and Air Superiority are interdependent missions. If CAS goes to the Army, the result would be a highly specialized force that would not likely be trained or equipped to do BAI. Air Force force structure, therefore, could not be reduced one for one. This would also reduce, if not eliminate, the close interface between Army and Air Force personnel that has led to a far greater understanding of each service's capabilities and limitations.

Reconsider the Elephant

Congress has recently authorized an additional $10 million in order to make sure that other aircraft (improved A-10 and AV-8B) are given due consideration. It is difficult to perceive how such action would contribute to a better understanding of where best to spend limited funds to win the battle at the FLOT. On the other hand, understanding the potential contribution of an improved A-10 or AV-8B relative to other alternatives—not just other aircraft—is probably important. Certainly enough studies have already been conducted, but if Congress feels compelled to mandate another, I suggest directing OSD to conduct one that will provide a framework within which alternatives can be evaluated.

When we all take off our blindfolds and look at the elephant, we might see that his tusks are not in such bad shape. In fact, we may find that he can't see the target because he's been blindfolded! Maybe, just maybe, the best thing we can do for the beast is let him "see" the target—precisely. ■

Maj. Gen. William A. Gorton, USAF (Ret.), is Vice President of International Planning and Analysis Center (IPAC, Inc.) in Washington, D. C. He is the former commander of USAFE's Sixteenth Air Force. As a tactical command pilot, he had more than 5,000 hours of flying time, and he was operationally qualified in eighteen types of aircraft. He spent two years as an air liaison officer and forward air controller with the 101st Airborne Division, including combat in Vietnam.

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Triumph and Tragedy

Maj. Ralph Cheli's war in the Pacific was an unparalleled drama of heroism and outrageous fate.

BY JOHN L. FRISBEE

BY THE summer of 1943, General MacArthur's strategic plan of advance along the north coast of New Guinea to reach the Philippines was well under way, supported by Gen. George Kenney's Fifth Air Force.

In July, his troops had secured a foothold in the Huon Gulf area and were preparing for the next step—capture of the Japanese stronghold at Lae—scheduled for early September. But first, Japanese airpower concentrated around Wewak, some 300 miles west of Lae, had to be neutralized.

General Kenney knew that Wewak and its satellite fields at But, Boram, and Dagua were being heavily reinforced. By mid-August, there were more than 100 bombers and about ninety fighters on the four fields. It was time to strike.

On the night of August 16–17, fifty B-17s and B-24s hit the four fields. On the morning of the seventeenth, thirty-two B-25s from Port Moresby and Dobodura, escorted by eighty P-38s, strafed and parafragged the fields.

For the Moresby-based B-25s, the 500-mile flight to Wewak was the deepest penetration into enemy-held territory yet made by medium bombers. Both the heavies and mediums were met by intense antiaircraft fire but little fighter opposition. A follow-up daylight raid was laid on for the eighteenth, with Maj. Ralph Cheli, one of the most experienced Fifth Air Force bomber pilots, leading the B-25s from Port Moresby.

The previous August, Cheli, then a captain, had led a flight of 38th Bombardment Group B-25s from Hamilton Field in California to Australia in the first air movement of B-25s from the States to the combat zone. Two months later, the 38th moved to Port Moresby in southeastern New Guinea, and Cheli was given command of the 405th Squadron.

On March 3, 1943, during the Battle of the Bismarck Sea, he led his squadron in the first daylight, masthead-level attack against a Japanese convoy. Now, on his fortieth combat mission, Ralph Cheli would take the Moresby B-25s over 500 miles of jungle and past 15,000-foot peaks to Dagua, a few miles west of Wewak.

Unlike the conditions during the first Wewak strike, the weather was bad on August 18. Only twenty-six of forty-nine heavy bombers reached their targets, bombing through broken clouds. Visibility was down to about two miles in rain and haze. Again, AA fire was heavy, but this time enemy fighters attacked the B-25s savagely and persistently.

Ten to fifteen Zekes and Oscars dived out of the clouds, concentrating their fire on Cheli's squadron. As the B-25s started their strafing run, an Oscar scored many hits on Cheli's plane, setting the right engine and wing afire. A crash was inevitable, but rather than disrupt the squadron at this crucial point by pulling up for a bailout, Major Cheli chose to continue the attack, dropping his bombs and strafing as flame streamed back from the doomed bomber.

Maj. Ralph Cheli bombed Dagua in a doomed B-25, won the Medal of Honor.

As they pulled up from the most successful attack of the day, Cheli ordered his wingman to take the lead. He would try to ditch in the ocean.

There were varying reports as to what happened next: Cheli's B-25 exploded and crashed in the jungle or in the sea, or ditched successfully. All that was known for sure was that Ralph Cheli and his crew—1st Lt. Vincent Raney, Flight Officer Don Yancey, T/Sgt. Raymond Warren, and S/Sgt. Clinton Murphree—were missing in action.

On October 28, 1943, Major Cheli was awarded the Medal of Honor for his courageous decision not to abandon the attack on Dagua.

Several months later, an unconfirmed Japanese broadcast reported that Cheli and three members of his crew had been taken prisoner. The story was not verified until after the war.

Cheli and at least two of his crew had in fact been captured and taken to a Japanese prison at Rabaul. Cheli was badly burned and "banged up." As the senior American POW at that time, he was interrogated and beaten frequently over the next several months but refused to give any information beyond name, rank, and serial number. According to repatriated fellow prisoners, Cheli was always cheerful and optimistic, despite his atrocious treatment.

Finally, the Japanese gave up and decided to send Cheli and about twenty other prisoners to Japan. On the evening of March 5, 1944, the POWs were put aboard a ship in a convoy bound for the home islands. Ninety minutes later, in one of the great ironies of the war, Fifth Air Force bombers attacked the convoy. The ship bearing Major Cheli and the other prisoners was hit. There were no survivors. ■

Airman's Bookshelf

War on Two Fronts

Going Downtown: The War Against Hanoi and Washington, by Jack Broughton. Foreword by Tom Wolfe. Orion Books, New York, N. Y., 1988. 336 pages. $18.95.

Those who read *Thud Ridge,* Jack Broughton's 1969 classic account of the air war over North Vietnam, know that he has few peers as a chronicler of air combat or as a critic of the civilian and military face cards who micromanaged the war from Washington to Hanoi. This book is not a replay of *Thud Ridge,* and West Pointer Broughton has lost none of his talent for colorful or caustic writing.

Actually, if not formally, *Going Downtown* (to Hanoi) falls into five parts. The first is about the author's experiences in Korea as head of a team that tested the Oerlikon air-to-ground rocket in combat. There's some pretty hair-raising stuff here. Next, Broughton tells about his tour as leader of the Thunderbirds, giving a pilot's assessment of jet fighters from the F-84 to the F-106, the latter his favorite of the lot.

Colonel Broughton, by this time Vice Commander of the 355th Tactical Fighter Wing at Takhli RTAFB, Thailand, then launches a well-documented attack against remote and often-inexperienced planners who were making the lives of F-105 Thud drivers difficult at best and short at worst.

Former Secretary of Defense Robert McNamara would not find these chapters heartwarming, nor would President Lyndon Johnson, were he still living. Some of the brass who were calling—or relaying—signals from the Pentagon and PACAF Headquarters in Hawaii, and whose careers were built on a foundation of big bombers, come out little better.

According to Broughton, "They had no appreciation for the principle of surprise and no understanding of the maneuverability or the flexibility of fighter aircraft." There are notable exceptions among the military—Adm. U. S. Grant Sharp, CINCPAC, who fought a valiant but losing battle to unleash airpower, and Gen. William "Spike" Momyer, a fighter pilot who reigned at Seventh Air Force.

Woven through these chapters is a lot of good, illustrative combat narrative that supports the author's case against the lack of understanding or concern for the men who were fighting the air war and the remote officials who were making operational decisions that rightly belonged to field commanders.

Broughton then describes in vivid detail the guns, the MiGs, and the SAMs as seen from his cockpit and by other Thud drivers who flew with him to Hanoi, Haiphong, and the other hot spots in Route Package Six. Before you're through with that tour, you'll be mopping your brow if you have any imagination at all.

Jack Broughton's concern for his own men proved his undoing. One of his pilots who had been fired on by guns at Cam Pha in the sanctuary of the Haiphong area returned fire, allegedly hitting a Soviet freighter, the *Turkestan.* Broughton knew that the careers of the pilot and his wingman were finished if Soviet allegations were proved correct. He ordered the gun camera film destroyed before it was developed.

An investigation directed by Gen. John D. Ryan, CINCPACAF, led to a general court-martial of Broughton and his two pilots. As described by the author in his four closing chapters, the events leading up to the trial and the trial itself read like the script of a Peter Sellers movie. The two pilots were found not guilty of charges, and Broughton, found guilty of destroying $42.50 worth of government property, was fined $600 and admonished.

Colonel Broughton, who wanted to fly three more missions "just to make it 105 in the F-105," was ordered out of the theater. Knowing that he had no future in the Air Force, Jack Broughton, a world-class pilot and admired combat leader, retired. Subsequently the Board for Correction of Military Records "threw the court's judgment out and expunged it from the records."

Not all readers will agree with everything the author has to say, but none of them is likely to lay the book aside before finishing the last page. This is a story about fighter pilots told by one of that breed, with no holds barred.

—Reviewed by John L. Frisbee. John L. Frisbee is a regular contributor to this magazine.

The Trade School

The Air Force Academy: An Illustrated History, by George V. Fagan. Johnson Books, Boulder, Colo., 1988. 248 pages with bibliography and index. $29.95.

The US Air Force Academy today is a marvelous educational institution with a world-class faculty and a modern, state-of-the-art physical plant. The young officers it turns out represent a rare excellence brought about by a synergism of strict scholarship, proper ideas of discipline, and high ideals of honor. Its stature and traditions came neither quick nor easy.

The lessons of World War I were learned well by members of the US Army Air Service. Immediately after the hostilities ended, military pilots realized the pressing need for a professional and educational aeronautic/aviation facility of the stature and quality of West Point and the Naval Academy.

Then-Brig. Gen. "Billy" Mitchell and then-Col. H. H. "Hap" Arnold lobbied as early as 1919 for the creation of an Air Service Academy. Their efforts, however, were constantly thwarted during the next twenty years by the traditional Army and Navy establishments.

If inter- and intraservice rivalries weren't enough to discourage its proponents, the notion of an Air Academy was constantly buffeted by legislative politics after World War II. Everybody from Capitol Hill and the Pentagon, it seems, had an idea on how to create an Air Academy, to define its scholastic responsibilites and its military obligations, and to establish its

fundamental philosophy and mission.

In 1954, the battle to establish the Academy was finally won when President Dwight Eisenhower signed the enabling bill into law. More than 600 locations in forty-five states were offered as proposed sites. In 1954, Colorado Springs was chosen as the home of the Air Force Academy.

While the permanent facilities were being built, the Academy took up temporary quarters at Lowry AFB in Denver. Its original facilities and personnel consisted of two rooms and three men: Lt. Gen. Hubert Harmon (Superintendent), a lieutenant colonel, and a sergeant major.

From this inauspicious beginning, a team was assembled that brought together the academic, professional, and military skills necessary for the staffing of the permanent Academy. These men were charged with determining exactly what an Air Force officer has to know in an age of supersonic jets, long-range missiles, and nuclear weapons, as well as determining the role of the Air Force in space.

Of equal importance was to ascertain how familiar a cadet should be with the problems of rapid social change and political decisions on a global scale.

The first cadets arrived at 0600 hours on July 11, 1955, at Lowry. Under the wise and able tutelage of General Harmon, they became dedicated officers and cultured gentlemen.

Harmon, a member of the famous West Point Class of 1915 (which spawned fifty-nine generals, including Eisenhower and Omar Bradley), believed that the spirit of intellectual inquiry must be fused with a sense of duty and discipline. He built a military institution firmly grounded on academics, professional training, and the production of a young officer "who would be as capable and comfortable in the drawing room as he would be in the cockpit."

The Air Force Academy quickly grew in academic and military prestige after 1954. It came of age as a major sports institution with the rise of the Falcon football team to national prominence. But all was not glory and triumph for the Academy. In 1965, its sterling reputation was severely tarnished by a massive cheating scandal. One hundred and three cadets eventually received honorable discharges, four got general discharges, and two were discharged under "less than honorable" conditions. This ordeal shook the very foundations of the Academy, and many years passed before it regained its reputation.

The Vietnam War years also took a toll on the Academy. One general reported in the mid-1960s that many members of the student body had demonstrated an "air of cynicism concerning concepts of duty . . . coupled with a breakdown in morale." This problem was compounded when a popular psychology professor, ordered to flying status in Vietnam following his tour of duty at the Academy, became a conscientious objector.

Morale rose in late 1967 when Col. Robin Olds became commandant. Colonel Olds was a heroic leader, not a manager; as the author notes, "He was the classic example of the quintessential fighter jock." An All-America football tackle at West Point and a famous ace who flew in both World War II and Vietnam, he quickly got the cadets back on the Air Force track. Academy graduates did well for themselves during the Vietnam War.

The face of the Academy changed dramatically in the 1970s. The admission of women and increasing num-

Airman's Bookshelf

bers of minority cadets have forever altered the composite picture of the WASP, male "Doolie" of 1954. The record speaks for itself—more than sixty percent of all Academy graduates are still on active duty today. Whether as general officers or leaders in such fields as business, engineering, or medicine, graduates of the Air Force Academy have made their mark on American society.

Obviously a labor of love for Dr. Fagan, who taught history at the Academy, this book is more than just a history of the institution at Colorado Springs. It is a testimony to the strong personalities and dedicated leaders who made the Academy what it is today—despite formidable bureaucratic and political obstacles.

For those readers who chose the Air Force way or those who simply admire the grit and determination of the unique breed of people who gave birth to and nurtured the Academy, this will be a valued book.

—Reviewed by Dr. William Teague. A regular reviewer for AIR FORCE *Magazine, Dr. Teague lectures on American government at the University of Texas at Dallas.*

New Books in Brief

Bell X-1 Variants, by Ben Guenther and Jay Miller. This latest issue in the Aerofax Datagraph series gives the family history of one of the most famous aircraft of all time, the Bell X-1. Through five versions that actually flew—X-1, X-1A, X-1B, X-1D, and X-1E—this slim volume details all of the changes in airframe, instrumentation, and systems that occurred in the program. Other items, such as different tail and wing designs (including X-29-like forward-swept wings) that never made it past wind-tunnel testing, are included.

As is typical of the Aerofax publications, a keen eye is turned to the small details of the X-1 series. All of the dates, names, and places of the program are listed, as are a complete flight log and details about construction of the aircraft. Many of the pictures have never been published before. Although these books sometimes come from the Joe Friday School of Writing—"Just the facts, Ma'am"—they definitely have a niche, and they are a valuable source of information. Aerofax, Inc., Arlington, Tex., 1988. 64 pages with photos. $12.95.

Grumman: Sixty Years of Excellence, by Bill Gunston. Wilbur and Orville, Grumman and Naval aviation—the two pairs are inseparable. Starting an aircraft manufacturing company at the beginning of the depression may not have been the smartest move Leroy Grumman could have made, but the gamble paid off handsomely. After an auto accident nearly ruined the company, Grumman started by building floats and aluminum truck bodies, and then grew to be one of the largest firms in the aerospace industry.

The history of the company (and of Naval aviation) is told through its planes from the FF-1, the first Grumman fighter, through the F4F Wildcat and F6F Hellcat of World War II, to the F-14 Tomcat of today. While the Navy planes are the stars of this book, Grumman's other projects, such as the SA-16 Albatross and EF-111 Raven for the Air Force, the Ag-Cat civilian crop duster, the Lunar Module for NASA, and the avionics and canoe-building businesses, are also examined. Complete specifications are listed for nearly every Grumman design. Orion Books, New York, N. Y., 1988. 157 pages with photos and index. $19.95.

—Reviewed by Jeffrey P. Rhodes, Aeronautics Editor.

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Power Equipment ☐ Brakes ☐ Steering
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☐ Mirrors ☐ Windows ☐ Tailgate/trunk release
☐ Seats _____ driver _____ passenger _____ bench
Radio ☐ AM ☐ AM/FM Stereo
☐ AM/FM Stereo with cassette player
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Intercom

Fighters of yesterday and today: Forty years of aerospace technology are spanned in the skies over Nellis AFB, Nev., as AFA National Vice President/Southwest Region Oliver R. Crawford's 1941 P-40 Warhawk (top right), cranking along at full throttle, is passed by F-16 Fighting Falcons of Twelfth Air Force's 474th Tactical Fighter Wing at near-stall speed.

AFA Life Member Directory

During the next several weeks, AFA Life Members will be receiving phone calls from the Harris Publishing Co., which is compiling AFA's new Directory of Life Members. These calls are being made with the complete approval of the Air Force Association.

Harris representatives will be phoning Life Members to verify the accuracy of the data listed in each Life Member's entry in the directory. In addition, Life Members will be provided an opportunity to purchase a copy of the directory, but there is no obligation or requirement whatsoever for any Life Member to do so. Any suggestions to the contrary should be reported directly to AFA headquarters.

The Life Member Directory promises to be a highly professional publication and should serve as a valuable reference guide for AFAers. Life Members are encouraged to assist the Harris Publishing Co. in their effort to make the directory as accurate and as current as possible.

At the USAF Senior NCO Academy at Gunter AFB, Ala., AFA President Sam E. Keith, Jr., presents SMSgt. John T. Morris, Jr., with the National Security Affairs/Force Employment Award for Class 88-D of the USAF Senior NCO Academy. Sergeant Morris is a member of the Air Force Commissary Service, headquartered at Kelly AFB, Tex.

RCA recently donated an original painting, depicting USAF accomplishments since 1947, to the Air Force Art collection. Shown here at the Pentagon presentation are (from left) Charles Durazo, AFA Vice President/Central East Region; Secretary of the Air Force Edward C. "Pete" Aldridge; RCA artist Sal Asaro; Mrs. Asaro; and Charles A. Schmidt, Division Vice President and General Manager, RCA Aerospace and Defense, GE Astro-Space Division.

"Project Texas"

At the recent Texas AFA State Convention held in Kerrville, Tex., a new statewide program, Project Texas, was introduced to assist chapters in (1) developing a year-long membership drive, (2) enhancing member involvement, and (3) providing clearer communications within and among the chapter, its members, and the community.

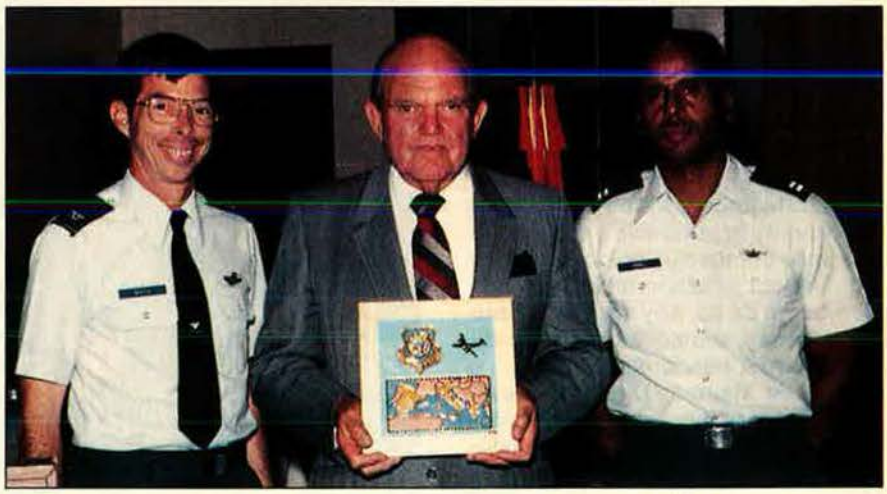
Initiated by the Panhandle AFA Chapter (formerly the Greater Amarillo Area Chapter), the objective of Project Texas is to encourage current AFA chapters to reach out into areas throughout the state that now have sparse AFA representation. Some states—and Texas is one of them—contain large geographic areas with few members and no AFA chapter. As part of Project Texas, chapters will make a conscious effort to contact these people and, with them, to form chapter "units" in these areas. The "units" will be served by special chapter teams who agree to work with the smaller group, not to form new chapters but to develop closer relationships between the chapter and the members it serves.

This "team" and "unit" concept of reaching out to individual members and groups of members who are not involved has application for all chapters, regardless of land area involved. Project Texas is a program to watch . . . and emulate.

Colorado Honors Outstanding Military Members

In special ceremonies conducted during the Colorado State Convention, four Air Force personnel were introduced as winners of the statewide competition for company-grade

Col. Jeffrey G. Cliver, Commander of the 36th Tactical Fighter Wing at Bitburg AB, West Germany, welcomes AFA National President Sam E. Keith, Jr., and his wife Mary Sue to the base. The Keiths made a three-week tour of air bases and AFA chapters in Europe during late June and early July.



During his recent tour of air bases and AFA chapters in Europe, AFA National President Sam E. Keith, Jr., was presented with a plaque from the 625th Military Airlift Support Group at Torrejon AB, Spain. Shown with President Keith are the Group's Commander, Col. Jack E. Keeter, Jr. (left), and Capt. David L. Terrell.

An Air Force Association National Symposium

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- Gen. Bernard P. Randolph, Commander, Air Force Systems Command
- Gen. Merrill A. McPeak, Commander in Chief, Pacific Air Forces
- Lt. Gen. Thomas G. McInerney, Commander, Alaskan Air Command
- Lt. Gen. Jimmie V. Adams, Vice Commander, Tactical Air Command
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Registration for all Los Angeles Symposium events is $275 ($300 for non-AFA members).

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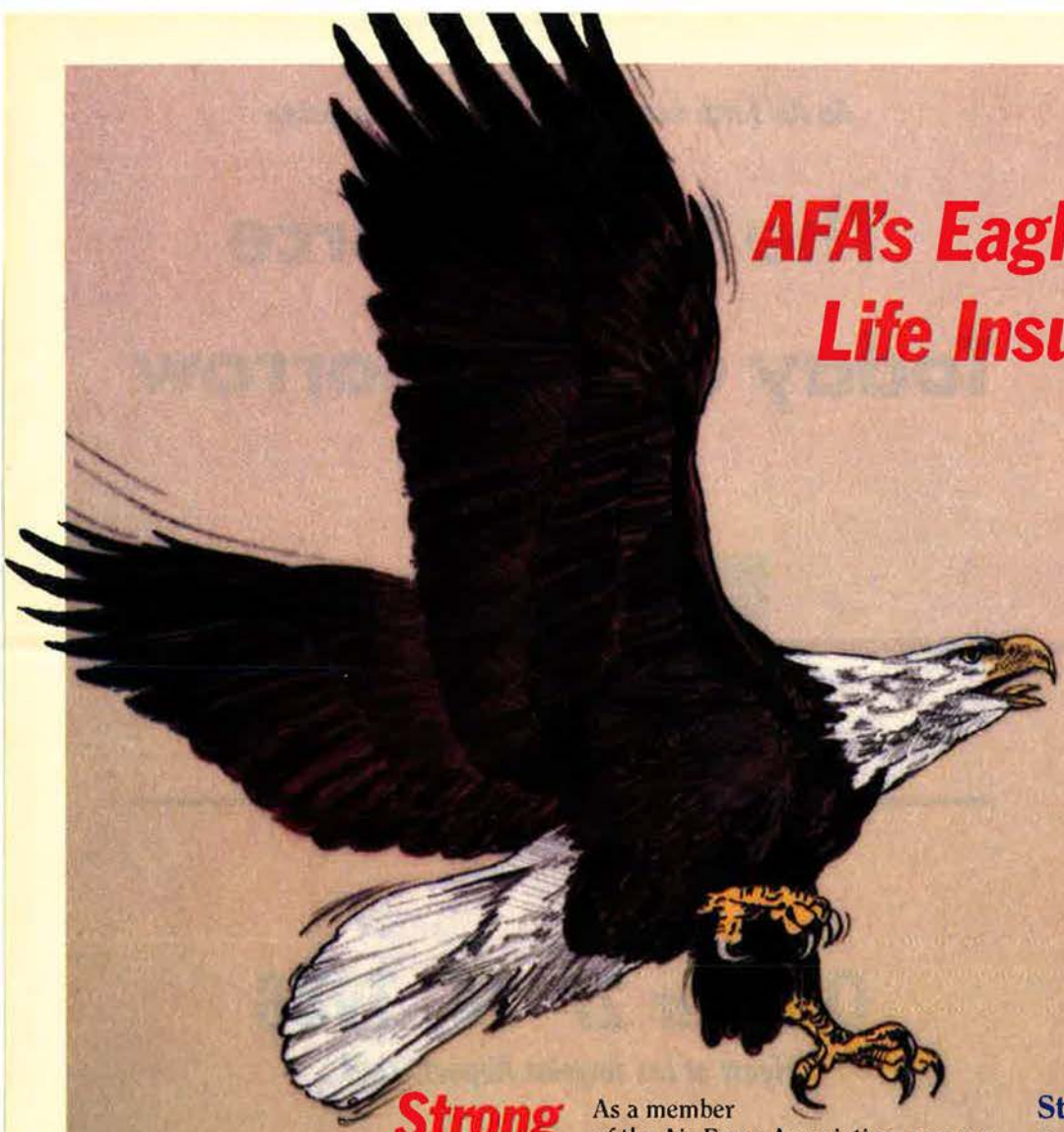

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officer, senior NCO, NCO, and airman of the year awards.

Recipients of the awards were Capt. Timothy Trachsel, 1st Space Wing, Peterson AFB, Colo.; SMSgt. Joan Johnson, Hq. ARPC, Denver, Colo.; TSgt. Thomas Voegtle, Air Force Space Command, Peterson AFB; and SrA. Lee Shannon, 3420th Technical Training Group, Lowry AFB, Colo.

Oldest AFA Member?

Pennsylvania AFA claims that its oldest AFA member is Henry Coffin III, a World War I balloonist who turned ninety-one last March. He is a walking encyclopedia of early aircraft tales and "amazing" stories. Though unable to attend the state convention in July, he was given special recognition by Pennsylvania AFA for his long-time contributions to the state organization.

States claiming AFA members who are senior to Pennsylvania's Henry Coffin are urged to write to "Intercom."

"Gear Up" at Cape Fear

One of AFA's newest units is North Carolina's Cape Fear Chapter, which held its first general membership meeting with twenty-five members on April 15 and now boasts more than eighty-five members. Part of their success story is a strong campaign for recognition in the Wilmington, N. C., area that features well-written letters to the editor, good photos, feature articles on community leaders with Air Force backgrounds, and a growing community awareness that the chapter and its leaders care about the Air Force and its people. A simple formula—and one that still works.

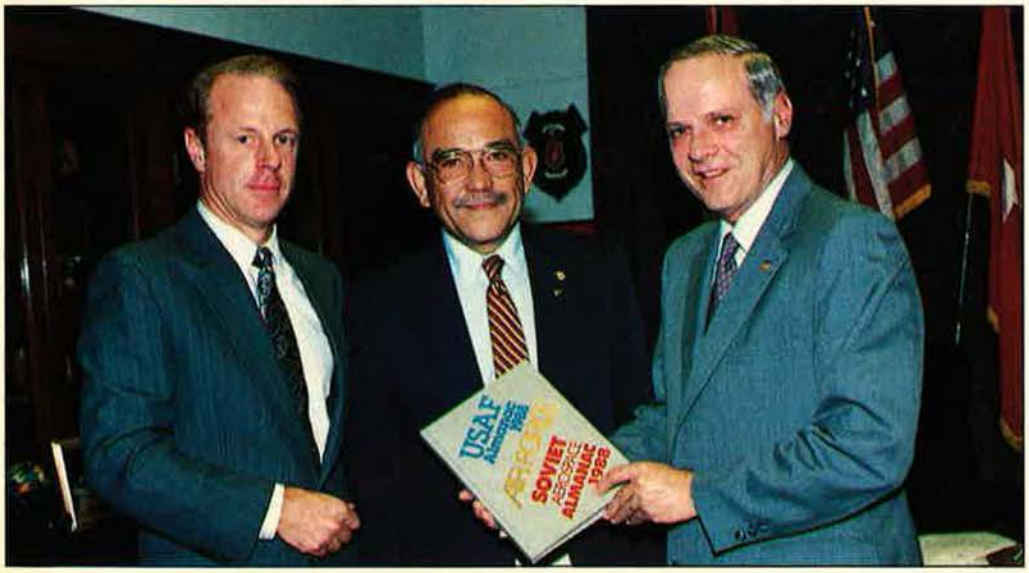
Kudos go to the chapter leadership: Norm Davis, President; John Kelly, Vice President; Bill Reed, Secretary; Leonidas Maximcuic, Treasurer; Troy Johnson, Communications; and Herb Trost, Membership. And to National Vice President (Southeast Region) "Red" Smith, North Carolina State President Robert Newman, and State Vice President John White for organizing the chapter.

Community Partners on The Move

Led by the Carl Vinson Memorial (Ga.) and the Gen. David C. Jones (N. D.) Chapters, each of which has passed the "century mark" in the tally of Community Partners, the Community Partner program is now the fastest growing segment of AFA's membership.

In future issues, "Intercom" wants also to recognize those chapters that have obtained fifty or more Community Partners. While several chapters have achieved this goal, special mention is made this month of the Pope Chapter (N. C.), with sixty-two Community Partners. The Pope Chapter developed a superb advertisement for use in local papers that describes the program and lists the community organizations affiliated with the chapter as Community Partners. It's a dynamite ad. Write to "Intercom" for sample copies—and let us know, too, how your Community Partner program works. ■

Suffolk County (N. Y.) Chapter President John B. Conley (right) presents a special AFA Citation to Lt. Col. William Stratemeier for the 102d Aerospace Rescue and Recovery Squadron. The citation commemorates the unit's eightieth anniversary of federal recognition.



AFA Executive Director Charles L. Donnelly presents new member Congressional Delegate Ben Blaz (R-Guam, center) with a souvenir book. The Congressman, a member of the House Armed Services Committee, became a member of the Nation's Capital Chapter in August. Looking on at left is David S. Osterhout, then Senior Vice President of the Chapter. Mr. Osterhout became President of the Nation's Capital Chapter on October 1.

Intercom

Standing before the portrait of Gen. H. H. "Hap" Arnold that hangs in the Air Force Room of the Army and Navy Club Building in Washington, D. C., are AFA charter member President Ronald W. Reagan and longtime AFA member Donald S. Dawson, Maj. Gen., USAF (Ret.), recently elected President of the Army and Navy Club. Earlier this year, President Reagan opened and dedicated a new Army and Navy Clubhouse, becoming the third US President to do so.

Air Force and AFA leaders recently attended a reception and banquet held at Bolling AFB, D. C., to honor the Air Force art program and the artists who contribute to it. From left: AFA National Director Dave Blankenship; AFA President Sam E. Keith, Jr.; Jody Aldridge; Air Force Secretary Edward C. "Pete" Aldridge; and AFA National Director, Past National President, and New York State President Gerald Hasler.

AFA Past President Bob Johnson talks with newly commissioned Ensign Chris Lehner during the 1988 Fighter Fling at NAS Oceana, Va. Mr. Johnson, the second-ranking US ace in the World War II ETO, participated in the Fighter Symposium that kicked off the annual three-day event.

Unit Reunions

Electronic Security Command
The Electronic Security Command NCO PME Center at Goodfellow AFB, Tex., is planning to hold its thirtieth-anniversary reunion on February 10, 1989. All former graduates and staff members of the USAF Security Service/ESC school are invited. **Contact:** ESC/PME Center, Det. 1, CESD/DPN, Goodfellow AFB, Tex. 76908-6377. Phone: (915) 657-3585. AUTOVON: 477-3585.

23d Tactical Fighter Squadron
Members of the 23d Tactical Fighter Squadron will hold their fiftieth-anniversary reunion in late summer of 1989, at Spangdahlem AB, Germany. **Contact:** Capt. Paul Lockhart, USAF, 23d TFS/52d TFW, PSC Box 851, APO New York 09123. Phone: 06575-4712.

Class 41-F
Members of Class 41-F are organizing a reunion for May 1989. **Contact:** Bill Ceely, 1103 N. Garfield Ave., Deland, Fla. 32724. Phone: (904) 734-2460.

Class 41-H
Members of Class 41-H (Brooks/Kelly Airfields, Tex.) will hold a reunion on October 28–30, 1988, at Kelly AFB, Tex. **Contact:** Verne Lollar, 10102 N. Manton, San Antonio, Tex. 78213. Phone: (512) 344-8200.

112th AC&W Squadron
Members of the 112th AC&W Squadron and the 112th Tactical Control Flight Unit, PennANG, State College, Pa., will hold a fortieth-anniversary reunion in May 1989. **Contact:** Lt. Col. James M. Herron, PennANG Commander, 112th Tactical Control Flight (ANG), State College AGS, 551 Bigler Rd. Ext., State College, Pa. 16803-6799. Phone: (814) 237-3004.

241st B.G. (H)
Members of the 241st B.G. (Heavy) will hold their reunion October 17–18 at Garrett's. **Contact:** S. Gomez, 3003 M St., Washington, D. C. Phone: (202) 333-8282.

1st/2d Antisubmarine Squadrons
For the purpose of planning a reunion, I would like to hear from members of the 1st and 2d Antisubmarine Squadrons, 480th Antisubmarine Group, who operated from St. Eval, England, and Port Lyautey, French Morocco.

For more information, please contact the address listed below.

CWO4 Gerald S. Maresh, USAF (Ret.)
14875 Native Dancer Dr.
Morgan Hill, Calif. 95037
Phone: (408) 779-7120

Class 42-13
I am trying to organize a reunion for members of Class 42-13 (Mather AFB, Calif.).

For more information, please contact the address below.

Lt. Col. Ted E. Gaty III, USAF (Ret.)
2023 Bridgeport Dr.
Lexington, Ky. 40502
Phone: (606) 268-4028

83d Fighter Interceptor Squadron
Members of the 83d Fighter Interceptor Squadron stationed at Hamilton AFB, Calif., from 1953 through the deactivation of the squadron in 1963 are planning to hold a reunion in late 1989.

For more information, please contact the address below.

Robert A. Rayford
P. O. Box 1112
Alexandria, La. 71309

Reunion Notices

Readers wishing to submit reunion notices to "Unit Reunions," AIR FORCE Magazine, 1501 Lee Highway, Arlington, Va. 22209-1198. Please designate the unit holding the reunion, a time and location, and a contact for more information.

Bob Stevens'

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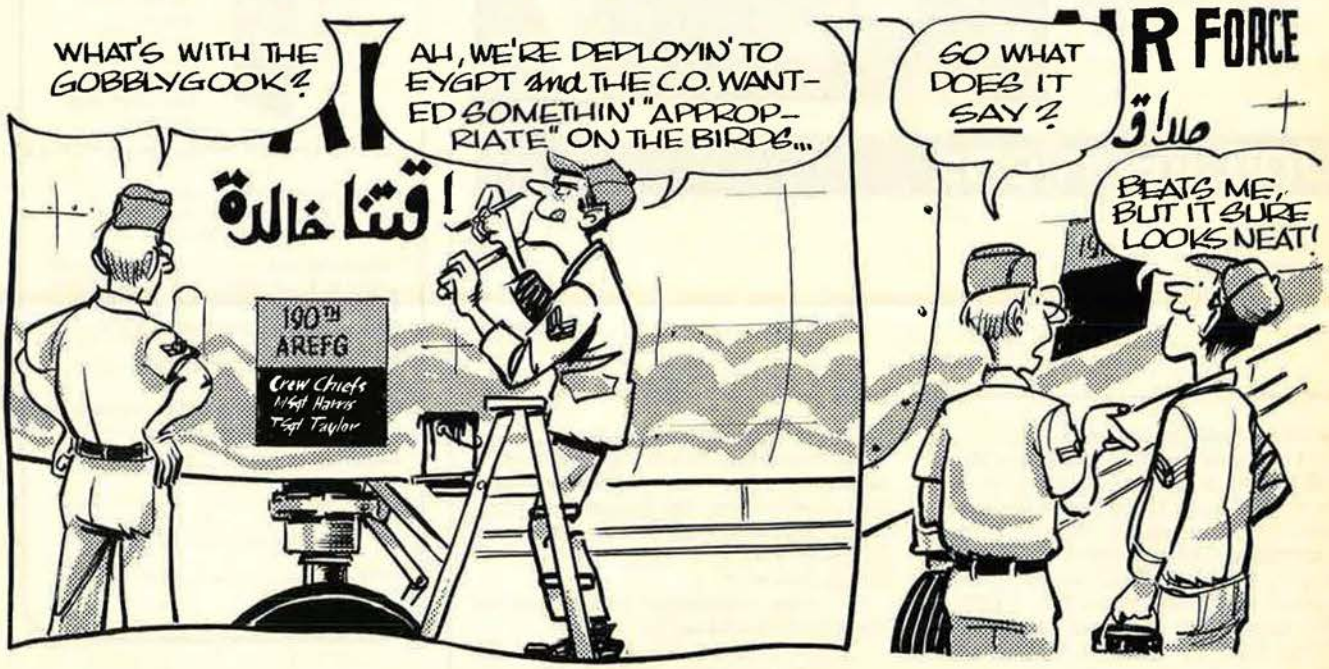

THE KC-135's TAKE ON A GAGGLE OF F-4s FOR REFUELING—

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