


AUGUST 1995/\$3

AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

A photograph of two Air Force pilots in flight suits. The pilot in the foreground, Chuck Ickes, has his arms crossed and is wearing a flight suit with a name tag that reads "CHUCK ICKES" and a squadron patch. The pilot in the background is wearing a flight suit with a name tag that reads "NICK PHILLIPS" and a squadron patch. They are standing in front of a control room display showing a green wireframe grid.

Instant Replay



Dot Hensel, Senior Engineering Specialist, Lockheed Fort Worth Company

"THE LAST TIME AMERICA LAUNCHED A NEW AIR SUPERIORITY FIGHTER WAS 7 PRESIDENTS AGO."

Go-Go boots. Love beads. 8-track tapes. These relics have passed into the history books. Yet, we continue to rely on a 30-year-old fighter design that is basically just equal to current foreign models for our national defense. But the F-22 fighter brings a new era. An era of assured air superiority. Dominion through stealth, supercruise, thrust vectoring and advanced avionics. And technology that will allow an F-22 squadron to be supported, maintained and deployed at 30% less cost than current squadrons. F-22. So America will still rule the skies many Presidents from now.



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About the cover: Maj. Rick Phelps and Lt. Col. Chuck Ickes fly with Florida Air National Guard's 125th Fighter Group, the team to beat at the ACMI range near Jacksonville, Fla. See "Instant Replay," p. 58. Photos by Lans Stout

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By John T. Correll, Editor in Chief

Signs of a Revolution

OVER the years, there have been periodic innovations leading to wholesale changes in the ways that wars were fought. Generally accorded to have been among these developments were the longbow, the cannon, the airplane, and the ballistic missile.

In a few instances, change was immediate. From the moment the atomic bomb was introduced in 1945, all nonnuclear warfare has automatically been regarded as "limited war." Most changes took effect gradually, though. The rifle was in everyday use for more than a hundred years as a sporting arm before it replaced the musket as the standard military shoulder weapon.

The popular term for such a change, a "Revolution in Military Affairs," was invented in 1982 by Marshal N. V. Ogarkov of the Soviet General Staff, who held that the precision and effectiveness of advanced conventional weapons represented a benchmark in the history of warfare. Marshal Ogarkov's term has been borrowed and broadened by Western theorists to describe a basic shift they believe to be under way.

"The Office of Net Assessment and others are investigating the hypothesis that over the next twenty to fifty years, a military revolution will transform the ways wars are fought," Andrew W. Marshall, the Pentagon's director of Net Assessment, told the Senate Armed Services Committee in May.

The change, as he described it, has two dimensions. The first is that "long-range precision strike weapons coupled to very effective sensors and command-and-control systems will come to dominate much of warfare. Rather than closing with an opponent, the major mode will be destroying him at a distance."

The second aspect is the emergence of "information warfare," Mr. Marshall said. "Much as over the last sixty to seventy years one wished to obtain air superiority in order to better conduct all other military operations, in the future, obtaining early superiority in the information area

may become central to doing well in warfare."

"Revolution" is an awkward term for a trend that could take fifty years or more to play out, but it does seem that something is happening that transcends the routine march of technology. For example, the combina-

The theory is that two factors—information technology and precision strike—are bringing about a basic change in the way wars are fought.

tion of precision and information in the Persian Gulf War made it possible for coalition airpower to hit 150 individual targets the first day. By contrast, Eighth Air Force during World War II struck only about fifty target sets in all of 1943. In the not-too-distant future, it may be possible to strike 1,500 targets in the first hour of combat.

Gen. Ronald R. Fogleman, US Air Force Chief of Staff, believes that information operations should be regarded as "the fifth dimension of warfare," extending beyond the previous dimensions of land, sea, air, and space. The change, he says, is driven in considerable part by exploding computational technology. Computers are doubling their operating speed every eighteen months, and there's no end in sight. General Fogleman sees "tremendous potential for breakthrough," particularly in the closely coupled areas of "the ability to exploit and exchange information and the ability to detect, fix, and target objectives on a battlefield."

The US will not have a monopoly on emerging technology. The proliferation of advanced sensors, computers, and highly accurate weapons is unavoidable and has already begun. Much will depend on the relative capability of our own systems to look deep, reach far, penetrate hostile territory, and strike with precision. More often than not, the combat advantage—if we can hold

it—will derive from systems operating in air and space.

At the same time, the threat to national security will most likely break free of traditional boundaries. In its recent report, the Commission on Roles and Missions of the Armed Forces warned that a future adversary adept at information warfare might be able to cripple all of the important financial, transportation, and communications functions of the US without even entering the country. Another haunting vision of the future is captured in the title of a briefing—the specific contents are classified—making the rounds in Washington: "What Two Smart Guys Can Do With a Computer and a Modem."

Nevertheless, the "Revolution in Military Affairs" suffers from a definite credibility problem. The first reason is that the name is misleading. "Revolution" implies a suddenness that isn't there. Change has not come as a bolt out of the blue but rather from the maturation and application of technology that was pioneered years ago. Second, some of the prophets of the Revolution get carried away and exaggerate. No "Revolution in Military Affairs," including this one, sweeps away all that went before or renders previous weapons and forces completely obsolete. Fifty years into the nuclear age, battles still turn on the stealthiness of fighter aircraft, and despite the spread of ballistic missiles, people still get shot with old-fashioned bullets.

On one point, however, nearly everyone agrees. Technology alone does not revolutionize the way wars are fought. It must be adapted, incorporated, and blended with strategy and operational concepts. Good thinking is at least as important as good technology. According to published reports, researchers at Los Alamos National Laboratory predict that, on the basis of current trends in information technology, the weapons of the 2030s will approximate the intelligence of chickens. The trick, it would seem, is to apply technology wisely and stay one jump ahead of the chicken. ■



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Letters

May Issue Miscues

I usually look forward to *Air Force Magazine* every month. I was extremely surprised and dismayed when, on reading my 1995 USAF Almanac, I realized you had left the 617th Air Support Operations Group out of the 17th Air Force structure. You have done a great disservice to the more than 450 men and women who belong to the four squadrons and staff of the 617th ASOG, and I think you owe them an apology. . . .

Our mission is to plan, coordinate, control, and sustain offensive air support operations and weather service for US and Allied air and ground forces. The 617th ASOG maintains constant readiness to deploy elements of a combat-ready offensive theater air control system, including an air support operations center, subordinate tactical air control parties, and weather teams for worldwide employment.

MSgt. Donna M. Coleman,
USAF
Heidelberg, Germany

Regarding "USAF Leaders through the Years, Commanders of Continental Air Command" [*May 1995, p. 59*], Continental Air Command (CONAC) was activated December 1, 1948, and the first commander was Lt. Gen. George E. Stratemeyer, who in April 1949 exchanged command with Lt. Gen. Ennis C. Whitehead, commander of Far East Air Forces.

Second, Lt. Gen. Edward J. Timberlake, Jr., retired in June 1965. His successor was Lt. Gen. Cecil H. Childre. General Childre was promoted to the rank of lieutenant general January 1, 1964, and served in that rank as US representative to the Permanent Military Deputies Group, CENTO, at Ankara, Turkey, before going to CONAC headquarters at Robins AFB, Ga. General Childre died of cancer May 28, 1966, at Andrews AFB, Md. Until that date, he was in command of CONAC.

Third, Lt. Gen. Henry Viccellio, Sr., retired from the Air Force on July 31, 1968. On that date, Continental Air Command (CAC) was deactivated.

General Viccellio was the last of twelve general officers to command CAC since its founding December 1, 1948.

Ralf P. Ehlers
Kiel, Germany

Your May 1995 USAF Almanac continues your excellent tradition of providing readers with a wealth of information in a useful and enjoyable format. I particularly appreciated the revised layout for the presentation of each Majcom.

I have rarely found errors in any of your issues, and when I have, they haven't materially affected the information presented—until now. The listing of enlisted education levels on p. 36 appears to have a built-in error because of the way the information was reported to you.

Every member of the Air Force, Air Force Reserve, and Air National Guard who has graduated from basic training since 1972 has received four semester hours of college credit in physical fitness through the Community College of the Air Force (CCAF). The vast majority of them have also gone on to earn far more credit through technical training and professional military education. Therefore, every member of the Air Force has some college credit, even the 74,051 who are listed under "High school" and "Below high school."

As the recipient of AFA's 1994 Hoyt S. Vandenberg Award for excellence in aerospace education, CCAF is extremely proud of the work it does. Being the world's largest post-second-

Do you have a comment about a current issue? Write to "Letters," *Air Force Magazine*, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be concise, timely, and preferably typed. We cannot acknowledge receipt of letters. We reserve the right to condense letters as necessary. Unsigned letters are not acceptable. Photographs cannot be used or returned.—THE EDITORS

ary institution is an awesome task, and we do our jobs with very high levels of quality. We would appreciate it if you can help us spread the word when you update your listing for next year's Almanac.

We would also appreciate having CCAF listed on p. 117 [*Guide to Air Force Installations Worldwide*] as one of the major organizations at Maxwell AFB, Ala.

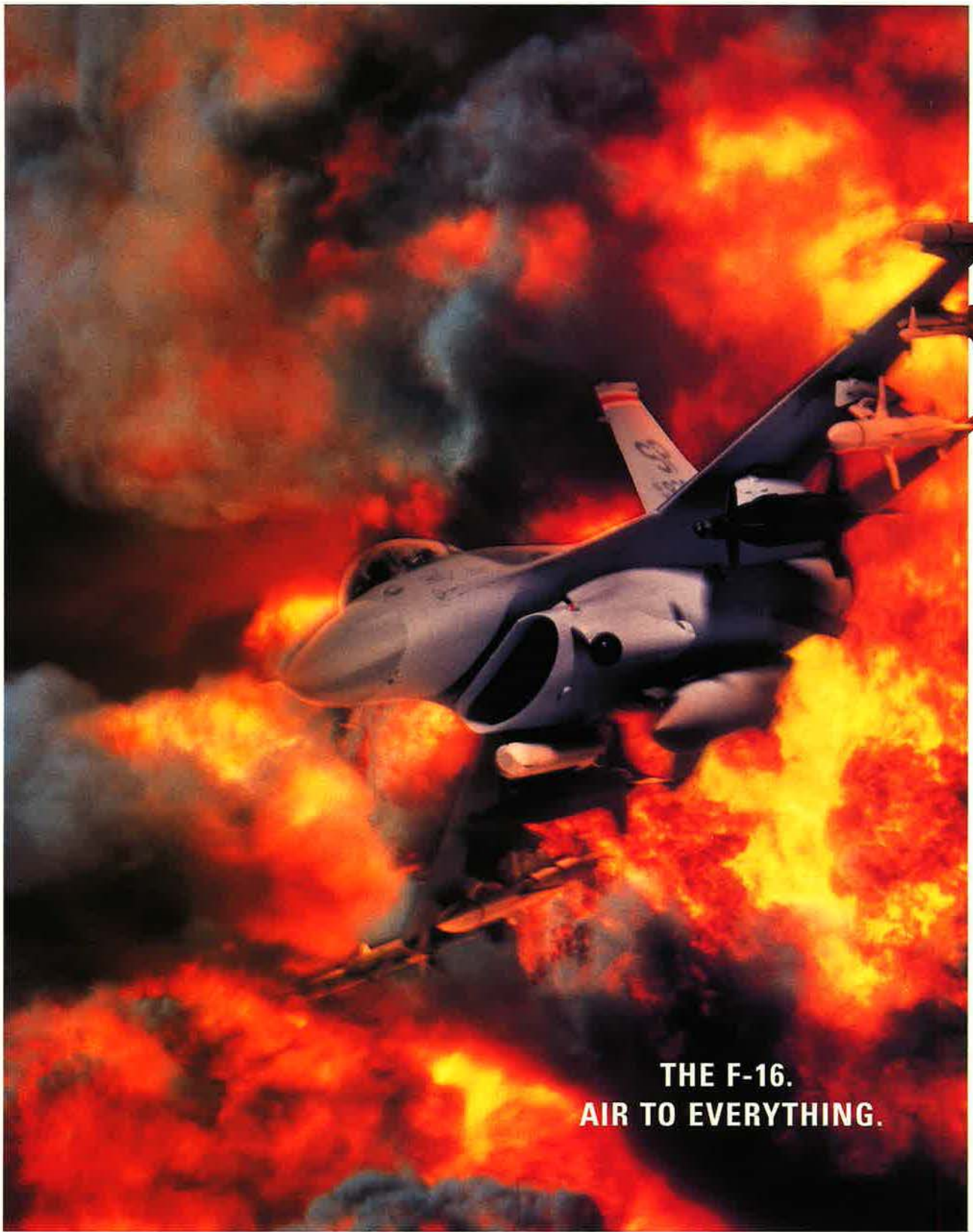
SMSgt. James R. Wirshing, USAF
Superintendent of Affiliations
Community College of the Air Force
Montgomery, Ala.

Did I miss something? I read in the Almanac that you correctly identified the change of the old Air Force Communications Service to Air Force Communications Command, which then became the AFC⁴ [*Field Operating Agencies*, p. 98]. But you list under Personnel, ANG 0. What happened to the thousands of officers and airmen of the combat communications squadrons and the air traffic control units? I believe there are still four combat communications groups, including the 251st CCG, the oldest of them all, located in Springfield, Ohio.

I also checked the entry for the Air National Guard on p. 106 through p. 108 and still could not find anything other than flying units. If the Air Force Association and your magazine wish to be an aircraft-only organization and publication that is your privilege, but if not, I think you owe an apology to some very dedicated people.

Lt. Col. William R. Soeller,
USAF (Ret.)
Springfield, Ohio

I wish to point out several errors in your 1995 USAF Almanac "Gallery of USAF Weapons" [p. 134]. The EC-130E Airborne Battlefield Command and Control Center (ABCCC) squadron ceased to be the 7th ACCS at Keesler AFB, Miss., a geographically separate unit of the 552d ACW at Tinker AFB, Okla., July 20, 1994. On that day, the ABCCC squadron, having moved from Keesler AFB, was redesignated the 42d ACCS and



**THE F-16.
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Letters

proudly stood up as part of the 355th Wing at Davis-Monthan AFB, Ariz. The 41st and 43d ECSs at Davis-Monthan fly the EC-130H Compass Call aircraft, but the 42d ACCS continues to fly the EC-130E ABCCC aircraft. A portion of the ABCCC squadron has indeed been deployed in support of the UN peacekeeping mission in Bosnia since July 1993.

Lt. Col. Charles E. Schmeling,
USAF
Davis-Monthan AFB, Ariz.

The Senior Executive Service (SES) pay chart on p. 42 of the 1995 USAF Almanac is incorrect. The note accompanying the chart is also wrong—the SES pay scale has *not* been revised to change the number of levels from six to five.

The pay scale in the Almanac under the heading "Senior Executive Service" is the pay scale for the Executive Schedule rather than the SES. . . . The correct SES pay rates are: ES-1, \$92,900; ES-2, \$97,400; ES-3, \$101,800; ES-4 \$107,300; ES-5, \$111,800; and ES-6, \$115,700.

Karen L. Bingo
Chief, Air Force Senior
Executive Matters Office
Washington, D. C.

I was very pleased to find our USAF Bandsmen of the Year highlighted in May's "Aerospace World" [*News Notes*, p. 32]. I must, however, clear up one inaccuracy. Both the ACC Heritage of America Band (at Langley AFB, Va.) and the ACC Heartland of America Band (at Offutt AFB, Neb.) are direct reporting units to Headquarters ACC.

We in the Heartland of America Band are very proud of the outstanding relationship we enjoy with the 55th Wing here at Offutt, but we aren't part of the 55th Wing. Therefore, Sgt. Katherine Nordeen, the USAF NCO Bandsman of the Year, should have been identified as a member of the ACC Heartland of America Band at Offutt AFB.

SMSGt. David W. Rogers,
USAF
Offutt AFB, Neb.

Congratulations on a fine 1995 USAF Almanac. I do, however, hope that next year the C-17 gets a wingspan measured like every other airplane rather than a "span between winglet tips" [*Gallery of USAF Weapons*, p. 142]. Ever since McDonnell Douglas angled the winglets out 15° to improve aerodynamic performance, there has been confusion over the C-

17's span. For years, the change in span because of the new winglet configuration was concealed or ignored, and the span continued to be reported as 165 feet.

By the way, when the wings contain fuel, the span increases because of wing droop. The C-17 appears to be maturing into a fine transport. It's time to start treating it like other airplanes in such simple matters as physical dimensions. The C-21's tip-tanks are included in its span as are the C-20 Gulfstream IV's winglets.

Col. Michael R. Gallagher,
USAF (Ret.)
Sacramento, Calif.

As an avid reader of your magazine, I have never had the occasion to question the accuracy of your articles or your published data.

Now I have a problem.

I am familiar with the experience of Col. Bill Edens, USAF (Ret.). His exploits are noteworthy and would constitute an interesting article for *Air Force Magazine*. However, when I looked for his name among the lists of aces of World War II and the Korean War on p. 65 and p. 66 of the May 1995 issue, I was unable to find it [*"Air Force Magazine's Guide to Aces," p. 64.*]

Is it possible that Colonel Edens's record as an ace at the age of twenty-one has been inadvertently overlooked and therefore not included in the lists of aces?

He certainly deserves to be appropriately recognized.

Lt. Col. Edson G. Hammer,
USAF (Ret.)
Chattanooga, Tenn.

■ *Readers Ehlers, Schmeling, Bingo, Rogers, and Gallagher are correct. In addition to these errors, the location of ANG's 125th Fighter Group was misstated on p. 107 ["The Air National Guard by Major Command Assignment"]. The group is located at Jacksonville IAP, Fla. [See "Instant Replay," p. 58.] Also, the correct spelling of 1993's Gunsmoke winner [p. 132] is Dwayne Stich. The omission protested by Sergeant Coleman was by no means intentional. The "levels of education" issues raised by Sergeant Wirshing are open to debate and may yet be resolved in the way he suggests. The 251st Combat Communications Group cited by Colonel Soeller reports to the Ohio governor in peacetime and to ACC's 8th Air Force during wartime. It has no connection with AFC⁴ at Scott AFB, Ill. Colonel Edens was an ace*

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with seven victories during World War II. Unfortunately, lack of space limits us to listing only those World War II aces with 14.5 or more victories.—

THE EDITORS

Salute Smartly

The kindest thing I can say about Maj. Henry A. Barkalow, USAF (Ret.) [*"Cannibal Controversy Continues," February 1995 "Letters," p. 9*], is, "Thank God he is no longer on the active rolls." Paramount to the success of this nation, our political system, and the finest armed forces in the world is the subordination of the military to civilian leadership elected by the people. I can remain silent no longer, listening to the disloyal harangue of a few vocal military personnel, both active-duty and retired.

If I remember my history correctly, Mr. Clinton was elected by the American people to be our President and Commander in Chief. It is now our duty and privilege to salute smartly and serve the Constitution and the President both proudly and honorably. If Major Barkalow and others of his ilk wish to continue their tirade, then please do so as private citizens and not while clad in the uniform you dishonor with such commentary.

Lt. Col. Mark Chapman,
USAF
Quarry Heights, Panama

The Correct Premise

In the March 1995 issue, you published "An Absurd Premise" [*"Letters," p. 4*]. In that letter, several ill-conceived assumptions were postulated that I wish to address. The basic assumption presented was that the Air Force must reject the plan to fight two simultaneous cold-start major regional conflicts (MRCs). One of the reasons presented for this assumption is that all the factors that led to our success in Operation Desert Storm will not exist in the future.

The writer, Maj. Charles Ringo, AFRES, fails to recognize that decades of planning and preparation gave the US the capability to dictate the course of the conflict. The "favorable factors" that he refers to were favorable to the US not because of the luck of the draw but because years of planning, preparation, training, and lessons learned allowed us to capitalize on our opponent's mistakes and maximize our effectiveness.

Major Ringo's second premise, that USAF should not spend its resources on large-scale (read "expensive") acquisition projects, is also faulty. He fails to recognize that the expenditures on cruise missile development and stealth aircraft technology (ex-

pensive projects to be sure) gave the US the ability to deliver a devastating initial attack that Iraq never recovered from during the course of the conflict. As Army Gen. Colin Powell stated during Desert Storm, the US "would bring all the tools in its toolbox." Those tools, although expensive, were pennies on the dollar compared to the potential cost in US and allied lives.

The last premise presented is that money spent on preparing for a two-MRC scenario would be better spent on improving education, combating social violence, or reducing the national debt. Although these are important issues, again the writer fails to recognize that potential enemies don't care about our internal problems. Our enemies would welcome a reduction in our warfighting preparedness. The less prepared we are to fight a two-MRC scenario, the more they are likely to take advantage of that fact.

The only comment by Major Ringo that does make sense is, "The world remains dangerous and uncertain." That is why we must remain prepared and certain of our requirement to pro-

tect US interests or project US military power anywhere and in the worst-case two-theater scenario if need be.

Lt. Col. Julian L. Whitley,
AFRES
Enumclaw, Wash.

Disgraceful Micromanagement

Congressional micromanagement is a disgrace [*"Capitol Hill: Dicks Proposes a Trade-Off," May 1995, p. 12*]. Few in Congress are trained military strategists, and not one of them should engage in telling the Department of Defense how to defend this nation. Congress should state the objectives and allocate the funding for DoD and not try to micromanage DoD's operations or acquisitions. It is one of our biggest wastes. . . .

It is just such micromanagement that forces the various departments to spend money they don't need to—and it's money from my pocket. Micromanagement is counterproductive.

Just give the objective and minimum constraints to the departments and let their experts decide what programs best support the objective.

Air Force Association Comparative Statement of Revenues and Expenses

General Fund	Year ended	
	Dec. 31, 1994	Dec. 31, 1993
Revenue		
Aerospace development briefings	\$ 1,058,347	\$ 1,014,672
Building operations	738,426	645,437
Convention	313,642	318,721
Data processing services	0	6,772
Industrial Associates	142,450	143,200
Insurance programs	4,848,460	4,460,521
Investment	196,100	250,363
Magazine	1,487,447	1,434,940
Membership	3,379,513	3,421,980
Patrons	209,348	233,151
Other	616,795	765,446
Total revenue	\$12,990,528	\$12,695,203
Expenses¹		
Aerospace development briefings	\$ 522,915	\$ 420,683
Building operations	582,988	755,146
Convention	757,392	793,887
Data processing services	0	38,338
Industrial Associates	141,367	126,073
Insurance programs	4,176,679	4,277,739
Magazine	1,445,735	1,461,637
Membership	3,676,661	3,618,865
Patrons	234,531	243,862
Total expenses	\$11,538,268	\$11,736,230
Excess (deficit) of revenue over expenses	\$ 1,452,260	\$ 958,973
Life Membership Fund		
Revenue from investments	\$ 544,643	\$ 704,396
Less: transfer to General Fund for annual dues and other costs	807,523	790,702
Net income (loss), Life Membership Fund	\$ (262,880)	\$ (86,306)

Treasurer's note: The figures presented herein have been extracted from audited financial statements submitted previously to the Board of Directors of the Air Force Association.

¹ Expenses include chapter commissions, state commissions, and other direct support for field units totaling \$483,054 in 1994 and \$502,652 in 1993.

Letters

Thanks for calling the micromanagement by Rep. Norm Dicks (D-Wash.) to our attention.

Maj. Gene Simmons,
USAF (Ret.)
Fort Walton Beach, Fla.

Reaching 3,000 Hours

Having corresponded for several years with a young fighter pilot in the Belgian Air Force who flies the F-16, I forwarded to him a recent "Aerospace World" photo of Maj. Mark Miller, who became "the first active-duty flyer to reach 3,000 hours in an F-16" [March 1995, p. 14]. I received the following comments in return:

"The first pilot to reach 3,000 active-duty hours in the F-16 was a Belgian pilot, Capt. Jean-Marie Tous-saint. He retired about two years ago but reached a little over 3,000 hours in F-16s before that. He was one of the first pilots in the world to fly the F-16 and was the very first Belgian pilot to fly the F-16 back in 1979." . . .

Harris W. Clark
Las Vegas, Nev.

Forgotten Tankers

After reading "Watch on the Gulf" [April 1995, p. 60], I wonder how all your contributing writers keep forgetting the KC-135 and KC-10 tankers. It seems to me that the last time I was on temporary duty at Riyadh AB, Saudi Arabia, tankers assigned to the provisional air refueling squadron were sitting on the ramp just down from the RC-135 and AWACS

aircraft. How did author Michael Dunn not see them? I would like to know how far and long the fighter and other aircraft could go without tanker support. It seems like the tankers and their flight and ground crews always get left out.

MSgt. John P. Beringer,
USAF
Birmingham, Ala.

Measuring Safety

Under "News Notes," p. 17, in the March 1995 "Aerospace World" you noted that "1994 was [DoD's] safest year in recent memory" for aviation, citing the decline in aviation fatalities from 119 in 1993 to sixty-eight in 1994. I hope the figure includes the twenty-three paratroopers killed in the F-16 crash at Pope AFB, N. C., and the victims of the friendly fire incident over Iraq. The 100 paratroopers injured during the Pope AFB crash, many of whom are permanently disabled, certainly should have been included in the safety figures.

In terms of aircraft losses and fatalities, 1994 may have been the safest in memory. Measured in aircraft losses, fatalities, injuries, and life-times of suffering, it may well have been one of the worst. We need to do better.

Richard H. Naigle
Fayetteville, N. C.

Back to Albania

I noticed a minor mistake in "Re-serve Supplies Orphanages" [March

1995 "Aerospace World," p. 11]. When an Air Force Reserve C-130 flew into Albania with relief supplies in December 1994, it was not "the first American humanitarian aircraft to fly into Albania."

In July 1991, a 436th Military Airlift Wing C-5 transported 170 tons of food from Dhahran AB, Saudi Arabia, to NAS Sigonella, Italy. From there, a 438th Military Airlift Wing C-141 StarLifter shuttled the food to Tirana, capital of Albania, on ten flights in July and August 1991. Crews from the 18th, 30th, and 702d Military Airlift Squadrons of the 438th and 514th Military Airlift Wings rotated on the StarLifter shuttle missions, which were dubbed the "Albanian Express."

Mother Teresa, the Nobel laureate who normally worked among the sick and destitute of Calcutta, India, greeted and thanked one of the crews. She had returned to her native Albania in its time of need. The airlift allowed Americans into Albania for the first time since 1946 and encouraged the opening of the country to the West. . . .

I appreciate your article because it shows an Air Force mission sometimes ignored or considered new. USAF has flown more than 560 humanitarian airlift operations since its founding in September 1947.

Daniel L. Haulman
Air Force Historical Research
Agency
Maxwell AFB, Ala.

Air Force Association Balance Sheet

	December 31, 1994			December 31, 1993		
	General Fund	Life Membership Fund	Total	General Fund	Life Membership Fund	Total
Assets						
Current assets						
Cash plus marketable securities at lower of cost or market	\$ 2,673,627	\$9,304,494	\$11,978,121	\$ 2,841,672	\$9,199,272	\$12,040,944
Receivables, prepaid expenses, etc.	2,605,622	399,652	3,005,274	736,157	358,149	1,094,306
Fixed assets (land, building, etc.)	11,482,974		11,482,974	11,899,107		11,899,107
Funds on deposit and other assets	7,402,420		7,402,420	7,190,320		7,190,320
Total assets	\$24,164,643	\$9,704,146	\$33,868,789	\$22,667,256	\$9,557,421	\$32,224,677
Liabilities and fund balances						
Current liabilities (including payables, accrued expenses, etc.)	\$ 3,014,928		\$ 3,014,928	\$ 2,678,072		\$ 2,678,072
Deferred revenue (including advance membership dues and magazine subscriptions)	1,136,296		1,136,296	1,018,023		1,018,023
Long-term debt	4,795,000		4,795,000	5,205,000		5,205,000
Fund balance						
Unrestricted	13,495,861		13,495,861	12,074,251		12,074,251
Designated	1,722,558		1,722,558	1,691,910		1,691,910
Restricted		\$9,704,146	9,704,146		\$9,557,421	9,557,421
Total liabilities and fund balances	\$24,164,643	\$9,704,146	\$33,868,789	\$22,667,256	\$9,557,421	\$32,224,677

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The Chart Page

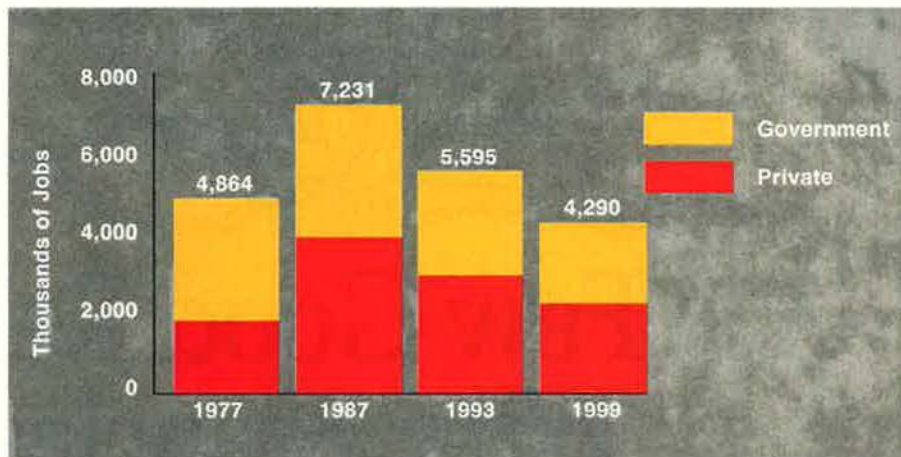
By Tamar A. Mehuron, Associate Editor

Defense Jobs in a Free-Fall

From 1977 through 1987, concerns about US military strength sparked and then sustained major increases in defense spending, which by 1987 accounted for 6.4 percent of the nation's Gross Domestic Product (GDP). Defense-related employment rose during that decade and by 1987 accounted for 7.2 million jobs, or 6.2 percent of total US employment.

The federal deficit and the end of the Cold War caused a steep drop in defense spending and employment. Between 1987 and 1993, the level of DoD spending fell by \$48.4 billion, dropping from 6.4 percent to 4.7 percent of GDP. Defense employment dropped by 1.6 million. About forty percent of these lost jobs, or 631,000, were in government—either among civilian Pentagon workers or in the uniformed armed services. The remaining losses were in the private sector.

The Labor Department predicts that by 1999, defense-related employment will fall to 4.3 million jobs, approximately 574,000 fewer than a 1977 low of 4,864,000 (Figure 1). Figure 2 shows the trend of employment by sector and industry.

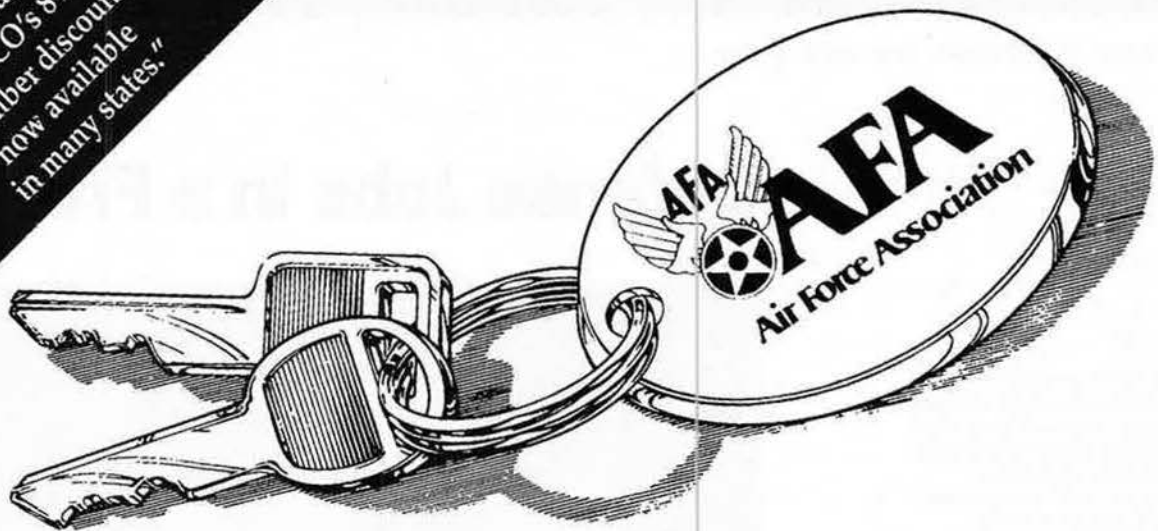


Employment by Sector and Industry
(in thousands)

	1977	1987	1993	1999
Total defense-related	4,863.7	7,231.4	5,595.3	4,289.8
Agriculture, mining, and construction	147.3	243.9	176.5	136.0
Manufacturing	1,088.0	1,857.4	1,206.5	899.0
Aircraft	123.9	192.5	111.9	78.6
Ship-building and repair	82.9	101.7	82.3	55.3
Guided missiles and space vehicles	44.2	116.6	76.3	53.7
Aircraft and missile parts	34.7	98.2	82.4	64.4
Aircraft and missile engines	64.4	108.7	64.6	47.5
Search and navigation equipment	71.0	119.2	59.1	43.3
Communications equipment	37.8	67.3	42.2	31.1
Miscellaneous electronic components	38.7	83.2	47.8	36.8
Ammunition and ordnance	18.6	37.8	27.0	18.2
Transportation, Communications, Public Utilities	159.8	273.4	200.9	156.5
Trucking and warehousing	65.3	112.0	82.0	64.4
Other Service-Producing	424.0	1,504.6	1,306.7	1,046.7
Wholesale trade	115.2	223.2	162.7	124.1
Personnel supply services	9.3	157.6	163.2	129.0
Services to buildings	21.4	92.4	89.7	63.7
Eating and drinking establishments	47.4	124.7	88.0	63.6
Retail trade	41.3	148.9	124.2	107.7
Research and testing services	0.0	159.5	155.3	139.3
Management and public relations	0.0	78.3	83.6	69.3
Hotels and other lodging places	42.4	71.2	59.1	45.0
Accounting and auditing services	13.8	42.7	37.7	29.2
Government	3,044.6	3,352.1	2,704.7	2,051.6
Uniformed armed forces	2,074.0	2,243.0	1,776.0	1,338.0
Civilian defense	938.0	1,049.0	885.0	679.0
Civilian nondefense	20.1	38.5	27.2	21.2
State and local	12.5	21.6	16.5	13.4

Source: US Department of Labor, Bureau of Labor Statistics, "Issues in Labor Statistics," May 1995.

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By Brian Green, Congressional Editor

The Defense Budget Gets a Boost

Congress plans to add billions to the Administration's request, and some see the need for future increases.

MIDWAY through the legislative year, the House and Senate had moved to increase the Clinton Administration's Fiscal 1996 defense spending request significantly. The Republican-led Congress concluded that the defense increase was necessary even though it was generally clamping down on federal spending to help reduce the deficit.

The House's final defense authorization bill, crafted by its National Security Committee (HNSC) and passed June 15, approved a total of \$267.3 billion in new budget authority. On June 30, the Senate Armed Services Committee (SASC) reported a \$264.7 billion bill, which the Senate planned to consider later in the summer.

With these actions, both chambers signaled dissatisfaction with the Administration's defense request of \$257.6 billion, made public last February. The House bill raised it by nearly \$10 billion; the SASC added more than \$7 billion.

In a separate action, House and Senate leaders shook hands over a compromise Fiscal 1996 budget resolution. It approved the addition of billions of dollars to the Clinton Administration's long-term defense spending blueprint, though not enough for House defense leaders, who had sought approval for larger increases.

Rep. Floyd D. Spence (R-S. C.), HNSC chairman, warned that this reduction in House-approved spending plans "will greatly complicate our ability . . . to revitalize the nation's defense posture." The SASC reported that it "remains concerned about the funding levels in future years of the budget resolution. . . . The progress reflected in this [SASC] bill cannot be maintained unless future funding can be increased."

Bombers

The House bill approved \$553 million for the acquisition of long-lead

items needed for construction of B-2 bombers beyond the twenty now authorized. The SASC, however, declined to add any B-2 funding. The HNSC specifically rejected the "swing" strategy, in which bombers would be shifted from one conflict to a second even while the first continued. That strategy, it said, "is dictated by the current inadequate bomber force structure." The House committee also said that it was "disturbed that the B-2 bomber industrial base is rapidly approaching final shutdown."

An amendment to delete the additional funds, sponsored by House Budget Committee Chairman Rep. John R. Kasich (R-Ohio), was defeated by a vote of 219-203.

The House measure would also add funding for B-1 maintenance upgrades intended to improve the B-1 fleet's mission capable rate to the seventy-five percent goal.

Airlift and Fighters

The Senate panel and the full House approved the request of \$2.6 billion for eight C-17s and other strategic airlift. The House added \$70 million to prior-year funds to acquire one Nondevelopmental Airlift Aircraft, should DoD pursue that option.

Both bills fully funded USAF's \$2.1 billion request for continued research and development of the F-22 fighter.

In addition, the House bill approved procurement of six F-15E and six F-16 fighters, for \$250 million and \$175 million, respectively. The House said the aircraft were needed to sustain a force structure of twenty fighter wing equivalents and address industrial base concerns. The SASC declined to authorize any funding for these aircraft.

Personnel and Quality of Life

Pay and Allowances. Both the SASC and the House approved the 2.4 percent pay raise proposed by the Administration. They also approved a 5.2 percent increase in basic allowance for quarters, 1.8 percent higher than the request. Service members now absorb twenty-two percent of their off-base housing

costs out of pocket, well above the fifteen percent goal set by Congress.

Housing. The HNSC described the current state of military housing as "deplorable." The House bill added \$425 million to \$1.56 billion to the request for construction and improvements to military housing, while the SASC bill added \$275 million. Both measures sought to improve the situation by promoting private financing and development of military housing.

Acquisition and Staff Reforms

Both bills aimed to streamline acquisition. The House bill would require a twenty-five percent reduction in "excessive acquisition work force" within four years and a reduction of 30,000 in Fiscal 1996. It would also require "maximum practicable" competition, simplified "other than competitive procedures," and simplified procedures to buy commercial items and would establish a single board to adjudicate contract disputes and bid protests.

The House bill would also reduce the staff of the Secretary of Defense by twenty-five percent.

"Nondefense" Accounts

The House authorization bill would cut about \$2 billion from accounts the HNSC describes as "nondefense." About \$1 billion would come from environmental programs, which the committee criticized for spending too much on studies and regulation. Another \$500 million would be taken out of the Technology Reinvestment Program (TRP). The HNSC directs DoD "to refocus its increasingly politicized and commercially oriented dual-use programs back to traditional military purposes." The SASC would chop the TRP by \$262 million.

Veterans

The compromise budget resolution included cuts based on a \$1.03 billion reduction in hospital construction and \$6.4 billion in savings in mandatory spending achieved by increasing prescription drug copayments, limiting some veterans' compensation payments, and other measures. The savings are spread over seven years. ■

Mothballed Manufacturing

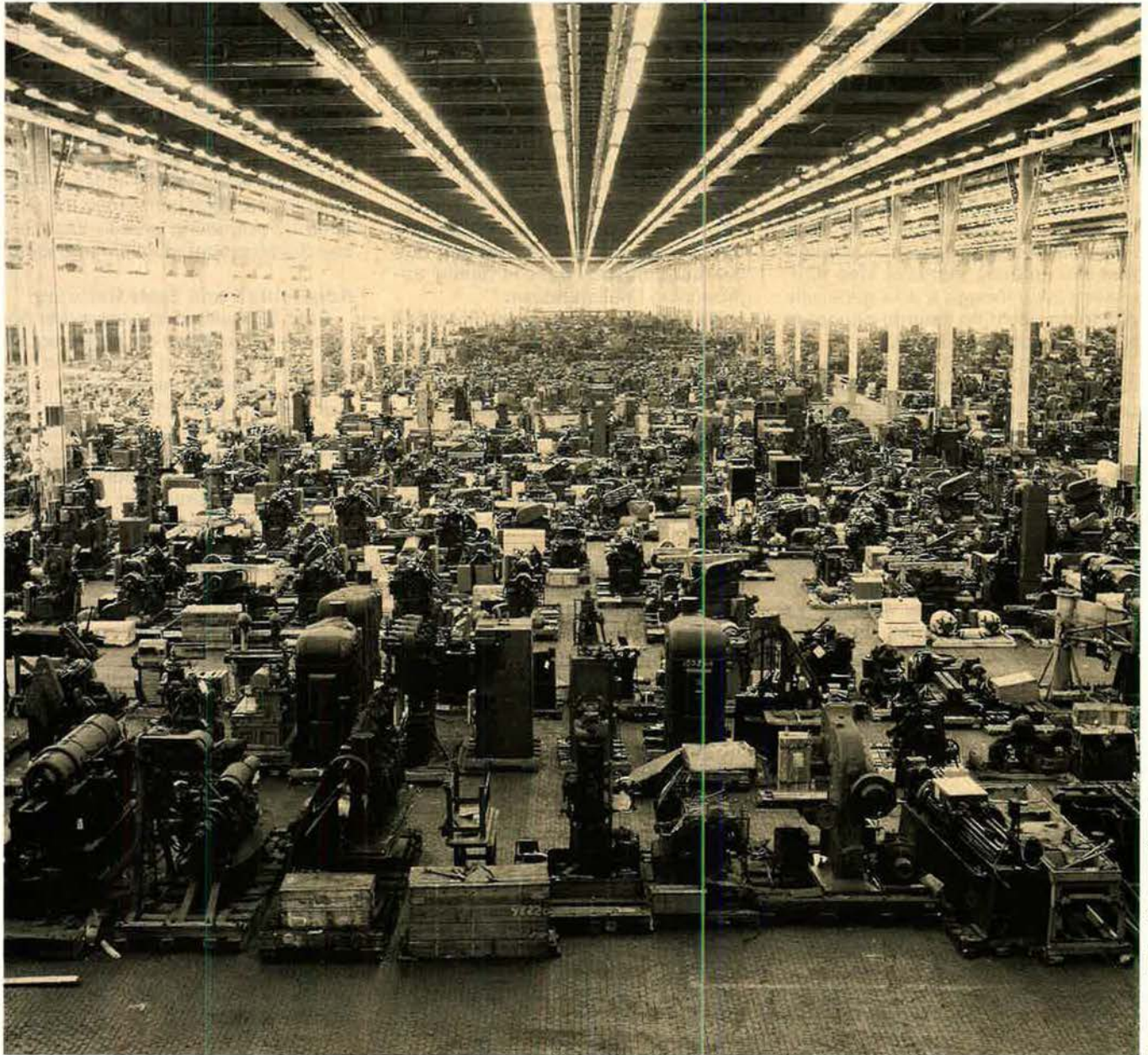


Photo courtesy Lockheed Martin via Jeffrey P. Rhodes

When World War II ended abruptly fifty years ago, excess industrial capacity and expanded inventories were transformed from assets to headaches almost overnight. Boeing Plant 6 at Marietta, Ga., where B-29s were assembled during the war, sat idle, a graveyard for machine tools until it was resurrected in 1951 to refurbish Superfortresses for their

return to duty in the Korean War. The B-29s had been in desert storage at Pyote AFB, Tex. Today the plant is used by Lockheed Martin for production of the C-130 Hercules and P-3 Orion. It is slated to be the F-22 plant.

Washington Watch

By John T. Correll, Editor in Chief

Surprise Package on Roles and Missions

The White Commission says that the traditional inter-service disputes are “non-issues.” It calls for more emphasis on joint operations and for “privatization” of support functions.



IN THE beginning anyway, the Commission on Roles and Missions of the Armed Forces had been expected to call for a major shake-up of the military services. The commission was the

creation of Congress, which had not been satisfied with the roles and missions review that was completed in 1993 by Gen. Colin Powell, who was then Chairman of the Joint Chiefs of Staff.

The Powell review prescribed no significant changes to the division of functions among the services. That did not set well with members of Congress who had hoped to save large amounts of money by military consolidations and realignments. A private commission was therefore established by a provision in the annual defense bill and ordered to reexamine the situation. Dr. John P. White of Harvard University was named to head this commission, which began slogging through the problem in the spring of 1994.

Leaks that dribbled out periodically over the next year from closed-door working group meetings were puzzling, however. They indicated that the commission was not reaching the conclusions that had been anticipated. And indeed, when the commission published its final report on May 24, it differed from the original expectations in nearly all respects.

It said that radical restructuring of operational functions is not needed and that traditional sore points in the dispute—the clash between Air Force and Navy airpower, for example, and arguments about the Marine Corps as a second land army—are “nonissues.”

Having determined that “popular perceptions of large-scale duplication among the services are wrong,” the commission declined to produce “a series of ‘put and take’ statements that rearrange US forces from one service to another.” It found that battlefield capabilities are more complementary than redundant and said that the “conventional criticism of the services—unrestrained parochialism and duplication of programs—is overstated.”

The real question, the commissioners said, “is no longer ‘who does what’ but how do we ensure that the right set of capabilities is identified, developed, and fielded to meet the needs of unified commanders.” The report says that joint effectiveness should be emphasized even more than it is already because “military operations are planned and conducted by joint forces under the direction of the CINCs [commanders in chief], not by the military services, defense agencies, or Pentagon staffs.”

The chairman of the panel, Dr. White, finds himself in extraordinary circumstances. In the closing days of the commission’s study, he was chosen to be deputy secretary of defense. One of the early duties in his new job, therefore, will be to deal with the roles and missions proposals he made in his previous position. In response to a question from the Senate Armed Services Committee during the confirmation hearings, Dr. White said he did not intend to recuse himself from Pentagon deliberations on commission proposals.

“Privatization” and “Outsourcing”

The commissioners stirred up a hornet’s nest with their call for “privatization” of depots and other support functions and for “outsourcing” to the private sector of work ranging from data processing and base maintenance to health services and classroom training. “More than a quarter of a million DoD employees engage in commercial-type activities that could be performed by competitively selected private companies,” the commission’s report said. “Experience suggests achievable cost reductions of about

twenty percent.” This proposal drew fire instantly as a threat to a quarter of a million jobs at military depots and elsewhere.

The alarm has not been moderated appreciably by acknowledgment from the commission that extended transition programs would be required or by the identification of such concepts as “privatization-in-place,” in which the work would be done in the same facility as now but under private ownership “or possibly some form of employee ownership.”

The report speculates that more than \$3 billion a year could be saved by contracting out the “commercial activities” that the services now do themselves. “We recommend that the government in general, and the Department of Defense in particular, return to the basic principle that the government should not compete with its citizens,” the report says. “To this end, essentially all DoD ‘commercial activities’ should be outsourced, and all new needs should be channeled to the private sector from the beginning.”

The biggest target of this language would be the depot-level logistics support of weapon systems. Even after the 1995 round of base closure actions is implemented, the commission notes, the services will operate some twenty depots and shipyards, performing seventy percent of the industrial maintenance, remanufacturing, and modification of US military equipment.

The commission’s recommendation is to “establish a time-phased plan to privatize essentially all existing depot-level maintenance,” but both the Pentagon and Congress will approach that idea warily because of the political implications of the bases, jobs, and contracts involved.

“Core Competencies”

The commissioners were not oblivious to the fierce interservice arguments that have been raging all around them for the past year. In their estimation, though, these were not basic roles and missions problems but rather requirements and resource issues to be resolved by the Secretary of Defense and the Joint Chiefs of Staff.

The closest the commission came to a statement of "who does what" was to recognize examples of "core competencies" that "define the service's or agencies' essential contributions."

These are:

- Air Force: air superiority; global strike/deep attack; air mobility.

- Army: mobile armored warfare; airborne operations; and light infantry operations.

- Navy: carrier-based air and amphibious power projection; seabased air and missile defense; antisubmarine warfare.

- Marine Corps: amphibious operations; over-the-beach forced-entry operations; maritime prepositioning.

- Coast Guard: humanitarian operations; maritime defense; safety; law enforcement; environmental protection.

In a vindication of sorts for the Air Force, the commission said that "overseas presence is a core competency of all the services." The Navy had made a strong claim that the aircraft carrier was the instrument of US presence abroad. In fact, part of the justification for the proposed carrier force depends on that proposition. The Air Force had argued that presence was a function shared by all of the services and that in some instances, it was best achieved by the deployment of long-range aircraft to the scene of crisis or need.

When the commission dug into a contentious issue, the underlying problems they typically found were not about roles and missions. Deep attack, for example, is performed in a variety of ways—all deemed useful—by each of the services. "No CINC that we talked to proposed eliminating any of these capabilities and it is almost inconceivable that one ever would," the report said. The *balance* of these capabilities does need attention, though, and "currently no one in DoD has specific responsibility for specifying the overall number and mix of deep attack systems."

Likewise, the commission said, there are questions about "whether the current mix of combat aircraft is the right one. That is, do we have the right mix of aircraft in terms of stealth, range, basing (land- and seabased), air-to-air and air-to-ground, and all-weather capabilities?"

The commission declined to designate close air support as a core capability of any service alone, noting that combat aircraft are multipurpose weapons, performing close air support of ground forces as well as other missions, and that "no clear savings would result from removing the CAS func-

tion from one or more of the services unless inventories of multimission aircraft were reduced."

Besides, the commission said, it is not in the nation's interest to eliminate every last vestige of duplication. In fact, "it is necessary to place a high value on broad service competition. To some, this is a counterintuitive finding. But competition among the services produces innovation in weapon systems, forces, doctrine, and concepts of operations that yield the dramatically superior military capabilities that we need."

Aerospace Issues

Whether it is regarded as an issue or a "nonissue," airpower is always high on the agenda when roles and missions are discussed. The White Commission repeated the conclusion of the Powell review in 1993 that "America has only one Air Force" but that "the other services have aviation arms essential to their specific roles and functions."

Inefficiencies in military aviation "are found mostly in the infrastructure, not on the battlefield." Both to save money and to encourage cooperation, the commission proposes that all of the services station their program managers responsible for the development of aircraft in the same location. The collocated program managers would retain the regular ties to their own services, but draw their technical and procurement support from a common pool of experts in engineering, contracting, cost estimating, and other disciplines. An added benefit of having the same set of experts supporting the aircraft programs of all services would be the "increased interoperability and lower support costs among the services through increased commonality in the many subsystems that require parts and service in the field."

Three other commission recommendations would broaden the Air Force's functional charter:

- The Air Force provides most of the people and most of the money for the military space program, but its bid for the space mission outright ran into bitter opposition from the Army and the Navy. The commission would add to USAF's *de facto* leadership by assigning it "primary (not sole) responsibility for acquisition and operation of multiuser spacebased systems." This would appear to give the Air Force the job of launching even more of the military space shots than it does now, as well as making USAF responsible for operating some systems previously controlled by the National Reconnaissance

Office on behalf of the intelligence community.

- Based on consideration of core capabilities, DoD should "expand the Air Force's executive agent responsibilities for escape and evasion to include responsibility for combat search and rescue."

- Like the Powell review in 1993, the White Commission sought to reduce the size of the "operational support" fleets—currently 551 aircraft used for "day-to-day support and executive travel"—and consolidate support for those that remain. The proposal is to transfer all of these aircraft, except for the Navy's C-9s, to the Air Force for management by US Transportation Command. (Aircraft of the 89th Airlift Wing, which supports Congress and the White House, would not be affected by this action.)

The B-2 Stutter Step

In one of the few instances when the commissioners expressed an opinion of a specific programmatic issue, they endorsed the position of top DoD officials that the B-2 bomber program should remain capped at twenty aircraft. The report said that "production of additional B-2s would be less cost-effective than buying additional precision weapons for existing bombers and other strike aircraft, or otherwise improving the conventional warfighting capabilities of existing bombers." The commission did advise, however, that a final decision on the bomber force wait until the industrial base considerations have been evaluated more fully.

According to the report, the commission staff reviewed more than twenty studies about bombers, and the panel made its judgment "from these studies, briefings, and our own assessments." The commissioners were said to be unanimous in this view, but a curiosity is that the staff review—a thirty-five-page paper entitled "Future Bomber Force," obtained and circulated by members of Congress—points toward a different conclusion.

"The studies generally conclude that bombers, and the B-2 in particular, are cost-effective, and in some cases the only, means of rapidly projecting survivable power," the staff paper said. "Most of the bomber studies reviewed conclude that more than twenty B-2s would be useful in a two-MRC [major regional conflict] strategy, and several recommend more B-2s." While the staff paper did not urge the commissioners to adopt any specific position, it did say that "stopping production of the B-2 limits America's future ability to project influence around the world."

Toward a Central Vision

To the White Commission, joint operations and concepts are the central considerations around which all else must revolve. It stated, "Today, it is clear that the emphasis must be on molding DoD into a cohesive set of institutions that work toward a common purpose—effective unified military operations—with the efforts of all organizations, processes, and systems focused on that goal from the beginning."

In the commission's assessment, "the services are individually superb," but "they do not work well enough together." There is a pressing need for a clear "central vision." Otherwise, each of the services will develop a perspective in which its own operation constitutes the main effort that the other services ought to support.

Each of the services has developed a statement of how it views its own role. The first of these was the Air Force's "Global Reach, Global Power." The Navy's vision statement is "Forward . . . From the Sea," and the Army's is "Force XXI." The commission said that these are "valuable statements" and that they "help form a joint vision, but collectively they cannot replace it." Without a strong central concept in force, "the services can only work to develop the capabilities they need to fulfill their own particular visions."

In the commission's concept of the future, there will be a strong emphasis on joint training and joint doctrine, and theater commanders in chief will have "greater influence over the processes and priorities used to acquire the weapons, equipment, and forces they need to accomplish their warfighting and other missions."

The report also recommends the creation of a new functional unified command without geographic responsibility to concentrate on the training, integration, and joint readiness of all general purpose forces, including Guard and Reserve components, based in the continental US. Such a command would seem to overlap considerably with some elements of the present unified force structure, especially the new US Atlantic Command, which opened for business in October 1993. The commission did not offer any suggestions on how to resolve the conflict.

Forces of the Future

"Rapid changes in technology may work in the nation's favor by advancing DoD's capabilities, but adversaries may also benefit—either by achieving technical advances that nullify US capabilities or by developing a new

capability before it is available to DoD," the report says.

The commissioners gave considerable attention to the point that future challenges to national security and the capabilities required to meet them may be enormously different from those experienced in the past. They quote a National Research Council report, "Computers in Crisis," which said that "tomorrow's terrorist may be able to do more damage with a keyboard than with a bomb."

The report identifies six attributes—responsiveness, reliability, cooperation and trust, innovation, competition, and efficiency—that will be particularly important for forces of the future and counsels the armed forces to prepare for four "emerging missions":

■ **Combating proliferation of weapons of mass destruction.** The commission mostly repeated conventional wisdom here. It had little fresh advice to offer except for a recommendation to put the Vice President in charge of an integrated national counterproliferation effort.

■ **Information warfare.** "In the past, victory in war hinged on the ability to dominate airspace, land, and the oceans," the commission said. "Today and in the future, major strategic and tactical advantages can be gained by controlling an adversary's access to information while protecting one's own information—and capitalizing on the difference." A number of federal agencies are working on this problem, but there is no national concept for the use of information to promote and protect US national interests. The report warns that "an adversary could cripple major civil and military support functions—financial, transportation, and communications—without even entering the country. America's clear conventional military superiority may cause opponents to see [information warfare] and other nontraditional forms of power as available means to achieve their goals."

■ **Peace operations.** In apparent recognition that many military traditionalists do not regard so-called "peace operations" as a valid military mission, the commissioners said that "the question for DoD and the government is not whether the armed forces will conduct these operations—each case will depend on choices made by policymakers—but how they can be planned and carried out with a minimum of disruption to DoD's core mission of preparing and fighting the nation's wars."

■ **Operations other than war.** "We expect DoD will be called upon to carry out law enforcement operations in the future. Our recent experience in Latin

America, the Caribbean, and Africa shows that there are no civilian agencies capable of short-notice law enforcement operations and training in hostile, demanding environments. By default these missions—like other [operations other than war] missions, such as large-scale delivery of food, water, or medicine to hostile areas—fall to the military." The commission's recommendation is that the Department of Defense should integrate "operations other than war" capabilities into overall mission planning and assign proper priorities to them.

The US Coast Guard is an instructive model in planning for operations other than war, the commission said. "Its military characteristics, e.g., chain of command, discipline, and twenty-four-hour-response capability, enable the Coast Guard to perform maritime safety, law enforcement, and marine environmental protection roles—and still meet its national security mission," the report said.

Medical Care and Other Issues

■ The report says that the armed forces presently have 12,500 physicians on active duty, about twice the number needed for wartime medical requirements. The commission said the Pentagon should choose a sizing standard, based on either wartime or peacetime needs, as a basis for the military health-care system. The standard should reemphasize the primacy of medical support to military operations, the commissioners said, but "peacetime operational missions" could figure into the decision.

"In the long term, we expect more medical care to be provided by civilian sources with the DoD medical establishment being reduced accordingly," the commissioners said. According to surveys studied in preparation of the report, most retirees and family beneficiaries would prefer, if given a choice, to rely more on private health-care providers.

■ Among the proposals generating a hot reaction was the commission's call to align service reserve components with actual requirements. "Some reserve forces are not organized, trained, or equipped appropriately for the types of operations they are likely to face in the future," the commission said. This section of the report concentrated on the Army and homed in on eight National Guard combat divisions with 110,000 personnel, organized as reinforcements for global conflict during the Cold War. No requirement presently exists for these units, the commission said, whereas the Army is currently short 60,000 combat support and combat service troops. ■

Aerospace World

By Suzann Chapman, Associate Editor

Raytheon Wins JPATS Contract

The Pentagon announced June 22 the selection of Raytheon Aircraft Co.'s Beech Mk. II turboprop as the Joint Primary Aircraft Training System (JPATS) competition winner. Current plans call for development and delivery of up to 711 production aircraft, 372 for the Air Force and 339 for the Navy. Raytheon Aircraft, based in Wichita, Kan., should deliver the Air Force's first operational trainer in 1999 and the first Navy operational trainer in 2002, with final delivery of all aircraft by 2017. DoD has budgeted \$7 million for the manufacturing development, production, and initial support program but expects the actual cost to be lower, according to a press release.

JPATS aircraft will replace USAF's T-37B and the Navy's T-34C, which are thirty-six and twenty-one years old, respectively. Besides training entry-level pilots, the new aircraft will also support undergraduate naval flight officer training and USAF navigator training.

Based on the Swiss Pilatus PC-9, the Beech Mk. II has a Pratt & Whitney PT6A-68 engine. It has a maximum speed of 270 knots and takeoff distance of 1,775 feet, both at sea level. Of the seven competing companies, Northrop Grumman Corp. was the only other with a turboprop entry.

To Paris via Bomb Run

A B-2 Stealth bomber launched from Whiteman AFB, Mo., June 10 to fly a twelve-hour, 4,900-mile global power mission in which it made a simulated bombing run over the Vliehors bombing range in the Netherlands. It then flew to Le Bourget Airport to land at the Paris Air Show for an engine-running crew change before returning to Whiteman.

Marking the first overseas flight for the new bomber, the global power mission also proved the global presence capability of the aircraft and provided realistic training for the crews, according to Air Combat Command officials. B-52 and B-1B bombers have also flown global power missions.



Slated to replace USAF's T-37B and the Navy's T-34C, Raytheon Aircraft Co.'s Beech Mk. II turboprop has won the Joint Primary Aircraft Training System competition. Current plans call for a buy of more than 700 aircraft.

Seeking More From F-22

The newest air-superiority fighter won't make its first flight until May 1997, but the Air Force is already trying to leverage its investment in the F-22 to cover additional mission areas beyond its intended air-superiority role as replacement for the F-15.

USAF awarded the F-22 development team of Lockheed Martin and Boeing a \$9.5 million contract to explore derivatives to meet requirements for strategic attack/interdiction, lethal and nonlethal Suppression of Enemy Air Defenses, reconnaissance, and surveillance. It also awarded a \$500,000 contract to Pratt & Whitney, developer for the F-22's F119 turbofan engines, to explore improved engine performance.

According to an industry program manager, using the F-22 "offers the potential for tremendous cost savings over developing a new fighter aircraft, and it will already have the performance and stealth characteristics required for combat effectiveness and survival in the next century."

Commission Overrules Pentagon

The Defense Base Closure and

Realignment Commission dealt the Air Force a setback June 22 by voting to close two Air Logistics Centers, rather than simply scaling back work at all five as the Pentagon had recommended. The commissioners voted six to two to close McClellan AFB, Calif., home of the Sacramento ALC, and to close the San Antonio ALC at Kelly AFB, Tex.

Commission Chairman Alan J. Dixon called the commission's depot decision the "greatest single deviation" from DoD recommendations over the entire base closure process. The commission's rationale for the move was that the closures would bring in more savings faster than transferring and reducing work loads.

The Air Force had stated just the opposite, that it could achieve a greater return under its plan to keep all five depots open. [See "More Base Closings in the Works," June 1995, p. 54.]

Other changes to Pentagon recommendations include keeping open three facilities: Rome Laboratory, located at Griffiss AFB, N. Y., Kirtland AFB, N. M., and Brooks AFB, Tex.

Presenting the *Enola Gay*

The *Enola Gay*, the B-29 that dropped the first atomic bomb on Hiroshima, finally went on display at the National Air and Space Museum June 28 in an exhibition that was aeronautical rather than political. In that, it was altogether different from the exhibition previously planned, "The Last Act: The Atomic Bomb and the End of World War II." That program was canceled in January by the Smithsonian Institution (of which the museum is a part) after a long-running controversy in which the Air Force Association and others complained that the museum had thrown away balance and context to pursue an ideological agenda.

Brig. Gen. Paul W. Tibbets, who flew the *Enola Gay* on its mission in 1945, said that he was "pleased and proud" with the display that opened in June. He had called the earlier exhibition "a package of insults." Another critic of the first exhibit, Rep. Sam Johnson (R-Tex.), called the new program "a job well done." Mr. Johnson is one of the new Smithsonian regents appointed at the peak of the controversy.

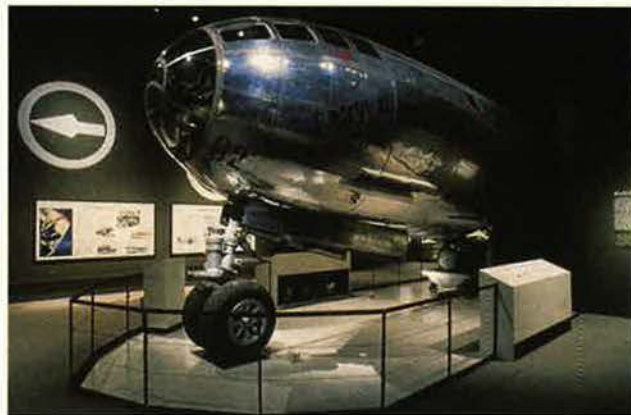
Protest activities, timed to coincide with the opening, were conducted by representatives of about twenty self-styled peace groups and by the Historians' Committee for Open Debate on Hiroshima. These groups object to the cancellation of the previous exhibit, which emphasized Japanese suffering and the horrors of the atomic bomb and gave passing attention to Japanese aggression and atrocities in World War II.

More than 3,200 visitors went through the exhibit on the first day it was open to the public. Police ejected about twenty demonstrators who sought to block passage through the gallery or otherwise disrupt the program. Most of the initial protesting, however, was done outside the museum and consisted of distributing leaflets, displaying banners, and other actions of an orderly nature.

The main element in the new exhibit is the forward fuselage of the *Enola Gay*, a fifty-three-foot section that is just over half the total length of the airplane. The wings and the rest of the body would not fit into the museum gallery. Stretching from floor to ceiling on the opposite wall is one of the propellers, seventeen feet from tip to tip and a reminder of how large a B-29 was. The vertical stabilizer of the *Enola Gay* is displayed separately from the fuselage, as are two of the engines. General Tibbets and other members of the crew tell their own story in a video presentation.

Visitors can look inside the aircraft through two transparent panels. Also covered by a clear security panel is an empty casing of a bomb like the "Little Boy" weapon that fell on Hiroshima. Expectation that the artifacts might be targets for vandalism turned out to be well founded. Before the exhibition opened, a protester charged the gallery where the *Enola Gay* is housed and flung red paint on the carpeting. Three persons were arrested July 2 after they threw human blood and ashes on the fuselage of the aircraft.

The museum's original exhibit plans flared into public controversy in the spring of 1994 when the Air Force Association and *Air Force Magazine* published a detailed description of the plan and circulated a detailed content analysis of graphic and text elements in the script. Over the next year, scrutiny by Congress, the news media, and veterans' groups



The forward fuselage of the B-29 *Enola Gay* now sits on display at the National Air and Space Museum—without the controversial, politically charged text and artifacts that the curators had originally assembled.

became intense. In May 1995, Dr. Martin Harwit, director of the Air and Space Museum, resigned, saying that nothing less would satisfy the critics.

At a press conference June 27, Smithsonian Secretary I. Michael Heyman fielded accusatory questions about why he had yielded to pressure from veterans and Congress. He said that objections to the first exhibit had not come only from "a handful of people or simply a handful of legislators" and that he had received between 30,000 and 40,000 letters from citizens.

Part of the wall text in the exhibition gallery says that "the use of the [atomic] bombs led to the immediate surrender of Japan and made unnecessary the planned invasion of the Japanese home islands. Such an invasion, especially if undertaken for both main islands, would have led to very heavy casualties among American and Allied troops and Japanese civilians and military. It was thought highly unlikely that Japan, while in a very weakened military condition, would have surrendered unconditionally without such an invasion."

Official review of the controversy continues. In September, the Smithsonian will get the results of a study it commissioned several months ago by the National Academy of Public Administration. There is also new reinforcement, apparently, for proposals that the National Air and Space Museum stop dabbling in politics and return to the basic mission of collecting, preserving, and displaying historic aircraft, spacecraft, and aeronautical artifacts. At the press conference, Mr. Heyman said he had "received yesterday a GAO [General Accounting Office] report on restoration activities by the Air and Space Museum that suggests we put more money into that and less into public programming."

The Smithsonian said that total cost for exhibition of the *Enola Gay* was \$451,000, of which \$308,000 had been expended on the "Last Act" version that was canceled in January.

The President had until July 15 to approve or disapprove the commission's report before sending it to Congress. No decision had been made at press time.

White Takes Office

Fresh from his stint as chairman of the Commission on Roles and Missions of the Armed Forces, John P.

White will now turn his business and government experience toward the number two spot in DoD. The Senate unanimously confirmed him for deputy secretary of defense on June 21.

The former Marine Corps officer was also the director of the Center for Business and Government at the Kennedy School of Government at Harvard University. From 1988 to 1992, he

was general manager of the Integration and Systems Products Division and vice president of the Eastman Kodak Co. He was chief executive officer and chairman of the board of Interactive Systems Corp. from 1981 until Kodak purchased it in 1988.

He served as deputy director of the Office of Management and Budget from 1978 to 1981 and as assistant

O'Grady's Training Pays Off

Flying on one of the 69,000 NATO Operation Deny Flight missions over northwestern Bosnia, Capt. Scott F. O'Grady catapulted into the national spotlight when a Bosnian Serb platform-launched SA-6 antiaircraft missile blew his aircraft apart June 2. His companion F-16 pilot, Capt. Bob Wright, only saw the explosion. He couldn't see if Captain O'Grady ejected because of the dense cloud cover.

That blast began a nearly six-day ordeal in which US and NATO aircraft searched and listened, Captain O'Grady hid, and his family and the nation waited.

Conflicting reports of his capture by the Serbs, then denial of that capture, and of possible intermittent beacon signals continued to enhance the saga of the pilot from the 555th Fighter Squadron, Aviano AB, Italy.

Then, quickly, on June 8, a fellow F-16 pilot picked up a voice message and shortly thereafter more than forty members of the 24th US Marine Expeditionary Unit, operating from USS *Keats* in the Adriatic Sea, plucked the Captain from a Bosnian pine forest. Ordeal over. Except for the fanfare.

Hailed by President Clinton as a hero, Captain O'Grady assured everyone that he was not, appropriately bestowing the label on the Marines who rescued him. "I want to thank . . . the people who came in there who . . . risked their lives to get me out," he said. "And if you want to find some heroes, that's where you should look because those are the biggest heroes in the world."

The twenty-nine-year-old Captain demonstrated his professionalism. Adm. William Owens, vice chairman of the Joint Chiefs of Staff, said at a Pentagon press briefing that the pilot "trained well, learned his lessons, and then executed his lessons when it mattered most." He evaded armed Bosnian

Serbs, who arrived on the spot within three to five minutes of his landing. He survived on rainwater and bugs when his limited rations ran out. He conserved the batteries on his radio and beacon, which simply transmits a tone that the NATO aircraft could receive, by limiting his broadcasts. He kept to the high ground and, when opportunity arose, used his radio to establish contact.

The Marines aboard USS *Keats* began their final planning as soon as the pilot had been identified positively by an Airborne Warning and Control System (AWACS) aircraft, about 3:00 a.m. (local time). They had been planning for a night operation, but, knowing it would be another eighteen hours of risk for the pilot, they launched the rescue mission about 5:00 a.m.

It was approximately eighty-five miles from the ship to Captain O'Grady's location, which the Marines pinpointed through Global Positioning System satellite receivers. As soon as the two CH-53 helicopters landed, the Marines fanned out, prepared to defend the area and search for the pilot. Captain O'Grady was ready and ran to the helicopters.

During the flight out of the area, the helicopters were fired on by small arms and shoulder-fired rockets. They couldn't be certain of the origination point so did not return fire.

With Captain O'Grady's safe return, questions linger about the lack of radar-jamming escorts for Deny Flight combat air patrols and whether or not the US and NATO had known there were surface-to-air missile sites in the area. Since this incident, NATO has decided that because of the uncertainty of the location of mobile SAM sites, Deny Flight missions will include electronic jammer aircraft. The question of intelligence access was still under review by both DoD and the Central Intelligence Agency.

Chronology of Search and Rescue

Times below are local times (Bosnia-Adriatic).

June 2, Friday F-16 hit by Bosnian Serb SA-6 antiaircraft missile near Banja Luka in northwestern Bosnia during NATO Deny Flight mission. Second F-16 pilot saw first F-16 get hit; did not see the pilot eject. NATO and US aircraft began search, flying correlated missions, trying to locate signal, if any. Bosnian Serb officials claimed they had captured the US pilot.

June 3, Saturday United Nations special envoy said there was information that the Serbs had the pilot. Gen. John M. Shalikashvili, Chairman of Joint Chiefs of Staff, said one short transmission, possibly from an emergency beacon, had been heard. Aircraft searches continued.

June 4, Sunday US military sources tried to make "thirdhand" contact with Bosnian Serbs through the UN. Aircraft searches continued.

June 5, Monday USAF Chief of Staff Gen. Ronald R. Fogleman said faint electronic signals, possibly from a pilot's emergency beacon, had been received by rescue units. Aircraft searches continued.

June 6, Tuesday Pentagon officials said the intermittent electronic beacon signals, which might have been transmitted by the pilot, had stopped. CNN reported that the Serbs said they did not have the pilot. Aircraft searches continued.

June 7, Wednesday General Shalikashvili told a Senate committee that the intermittent signals that had been reported could not be tied to the pilot or the equipment he carried; his fate was unknown. Aircraft searches continued.

June 8, Thursday 2:08 a.m. An F-16 pilot, also from Aviano AB, Italy, heard, "This is Basher 52" and recognized Capt. Scott O'Grady's voice. The pilot informed an AWACS aircraft.

2:20 The AWACS crew pinpointed O'Grady's location and made a positive identification.

2:30-3:00 Marine Col. (Brig. Gen. selectee) Marty Berndt started a planning cycle for rescue operation aboard USS *Keats*.

5:00-5:45 Colonel Berndt received the launch order for his Tactical Recovery of Aircraft or Personnel (TRAP) package.* Additional recovery operation aircraft launched.

6:12 TRAP team contacted Captain O'Grady by radio, then saw yellow smoke from a signal flare.

6:44 Two CH-53s on ground, Marines secured perimeter, ready to search for Captain O'Grady, but he ran to meet them; all back on board within two to three minutes.

7:07 One or more shoulder-fired surface-to-air missiles and small arms fire targeted the helicopters; none hit.

7:30 Captain O'Grady safely aboard USS *Keats*.

*Multinational Rescue Force: Marine TRAP package included two CH-53 helicopters with about twenty Marines per aircraft, two AH-1 Cobra helicopter gunships, and some AV-8B Harriers. Entire recovery operation included more than forty NATO and US aircraft: F-16C, F-15E, EF-111, A-10, KC-135R, HC-130, MH-53J, E-3 AWACS, EA-6B, and F/A-18.



Capt. Scott F. O'Grady embraces his sister at Andrews AFB, Md. The pilot made headlines in June after he survived a Bosnian Serb missile attack, evaded the enemy, and was rescued by a Marine expeditionary unit. (See box opposite.)

secretary of defense for Manpower, Reserve Affairs, and Logistics from 1977 to 1978. He was senior vice president for national security at RAND Corp. from 1968 to 1977. He holds both a master's degree and a Ph.D. in economics from Syracuse University and a bachelor's degree in industrial and labor relations from Cornell University. (Correction: In "Aerospace World," July 1995, p. 28, Dr. White was erroneously referred to as a "retired" Marine Corps officer. He is not.)

Commander Pleads Guilty

Almost a year after the B-52 crash at Fairchild AFB, Wash., which killed the crew of four and focused national attention on the Air Force's failure to curb a veteran pilot's chronic reckless flying, the court-martial of Col. William E. Pellerin, former 92d Operations Group commander at Fairchild, has ended with his guilty plea on two counts of dereliction of duty.

Colonel Pellerin will forfeit \$1,500 per month for five months and receive a written reprimand as part of a pre-trial agreement, which included dismissal of a third offense and limitations on the extent of his punishment.

According to an Air Force press release, the first of the two offenses to which he pleaded guilty involved failure to obtain required higher headquarters' approvals for aerial maneuvers and failure to ensure that maximum bank angles were not exceeded in air show-related flights. The second offense was failure to make adequate inquiry into a pilot's qualifications to perform flying duties after becoming

aware of issues concerning the pilot's airmanship and air discipline.

The dismissed offense was an allegation that Colonel Pellerin had been derelict in his duties by failing to remove the pilot, Lt. Col. Arthur A. "Bud" Holland, from flying duties.

An Air Force accident investigation determined that the primary cause of the crash, which occurred June 24, 1994, during practice for an air show, was "unsafe flying" by Colonel Holland, who was chief of standardization and evaluation, 92d Operations Group. Flying with Colonel Holland were Lt. Col. Mark C. McGeehan, Lt. Col. Kenneth S. Huston, and Col. Robert E. Wolff.

Panel to Review Safety

With eighteen mishaps since January 1 and recent allegations questioning viability of the Air Force Aircraft Mishap Prevention Program, USAF Chief of Staff Gen. Ronald R. Fogleman said it's time to conduct a "major, independent review." The Fairchild crash [see previous entry] has been a key item in many allegations.

Retired Navy Vice Adm. Donald D. Engen, former member of the National Transportation Safety Board and former FAA Administrator, will head the four-person blue-ribbon panel. Other members are former Air Force Secretary Hans Mark, an aerospace engineering professor at the University of Texas in Austin; retired Air Force Gen. Robert C. Oaks, USAir's vice president of safety and regulatory compliance; and retired Air Force Brig. Gen. Joel T. Hall, former director of aerospace safety.

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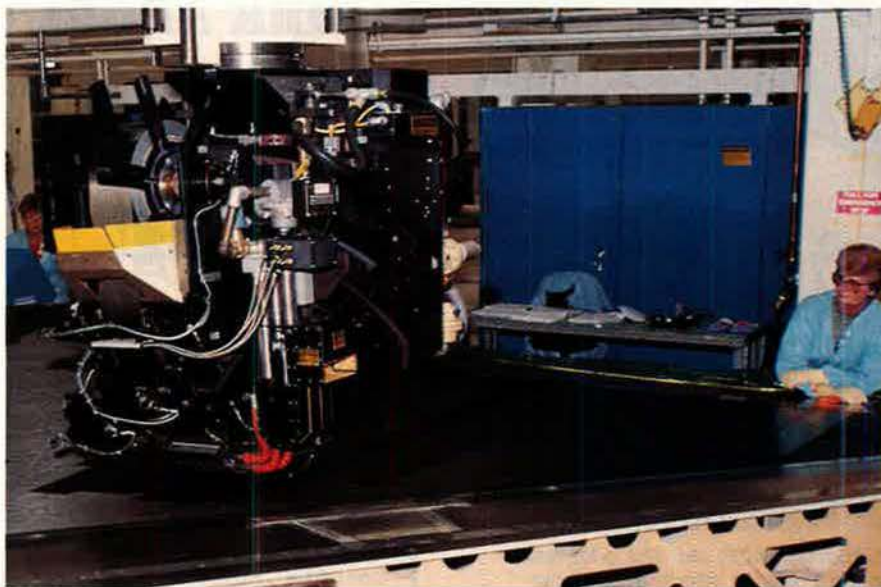
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The first F-22 is taking shape at Boeing's Development Center in Seattle, Wash. Here, Boeing employees monitor a machine applying layers of resin-impregnated tape to form an upper wing-skin panel.

Admiral Engen said the panel intends to present a report within sixty days of its first meeting, releasing its findings at the end of this month. The panel will have access to all safety investigation reports, safety archives, and data automation systems, including classified or other sensitive information.

AWACS Officer Cleared

Another controversial court-martial ended June 20 when ten Air Force jurors found Capt. James Wang not guilty of three counts of dereliction of duty. However, for some, questions linger.

The twenty-nine-year-old Captain was the senior director on board the E-3B Airborne Warning and Control System aircraft during the shutdown of two US Army UH-60 Black Hawk helicopters April 14, 1994, over northern Iraq. He was the only person to stand trial in the incident in which two F-15 pilots shot down the helicopters killing the twenty-six military and civilian people on board. [See "Aerospace World," January 1995, p. 14, and February 1995, p. 16.]

Captain Wang and members of the victims' families reportedly feel that the issue is unresolved. Some have said that the Captain became a scapegoat and want further investigation, perhaps by Congress.

Following the verdict, the Pentagon released a list of administrative actions taken against other individuals involved, which it had previously refused to release because of Pri-

vacancy Act considerations. Each F-15 pilot and three AWACS crew members received letters of reprimand that will remain in their personnel records for only two years. One AWACS crew member received an unspecified administrative punishment, which could have included reduction in pay or confinement to base.

Brig. Gen. Jeffrey S. Pilkington, commander of Operation Provide Comfort, received a letter of admonition "for his failure to fulfill his re-

sponsibilities as commander." Brig. Gen. Curtis H. Emery II, commander of the Combined Air Force Component, also received a letter of admonition "for failure to maintain adequate control and aircraft integration."

In the DoD investigative report issued last year, Defense Secretary William J. Perry blamed all levels of command for "errors, omissions, and failures" in procedures. Responding to questions after the trial, he said that although no one went to jail, "many officers' careers have been very adversely affected by this."

OTA Questions Launch Policy

In a report released June 13, the Office of Technology Assessment cited concerns about the viability of the National Space Transportation Policy, which the White House issued last August.

OTA said the policy raised questions about potential redundancies and conflicts between NASA and DoD, effectiveness of government-industry cooperation, competition and cooperation with foreign launch vehicle and component providers, and limits placed on the use of excess US long-range ballistic missiles as boosters. The report also stated that the national policy did not include provisions for preserving long-range ballistic missile capabilities after final production in 2005 of the Navy's latest Trident II D5 missile.

However, OTA did note that although the Air Force will not buy any



RF-4Cs from the 152d Reconnaissance Group (ANG) will take to the air one last time in ceremonies at the Reno-Cannon IAP, Nev., next month. The 152d RG will become the 152d Aerial Port Flight as it retires the RF-4s and accepts the first of eight C-130 aircraft later this year.

Staff photo by Guy Aento

new missiles, it plans to modernize Minuteman IIIs with new motors and to upgrade systems and materials. The Air Force also plans to sustain the guidance and reentry-vehicle industrial base.

EELV Competition Kicks Off

The Air Force issued a request for proposals in May for the first phase in its search for an Evolved Expendable Launch Vehicle. Later this month, the service will select as many as four contractors to develop concepts for money-saving upgrades to existing launchers during the fifteen-month "low-cost concept validation phase."

According to Air Force Secretary Sheila E. Widnall, "the EELV system will be a national resource, equally viable as a commercial or a military booster." She expects the EELV to achieve a launch-cycle time of thirty days or less and said that the primary objective is to reduce total cost for medium and heavy space-launch vehicles. She added, "We are minimizing government specs and standards, maximizing commercial performance standards and commercial specs, and conducting frequent and early discussions with industry."

In contrast to the OTA report [see previous entry] that said government

launches would continue to dominate the market for the next ten to fifteen years, Secretary Widnall said that commercial launches will surpass military launches this year and throughout the decade at Cape Canaveral, Fla. She noted that "the thirty/seventy civilian/military launch mix will flip-flop, with sixty to seventy percent of ELV launches in the late '90s going commercial."

DarkStar To Support Tactical Ops

Unveiled in June for the first time, the Pentagon's new low-observable Tier III Minus unmanned aerial vehicle (UAV), DarkStar, will provide battlefield commanders with bomb-damage assessment and detection of enemy missile systems in near real time, day or night, regardless of weather. It is designed to operate in high-threat environments at altitudes higher than 45,000 feet, for at least eight hours, and with a range of more than 1,000 nautical miles. It will be able to monitor a mission area of 14,000 square nautical miles. [See "Aerospace World" photo, July 1995, p. 19.]

DarkStar is one of two complementary high-altitude UAV systems under development for the Defense Airborne Reconnaissance Office by the

Advanced Research Projects Agency (ARPA). The other UAV is the Tier II Plus, which will operate in a low-to-moderate threat environment. Both vehicles will be capable of fully autonomous takeoff, flight, and recovery; dynamic retasking while in flight; and will use common ground control stations. The Tier II Plus system UAVs will have twenty-four-hour operating capability at ranges up to 3,000 nautical miles from base.

Lockheed Martin and Boeing jointly developed the Tier III Minus over the past year. ARPA just awarded the Tier II Plus contract to Teledyne Ryan in late May. The Pentagon plans to buy a mix of the two systems.

New Gulf War Illness Hotline

Defense Secretary Perry said DoD wants to get "firsthand accounts directly from those who were in the [Persian Gulf War] to make sure we don't miss anything important that might shed some light" on Gulf War illnesses.

Anyone who served in the Persian Gulf region can call (800) 472-6719 to report incidents they believe may have led to medical problems. Healthcare providers may also call the number to report theories based on evaluation of patients. The number

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Prior to marching in the St. Petersburg, Russia, Veterans Parade commemorating the fiftieth anniversary of V-E Day, MSgt. Marty Cain of the Command Band of the Air Force Reserve receives the reenlistment oath from his commander, Capt. Kelly Bledsoe, as SSgt. Mike O'Connor shows the flag.

operates from 8:00 a.m. to 11:00 p.m., eastern daylight time.

DoD operates a separate hotline for military members and their families to register for medical examination and treatment. That number is (800) 796-9699. Veterans may call the VA at (800) 749-8387.

More B-2s?

When the House National Security Committee's push to include additional B-2 bomber funding in the Fiscal 1996 defense budget passed successfully through the full House in mid-June, the potential for continuing B-2 production beyond the currently authorized twenty aircraft took more substantial shape. However, the Senate had not yet deliberated on the issue.

The Pentagon still maintains it does not want additional B-2s, based on its Heavy Bomber Force Study [see "Washington Watch: The Pentagon Declines More B-2s," July 1995, p. 13] and higher-priority requirements, such as the F-22. There is also still a question of what to do, if anything, about the bomber industrial base. DoD's report on that issue was released to Congress July 11.

B-1Bs Make Nonstop World Flight

A global power mission, "Crown of the Bat," put two B-1Bs from Dyess AFB, Tex., through a historic, around-the-world, thirty-six-hour, thirteen-minute flight on June 2-3. The 20,100-mile flight required six air refuelings and constant weather updates and included coping with monsoon-related

thunderstorms over the Indian Ocean and a tropical depression near the Philippines.

The mission incorporated practice conventional runs over the Fajano Bombing Range, Italy, the Torishima Range, near Kadena AB, Japan, and the Utah Test and Training Range. The B-1Bs dropped EDU-50s, which are inert, concrete-filled, 500-pound Mk. 82 munitions.

Brig. Gen. Charles R. Henderson, 7th Wing commander at Dyess, said that the mission was a "genuine team effort," including assistance from many Air Force units. He credited the wing's maintenance crews with the fact that the bombers completed the mission successfully and returned "Code One," requiring only minor routine maintenance.

According to a press release, the B-1Bs unofficially set several records, including fastest time around the world nonstop, fastest time around the world in its weight class, and fastest time in the air refueled class. Aircraft crew members included Lt. Col. Douglas Raaberg and Capt. Rick Carver, Gerald Goodfellow, Kevin Clotfelter, Steve Adams, Chris Stewart, Kevin Houdek, and Steve Reeves.

USAF Unveils "Lightning Bolts"

To further reduce costs and increase efficiency in procurement the Air Force released eight "Lightning Bolt" initiatives June 1. Darleen Druyun, acting assistant secretary of the Air Force for Acquisition, said that

"fat regulations and thin budgets" are the basic reasons for continued acquisition reform.

"It's time that we cut out the fat in RFPs [requests for proposal] because it's the real driver in terms of cost, both for the government as well as for the contractor," said Secretary Druyun. She added that the fat greatly increases the number of people both government and industry need to run a program. These latest initiatives have deadlines as early as last month through April 1996:

- Establish an RFP support team to scrub all RFPs, contract options, and contract modifications over \$10 million. Similar teams at lower levels will review RFPs between \$100,000 and \$10 million.

- Create an Acquisition Strategy Panel, composed of senior acquisition personnel from USAF headquarters, Air Force Materiel Command, and other major commands, to promote consistency and apply lessons learned from past programs.

- Develop a new System Program Office manpower model, achieving at least a fifty percent reduction in SPO size. At the same time, the Air Force's acquisition staff at the Pentagon will reduce its size by a minimum of thirty to fifty percent over the next five years.

- Limit publication of acquisition policies to AFMC and the Pentagon, and cancel any existing policies issued by lower levels.

- Streamline the Air Force Selected Acquisition Review Council process, moving to a paperless process with council meetings only to iron out disagreements.

- Enhance the consideration of a contractor's past performance in the source selection process.

- Replace multiple documents now required for milestone reviews with a Single Acquisition Management Plan.

- Include measurements to track progress of acquisition reforms in each program in the Program Executive Officer reviews.

Annual Recruiting Goals in Sight

The military recruiting results for the first half of Fiscal 1995 show that the services are on track with numbers, quality, and diversity. The Army, Navy, and Marine Corps met their year-to-date objectives, while the Air Force was just short, at ninety-nine percent of its goal.

According to a Pentagon press release, recruit quality also remains strong. Through the first half of both Fiscal 1994 and 1995, ninety-four

percent of recruits had high school diplomas, and seventy percent scored in the upper half of the Armed Forces Qualification Test.

The proportion of black recruits increased slightly, from nineteen to twenty percent, and Hispanic recruits from seven to nine percent, compared to Fiscal 1994. Throughout DoD, the percentage of female recruits increased from seventeen to nineteen percent. The Air Force had the largest proportion of female recruits, at twenty-four percent. However, the Navy experienced the largest growth in female recruits, from fourteen to twenty-two percent.

Cycle Test Improved

Representatives from each major command, including medical, services, personnel, and scientific career fields gathered at Brooks AFB, Tex., in early May to discuss Air Force fitness, specifically the cycle ergometry test. This is the second time Air Force specialists have met to attempt to refine the test since its introduction in 1992.

Although cycle ergometry testing has been in use for more than forty years and medical officials consider it a valid measure of fitness, it is not 100 percent accurate for everyone.

The Air Force has had repeated complaints from military members and their commanders that the test routinely gives aerobically healthy individuals failing grades.

To help understand the problems, USAF commissioned the University of Florida last year to study the test. The study revealed that four percent of those who should have passed the test did not pass because their heart rates rose too fast. Based on this finding, the Air Force added a warm-up period to the exercise program.

Out of this latest meeting, recommendations include trading mandatory exercise programs for those who fail the test for self-paced routines guided by trained physiologists and letting commanders waive the test for people who exercise regularly but still can't pass. The group also suggested making additional software improvements and standardizing the evaluations.

Cyberspace Offense

The Air Force has joined the growing ranks of groups affected by and concerned about the use of the Internet to disseminate pornography. In fact, the service convicted an officer in early June for violating the federal anti-child pornography statute.

A court-martial panel found that Capt. Anthony T. Russell, a computer specialist assigned to Kadena AB, Japan, used an Air Force computer system to obtain and download pornographic images, including some depicting children, from the Internet.

Although the captain claimed he had "stumbled across" the porn sites by accident, Air Force Office of Special Investigations computer experts showed how he had programmed his computers, both at his office and at home, to seek out Internet sites with explicit names and file listings. He has been dismissed from the service, sentenced to three months' confinement, and ordered to pay more than \$8,500 in fines.

AWACS Crew Saves Pilot

Heading home to Seattle, Wash., after testing a new radar system over the northeastern part of the country, the crew of the Air Force's only Airborne Warning and Control System test aircraft powered up their radar systems in a record-setting five minutes to help save a damaged civilian aircraft. It normally takes twenty to thirty minutes to power up an AWACS.

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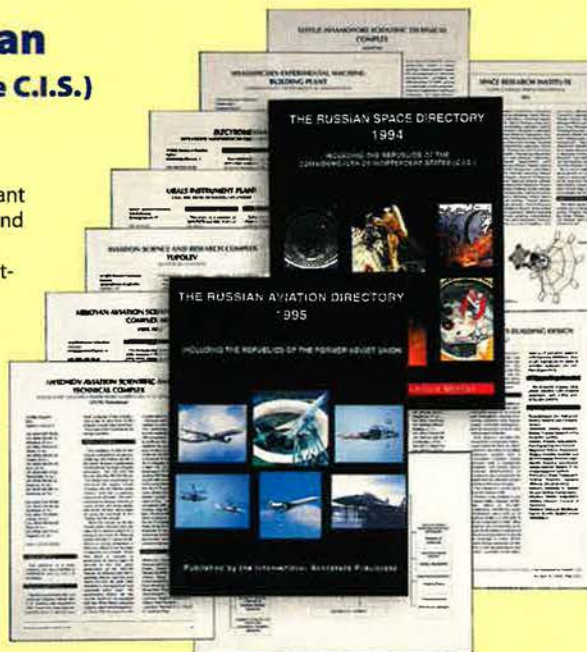
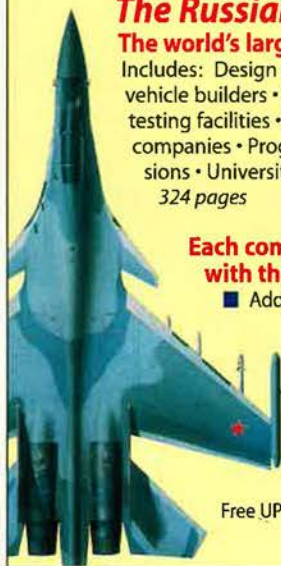
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Thanks to a new \$57 million contract, 313 of USAF's AGM-88B High-Speed Antiradiation Missiles will be upgraded to the AGM-88C configuration. Texas Instruments will install improved guidance and warhead sections on the missiles.

ment 1 crew, part of USAF's Air Warfare Center, Eglin AFB, Fla., heard a radio call from a civilian pilot whose aircraft had damaged one wing in bad weather. The pilot was trying to contact Great Falls Flight Service Station, Mont., for help but could not get clear radio contact. The test AWACS crew located the civilian aircraft and provided radio and radar relay to the Salt Lake City Air Traffic Control Center, Utah, whose controllers then directed the pilot to an emergency airfield in Montana.

Doubled C-130 Airdrops

If an improvement to an existing radar system aboard C-130 transports proves successful, it could increase the aircraft's air-drop capabilities by 100 percent, according to Air Combat Command officials. C-130s would be able to drop their loads in "blind" conditions, which include night drops, poor weather visibility, and high altitudes.

The radar is the Westinghouse Low-Power Radar, or AN/APN-241, which originally served as a weather-avoidance device. However, during initial use, Air Force testers noticed its ground-mapping capabilities, which could complement the C-130 Adverse Weather Air Delivery Systems.

Capt. Scott Babos, a project officer with the 50th Airlift Squadron, Little Rock AFB, Ark., said that while air-dropping had been mostly visual, with the AN/APN-241, he could "mark and update a target in the computer and never see the ground." Officials

expected to complete testing this month.

Aerobics For the B-1B

Reduction was the name of the game during the Air Force's first Action Workout held in May at Dyess AFB, Tex. A civilian business method of creating change, the workout goal was to save time, cost, and work during a B-1B phase inspection before the aircraft went through routine maintenance.

Five teams spent a week filming, mapping, measuring, examining, testing, and discussing B-1B maintenance actions. Each day, they searched for better methods, then tested their solutions. Each night, team leaders briefed senior officials who provided resources to continue pursuing solutions as necessary.

Col. Bruce Sutherland, 7th Wing vice commander, said that the process was phenomenal in cutting waste, citing sixty, seventy, and 100 percent reductions in time, cost, or work.

News Notes

■ An MH-53J Pave Low caught fire just after the pilot made an emergency landing fifteen miles northwest of Osan AB, South Korea, June 6, but all seven people aboard got out safely. The crew of six, from Osan's 31st Special Operations Squadron, noticed a malfunction while on a training mission. The seventh person was an Air Force Academy cadet on a military familiarization trip.

■ Two fire fighters from Sheppard AFB, Tex., were killed June 11 while helping with a fuel-tank fire in Addington, Okla., about forty miles northeast of Sheppard. Richard Hogan, an Air Force civilian fire fighter from Wichita Falls, Tex., and A1C Christopher Rezac of Mesa, Ariz., part of a team dispatched from Sheppard, were caught in flames when a 55,000-barrel fuel tank ruptured.

■ The first jointly trained navigators, including four Air Force first lieutenants,



Lockheed Martin photo by John Rossino

Forty years ago, the first production Lockheed C-130 Hercules took flight. After deliveries to sixty-four nations in more than seventy configurations, the C-130 passed a significant milestone when the 302d Airlift Wing (AFRES) accepted delivery of the 2,100th aircraft at Peterson AFB, Colo.

tenants, graduated from a Navy Training Squadron at NAS Pensacola, Fla. Starting October 1, 1995, all Air Force navigators will train with the Navy. New Air Force students will number 111 by September 1, and officials expect the number to rise to 450 within two years.

■ USAF will promote 5,068 technical sergeants to master sergeant for a 20.9 percent selection rate, based on 26,833 eligible techs in the Fiscal 1995 cycle.

■ Promotion lists are now on the World Wide Web. Air Force personnel officials placed the June 7 list of new master sergeants on the USAF Internet home page, AirForceLINK, within minutes of release, making the list accessible to everyone simultaneously and ending the usual weeks-long wait.

■ An Atlas II launch vehicle successfully boosted a Navy ultrahigh-frequency communications satellite into orbit May 31 from Cape Canaveral AS, Fla., marking the sixth Atlas launch from the nation's Eastern Range so far in 1995. There were five Atlas launches from the East Coast launch facility in 1994.

■ Military-industry cooperation resulted in a win-win situation for commercial aviation and the Air Force

when Pratt & Whitney purchased talent and facility time from USAF's Arnold Engineering Development Center to test the new P&W 4084 jet engine. The engine powers Boeing's new commercial 777 aircraft, first flown by United Airlines in early June.

■ Early retirement applications continue to trickle in. As of June 28, the Air Force had received applications from 775 enlisted persons and 434 officers, under the Fiscal 1996 early retirement program. Personnel officials stated the goals are 1,200 enlisted and 1,000 officer volunteers.

■ The Department of Veterans Affairs appointed Joan A. Furey, a Vietnam veteran, nurse, and author, as director of the VA's new Center for Women Veterans, based in Washington, D. C.

■ Pulling 75,000 photos from Air Force personnel files to comply with a December 1994 directive that eliminated photos from officer selection records for colonels and below was just the first step. It took a ten-person team nearly three months to pull and "sanitize" the photos by separating the names and Social Security numbers from each photo. Silver recovery from the 2,000 pounds of photos netted the Air Force \$1,700.

Senior Staff Changes

RETIREMENTS: Gen. Charles G. **Boyd**, L/G Carl G. **O'Berry**, M/G Donald J. **Harlin**.

CHANGES: Col. (B/G selectee) **Patrick O. Adams**, from Ass't to the Cmdr., Hq. AMC, Scott AFB, Ill., to Dir., Services, Hq. USAF, Washington, D. C., replacing Col. Stevan B. Richards . . . B/G (M/G selectee) **Frank B. Campbell**, from Dir., Forces, DCS/P&O, Hq. USAF, Washington, D. C., to Dir., Requirements, Hq. ACC, Langley AFB, Va., replacing B/G (M/G selectee) William S. Hinton, Jr. . . . L/G (Gen. selectee) **Richard E. Hawley**, from Principal Dep. Ass't Sec'y of the Air Force for Acquisition, OSAF, Washington, D. C., to Cmdr., AAFCE, NATO; CINC, Hq. USAFE; and AF Component Cmdr., USEUCOM, Ramstein AB, Germany, replacing Gen. James L. Jamerson.

M/G **Tad J. Oelstrom**, from Vice Cmdr., 9th AF, ACC, and Dep. Cmdr., USCENCOM Air Forces, Shaw AFB, S. C., to Cmdr., 3d AF, USAFE, RAF Mildenhall, UK, replacing M/G James G. Andrus . . . M/G **Arnold R. Thomas, Jr.**, from Dep. Dir., ACE Reaction Force Air Staff, NATO, Kalkar, Germany, to Vice Cmdr., 9th AF, ACC, and Dep. Cmdr., USCENCOM Air Forces, Shaw AFB, S. C., replacing M/G Tad J. Oelstrom . . . Col. (B/G selectee) **Ralph Pasini**, from Cmdr., 5th BW, ACC, Minot AFB, N. D., to Dep. Dir., ACE Reaction Force Air Staff, NATO, Kalkar, Germany, replacing M/G Arnold R. Thomas, Jr.

SENIOR EXECUTIVE SERVICE (SES) RETIREMENTS: David E. **Anderson**, Robert L. **Baugh**.

SES CHANGES: W. **Wade Adams**, to Senior Scientist, Organic Polymer Chemistry, Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio . . . **Russell R. Burton**, to Chief Scientist, Crew Systems, Armstrong Lab, AFMC, Brooks AFB, Tex. . . . **John W. Davis**, to Chief Scientist, AEDC, AFMC, Arnold AS, Tenn., replacing Donald Daniel . . . **Robert Q. Fugate**, to Senior Scientist, Atmospheric Compensation, Phillips Lab, AFMC, Kirtland AFB, N. M. . . . **Alan Garscadden**, to Chief Scientist, Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio . . . **Theodore Nicholas**, to Senior Scientist, High Temperature Materials Life Prediction, Wright Lab, Hq. AFMC, Wright-Patterson AFB, Ohio . . . **Milton C. Ross**, to Dep. Dir., Prgm. Support Div., Hq. AFMC, Wright-Patterson AFB, Ohio, replacing Linda Williams . . . **Dennis J. Volpe**, to Dir., Plans and Advanced Prgrms., ESC, AFMC, Hanscom AFB, Mass., replacing Gary Grann.

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Before the C-130 Hercules came the C-47 Skytrain and its civilian variant, the DC-3. Fans of the "Gooney Bird" will be happy to learn it is still flying regularly in Alaska. Two refurbished DC-3s are now plying Alaska's skies after being fitted with the instruments necessary to conform with today's flight rules.

■ Analysis of quality-of-life surveys from 360,000 Air Force military and civilian members is under way. Personnel officials estimate they will release the results in late summer after review by the Secretary and the Chief of Staff of the Air Force. The return rate was sixty-six percent.

■ The Tricare dental plan for active-duty family members is on hold while the General Accounting Office reviews a protest filed by the current plan provider Delta Dental. However, according to Air Force officials, Delta Dental agreed to honor lower rates offered by the new provider, United Concordia Co., in the meantime.

■ Nineteen World War II China-Burma-India "Hump" veterans from all services flew the famous air route once more in May, but this time in a C-17 and two KC-10s, to commemorate the thousands of supply missions flown over the highest mountain range in the world, the Himalayas. [See "Valor: Four-Engine Fighter Pilot," June 1995, p. 77.]

■ According to research, the B-52 will last until 2020, Air Force Secretary Widnall said, after completing her first flight in the venerable bomber in late May at the 2d Bomb Wing, Barksdale AFB, La. She also said the Air Force takes "extremely good care of our planes."

■ Misawa-bound military members may bring their families again starting this month, according to Air Force officials. When the military population at Misawa AB, Japan, overtaxed

the limited on- and off-base housing in late 1991, the Air Force required newly assigned troops to find housing before allowing their families to join them.

■ Best test pilot honors go to Maj. Joe Felock, Edwards AFB, Calif., who received the 1994 Lt. Gen. Bobby Bond Memorial Aviator Award as chief test pilot of the F-15E Keep Eagle program. He helped design and test new flight control software to improve the F-15E's high angle of attack, which had been restricted for F-15Es fitted with conformal fuel tanks after USAF lost two of the aircraft to unrecoverable spins.

■ Exceptional maintenance achievements earned 1995 DoD awards for the 388th Maintenance Squadron, Hill AFB, Utah, and the 325th Fighter Wing, Tyndall AFB, Fla. The 388th MS maintained a 91.1 percent mission capable rate on 388th Fighter Wing F-16s. The 325th FW reached record levels in nine of fifteen primary maintenance areas for a 90.1 percent mission capable rate on the oldest F-15s in the Air Force.

■ Declining research and development budgets have prompted the Air Force to use foreign technologies. The Electronic Systems Center, Hanscom AFB, Mass., hosted scientists and technologists from France at an initial meeting in late May. The working group discussed advanced packaging, wave scale integration, antenna technologies, clutter mitigation, polarization diver-

sity, radiation-hardened electronics, and time stress measurement devices.

■ The 21st Contracting Squadron, Peterson AFB, Colo., won the 1994 Air Force Small Business Program Excellence Award.

■ USAF took five first-place honors in DoD's 1994 Thomas Jefferson Awards for excellence in military print and broadcast media: *Forward March*, March AFB, Calif., TSgt. Matthew Proietti, editor; *Kadena Shogun*, Kadena AB, Japan, TSgt. Joseph A. Gonzales, editor; sports articles by TSgt. Patrick McKenna, Travis AFB, Calif.; feature, news, or sports photo by MSgt. Mike Van Hoecke, Kadena; print journalist of the year, Sergeant McKenna.

■ The Human Engineering Division, part of Air Force Materiel Command's Armstrong Laboratory, turned fifty years old in June. The Army Air Force created the unit in 1945 at Wright Field, now Wright-Patterson AFB, Ohio, as a psychological research facility to study equipment design problems that were causing aircrew and aircraft losses in World War II. The unit has since pioneered advances in military pilot work load measurement, basic visual performance modeling, space vision, and cockpit design integration.

■ The Pentagon has released the third in a series of regional security strategies: "United States Security Strategy for Europe and NATO." The report includes discussions on NATO's Partnership for Peace efforts, NATO enlargement, building cooperative relations with Russia, supporting European integration, and maintaining relationships with US allies and new partners.

■ A B-2 Stealth bomber dropped a precision guided munition on target June 13 at China Lake, Calif., in the bomber's first test with the Northrop Grumman Global Positioning System-Aided Munition (GAM). According to a press release, the test proved proper GAM response to B-2 command messages, successful GAM transition from launch to free flight, controllability, and extended downrange capabilities.

■ Pratt & Whitney presented the 300th F100-PW-229 Increased Performance Engine to the Air Force in May. As part of a foreign military sales contract, the milestone engine will go into one of seventy-two McDonnell Douglas F-15s the Royal Saudi Air Force has ordered with the improved engines.

■ The first "Westernized" MiG-21



Finland accepted its first McDonnell Douglas F/A-18 in ceremonies in St. Louis in June. The Scandinavian nation selected the Hornet in 1992 after considering several US and European alternatives. The first aircraft, a two-seat D model, came complete with the latest General Electric F404-GE-402 engines.

flew its maiden flight successfully May 24. Israel Aircraft Industries Ltd. developed the upgraded MiG, adding a new cockpit design, Western avionics, and new navigation, flight and mission management, and armament systems. IAI expects to market the upgrading program to eastern European countries.

- Vietnam has bought six Russian Sukhoi Su-27s to modernize its Air Force. It is also discussing with Israel upgrades for its MiG-21 and MiG-23 fighters.

- Smart, adaptive wing concepts may increase aircraft efficiency, leading to greater payloads, longer range, and decreased operating costs, according to the Advanced Research Projects Agency. ARPA awarded a two-year, \$3.4 million contract to Northrop Grumman to develop and demonstrate concepts called lift-enhancement and optimal transonic cruise, which use smart materials and structures to change wing shape in flight. While the idea is not new, recent technology may alleviate problems with weight and complexity of the prior designs.

- New software for GPS Block IIR satellites developed by Loral Corp. may allow Air Force ground controllers to program the spacecraft's computers from the ground to add new mission duties while in orbit. Loral has successfully tested its new Operational Release 6.A software with the Block IIR reprogrammable processors, a new feature on the advanced spacecraft, which the Air Force plans to launch in 1996.

- A new industrial working group, led by Northrop Grumman and including aerospace companies in Europe and North America, will offer the Joint Surveillance and Target Attack Radar System to NATO's sixteen member nations. The group will define a model program showing how to structure, procure, and integrate Joint STARS into NATO operations. A NATO study in late 1994 showed a pressing need for air-to-ground surveillance.

- "Reduce frequency by half" is the message from the Aerospace Industries Association to the organiz-

ers of Europe's Paris and Farnborough (United Kingdom) air shows. These shows now alternate annually, but AIA thinks that there should only be one show every other year because of cutbacks in the aerospace industry.

- The 1994 Air Force Judge Advocate General award winners are Maj. Nancy S. Richards, Shaw AFB, S. C., judge advocate; Lt. Col. John N. Kulas, Hanscom AFB, Mass., Reserve judge advocate; Wayne A. Warner, Eglin AFB, Fla., civilian attorney; TSgt. Renee M. Loomis, Nellis AFB, Nev., paralegal; MSgt. Verscia V. Eason, Robins AFB, Ga., Reserve paralegal; Maureen A. Nation, Tinker AFB, Okla., legal services civilian; and Col. Jerald D. Stubbs, Wright-Patterson AFB, Ohio, senior attorney.

Obituary

George R. Caron, former staff sergeant and tail gunner on the *Enola Gay*, died of pneumonia June 3 in Denver, Colo. He was seventy-five. Mr. Caron was the only crew member to actually witness the atomic blast when the B-29 bomber dropped an atom bomb on Hiroshima fifty years ago. He had closely followed the controversy surrounding the proposed *Enola Gay* exhibit at the Smithsonian's National Air and Space Museum. In his last correspondence with this magazine in November 1994, he said that although the Japanese had already lost the war in 1945, they would not give up. "I believe the use of the atom bombs convinced Japan to give up," he said. "The resultant nuclear age is an entirely different subject." ■

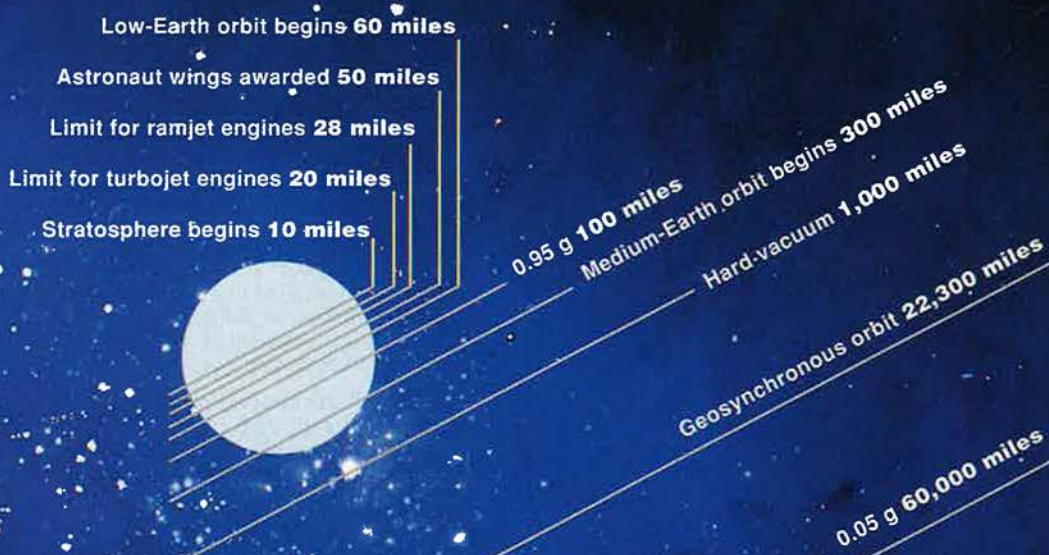
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SPACE



ALMANAC



On the following pages appears a variety of information and statistical material about space—particularly military activity in space. This almanac was compiled by the staff of *Air Force Magazine*, with assistance and information from Marcia S. Smith, Science and Technology Policy Specialist, Congressional Research Service; Dr. R. W. Sturdevant, Air Force Space Command History Office; Tina Thompson, editor of *TRW Space Log*; Phillip S. Clark, Molniya Space Consultancy, Heston, UK; Theresa

Foley; Dr. Roger D. Launius, chief, NASA History Office; Air Force Space and Missile Systems Center History Office; and Air Force Space Command Public Affairs Office. Col. Gilbert Siegert, USAF, provided technical advice.

Figures that appear in this section will not always agree because of different cutoff dates, rounding, or different methods of reporting. The information is intended to illustrate trends in space activity.

Space Terms

Aerospace. A physical region made up of Earth's atmosphere and the space beyond.

Aerospace plane. A single spacecraft able to operate effectively in both the atmosphere and space. Also known as a "transatmospheric vehicle."

Apogee. The point of greatest distance from Earth (or the moon, a planet, etc.) achieved by a body in elliptical orbit. Usually expressed as distance from Earth's surface.

Atmosphere. Earth's enveloping sphere of air.

Boost phase. Powered flight of a ballistic missile—*i.e.*, before the rocket burns out.

Burn. The process in which rocket engines consume fuel or other propellant.

Circumterrestrial space. "Inner space" or the atmospheric region that extends from sixty miles to about 50,000 miles from Earth's surface.

Constellation. A formation of spacecraft orbiting for a specific combined purpose.

Deep space. All space beyond the Earth-moon system, or from about 480,000 miles altitude outward.

Eccentric orbit. An extremely elongated elliptical orbit.

Ecliptic plane. The plane defined by the circle on the celestial sphere traced by the path of the sun.

Elliptical orbit. Any noncircular, closed spaceflight path.

Exosphere. The upper limits of Earth's atmosphere, ranging from about 300 miles altitude to about 2,000 miles altitude.

Expendable launch vehicle (ELV). A launch vehicle that cannot be reused after one flight.

Ferret. A satellite whose primary function is to gather electronic intelligence, such as microwave, radar, radio, and voice emissions.

Geostationary Earth orbit. A geosynchronous orbit with 0° inclination in which the spacecraft circles Earth 22,300 miles above the equator and appears from Earth to be standing still.

Geosynchronous Earth orbit (GEO). An orbit at 22,300 miles that is synchronized with Earth's rotation. If a satellite in geosynchronous orbit is not at 0° inclination, its ground path describes a figure eight as it travels around Earth.

Geosynchronous transfer orbit (GTO). An orbit that originates with the parking orbit and then reaches apogee at the GEO.

Ground track. An imaginary line on Earth's surface that traces the course of another imaginary line between Earth's center and an orbiting satellite.

High-Earth orbit (HEO). Flight path above geosynchronous altitude (22,300 to 60,000 miles from Earth's surface).

High-resolution imagery. Detailed representations of actual objects that satellites produce electronically or optically on displays, film, or other visual devices.

Inertial upper stage. A two-stage solid-rocket motor used to propel heavy satellites into mission orbit.

Ionosphere. A region of electrically charged thin air layers that begins about thirty miles above Earth's atmosphere.

Low-Earth orbit (LEO). Flight path between Earth's atmosphere and the bottom of the Van Allen belts, *i.e.*, from about sixty to 300 miles altitude.

Magnetosphere. A region dominated by Earth's magnetic field, which traps charged particles, including those in the Van Allen belts. It begins in the upper atmosphere, where it overlaps the ionosphere, and extends several thousand miles farther into space.

Medium-Earth orbit (MEO). Flight path between low-Earth orbit (about 300 miles in altitude) and geosynchronous orbit at an average altitude of 22,300 miles.

Mesosphere. A region of the atmosphere about thirty to fifty miles above Earth's surface.

Orbital decay. A condition in which spacecraft lose orbital altitude and orbital energy because of aerodynamic drag and other physical forces.

Orbital inclination. Angle of flight path in space relative to the equator of a planetary body. Equatorial paths are 0° for flights headed east, 180° for those headed west.

Outer space. Space that extends from about 50,000 miles above Earth's surface to a distance of about 480,000 miles.

Parking orbit. Flight path in which spacecraft go into LEO, circle the globe in a waiting posture, and then transfer payload to a final, higher orbit.

Payload. Any spacecraft's crew and/or cargo; the mission element supported by the spacecraft.

Perigee. The point of minimum altitude above Earth (or the moon, a planet, etc.) maintained by a body in elliptical orbit.

Period. The amount of time a spacecraft requires to go through one complete orbit.

Polar orbit. Earth orbit with a 90° inclination. Spacecraft on this path could pass over every spot on Earth as Earth rotates under the satellite's orbit (see "orbital inclination").

Remote imaging. Images of Earth generated from spacecraft that provide data for mapping, construction, agriculture, oil and gas exploration, news media services, and the like.

Rocket. An aerospace vehicle that carries its own fuel and oxidizer and can operate outside Earth's atmosphere.

Semisynchronous orbit. An orbit set at an altitude of 12,834 miles. Satellites in this orbit revolve around Earth in exactly twelve hours.

Single-stage-to-orbit (SSTO) system. A radically new, reusable single-stage rocket that can take off and land repeatedly and is able to boost payloads into orbit.

Stratosphere. That section of atmosphere about ten to thirty miles above Earth's surface.

Sun-synchronous orbit. A low-Earth orbit inclined at about 98° to the equator. At this inclination and altitude, a satellite's orbital plane will always maintain the same relative orientation to the position of the sun.

Thermosphere. The thin atmosphere about fifty to 300 miles above Earth's surface. It experiences dramatically increased levels of heat compared to the lower layers.

Transfer. Any maneuver that changes a spacecraft orbit.

Transponder. A radar or radio set that, upon receiving a designated signal, emits a radio signal of its own.

Troposphere. The region of the atmosphere from Earth's surface to about ten miles above the equator and five miles above the poles. This is where most clouds, wind, rain, and other weather occurs.

Van Allen belts. Zones of intense radiation trapped in Earth's magnetosphere that could damage unshielded spacecraft.

Space Firsts

February 24, 1949 Project Bumper, the first fully successful two-stage rocket-launch into space, reaches a record altitude of 244 miles.

July 24, 1950 Bumper-WAC becomes first missile launched from Cape Canaveral, Fla.

September 20, 1956 US Jupiter C rocket achieves record first flight, reaching an altitude of 682 miles and landing 3,400 miles from Cape Canaveral.

August 21, 1957 First successful launch of Soviet R7 rocket, which six weeks later will loft Sputnik into orbit.

October 4 USSR launches Sputnik 1, the first man-made satellite, into Earth orbit.

November 3 First animal in space, a dog, is carried aloft by Soviet Sputnik 2.

December 6 First US attempt to orbit satellite fails when Vanguard rocket loses thrust and explodes.

December 17 First successful Atlas booster launch.

January 31, 1958 Explorer 1, first US satellite, launched.

May 15 USSR launches first automatic scientific lab aboard Sputnik 3, proving satellites can have important military uses.

December 18 Project Score spacecraft conducts first US active communication from space.

February 28, 1959 Discoverer 1 becomes first satellite launched from Vandenberg AFB, Calif.

June 9 First engineer group arrives at Cape Canaveral to prepare Atlas booster carrying first Mercury capsule.

August 7 Explorer 6 spacecraft transmits first television pictures from space.

September 12 Soviet Union launches Luna 2, which two days later becomes first man-made object to strike the moon.

April 1, 1960 TIROS 1 becomes first US weather satellite to go aloft.

April 13 Transit 1B becomes first US navigation satellite in space.

May 24 Atlas D/Agema A booster places MIDAS II, first early warning satellite, in orbit.

June 22 US performs first successful launch of multiple independently instrumented satellites by a single rocket.

August 12 First passive communications carried via Echo 1 satellite.

January 31, 1961 Preparing for manned spaceflight, US launches a Mercury capsule, carrying the chimpanzee Ham on a suborbital trajectory.

February 16 Explorer 9 becomes first satellite launched from Wallops Island, Va.

April 12 Soviet cosmonaut Yuri Gagarin pilots Vostok 1 through nearly one orbit to become first human in space.

May 5 Lt. Cmdr. Alan B. Shepard, Jr., aboard Freedom 7 Mercury capsule, becomes first American in space, climbing to 116.5 miles during suborbital flight lasting fifteen minutes, twenty-eight seconds.

October 27 First flight of Saturn rocket marks beginning of more than eleven years of Apollo launches.

February 20, 1962 Project Mercury astronaut Lt. Col. John H. Glenn, Jr., aboard the Friendship 7 capsule, completes the first US manned orbital flight.

December 14 Mariner 2 passes Venus at a distance of 21,600 miles, becoming the first space probe to encounter another planet.

June 16, 1963 Valentina Tereshkova of USSR pilots Vostok 6 to become first woman in space.

July 26 Hughes Corp.'s Syncom 2 (prototype of Early Bird communications satellite) orbits and "parks" over the Atlantic to become world's first geosynchronous satellite.

October 17 Vela Hotel satellite performs first spacebased detection of a nuclear explosion.

July 28, 1964 First close-up lunar pictures provided by Ranger 7 spacecraft.

August 14 First Atlas/Agema D standard launch vehicle successfully fired from Vandenberg AFB.

March 18, 1965 First spacewalk conducted by Alexei Leonov of Soviet Voskhod 2.

March 23 Gemini 3 astronauts Maj. Virgil I. "Gus" Grissom and Lt. Cmdr. John W. Young complete world's first piloted orbital maneuver.

June 4 Gemini 4 astronaut Maj. Edward H. White performs first American spacewalk.

July 14 Mariner provides the first close-up pictures of Mars.

August 21 Gemini 5 launched as first manned spacecraft with electrical power other than batteries; it is equipped with fuel cells.

March 16, 1966 Gemini 8 astronauts Neil A. Armstrong and Maj. David R. Scott perform first manual docking in space with Agena rocket stage.

June 2 Surveyor 1 is first US spacecraft to land softly on the moon. It analyzes soil content and transmits surface images to Earth.

January 25, 1967 Soviet Cosmos 139 antisatellite weapon carries out first fractional orbit bombardment.

January 27 First deaths of US space program occur in flash fire in Apollo 1 command module, killing astronauts Grissom, White, and Lt. Cmdr. Roger B. Chaffee.

September 8 Surveyor 5 conducts first chemical analysis of lunar soil.

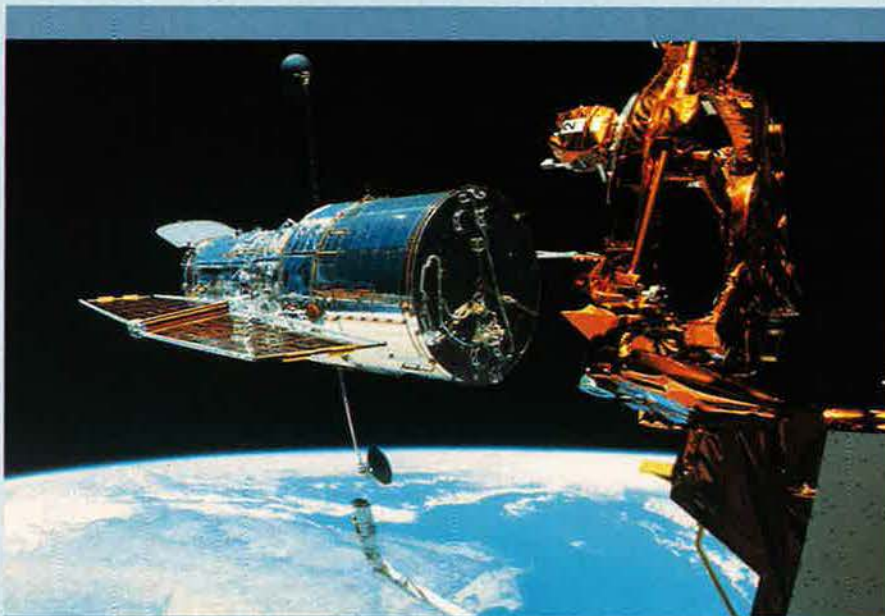
October 20, 1968 Soviet Cosmos 248 and Cosmos 249 spacecraft carry out first co-orbital antisatellite test.

December 21–27 Apollo 8 becomes first manned spacecraft to escape Earth's gravity and enter lunar orbit. First live lunar television broadcast.

March 3–13, 1969 Apollo 9 crew members Col. James A. McDivitt, Col. David R. Scott, and Russell L. Schweickart conduct first test of lunar module in Earth orbit.

July 20 Apollo 11 puts first human, Neil A. Armstrong, on the moon.

November 14–24 US Apollo 12 mission deploys first major scientific experiments on the moon and completes first acquisition of samples from an earlier spacecraft—Surveyor 3.



In a December 1993 space first, the Endeavour crew repairs the Hubble Space Telescope (shown at left) completing one of the most complex, on-orbit servicing operations of a spacecraft. Shuttle astronauts performed five spacewalks during the eleven-day mission.

February 11, 1970 Japan launches first satellite, *Osumi*, from Kagoshima Space Center using Lambda 4S solid-fuel rocket.

January 31, 1971 Apollo 14 launched; its astronauts will complete first manned landing on lunar highlands.

April 19 First space station, *Salyut 1*, goes aloft.

June 6 USSR's *Soyuz 11* performs first successful docking with *Salyut* space station.

October 28 First British satellite, *Prospero*, launched into orbit on Black Arrow rocket.

November 2 Titan IIIC launches first Defense Satellite Communications System Phase II (DSCS II) satellites into geosynchronous orbits.

April 16–27, 1972 Apollo 16 astronauts Capt. John Young, Lt. Cmdr. Thomas K. Mattingly II, and Lt. Col. Charles M. Duke, Jr., are first to use the moon as an astronomical laboratory.

July 23 US launches first Earth Resources Technology Satellite (ERTS A), later renamed *Landsat 1*.

December 3, 1973 Pioneer 10 becomes first space probe to come within reach of Jupiter.

July 15, 1975 US Apollo and Soviet *Soyuz 19* spacecraft perform first international docking of spacecraft in space.

August 12, 1977 Space shuttle *Enterprise* performs first free flight after release from a Boeing 747 at 22,800 feet.

February 22, 1978 Atlas booster carries first Global Positioning System (GPS) Block I satellite into orbit.

December 13 Successful launch of two DSCS II satellites puts a full four-satellite constellation at users' disposal for first time.

July 18, 1980 India places its first satellite, *Rohini 1*, into orbit using its own SLV-3 launcher.

April 12–14, 1981 First orbital flight of shuttle *Columbia* (STS-1) and first landing from orbit of reusable spacecraft.

December 20, 1982 First Defense Meteorological Satellite Program Block 5D-2 satellite launched.

June 18, 1983 Space shuttle *Challenger* crew member Sally K. Ride becomes first American woman in space.

September 11, 1985 International Cometary Explorer becomes first man-made object to encounter a comet (Giacobini-Zinner).

September 13 First US antisatellite intercept test destroys *Solwind* scientific satellite by air-launched weapon.

January 28, 1986 In the first shuttle mishap, *Challenger* explodes after liftoff, killing seven astronauts.

February 22 France launches first *Satellite Pour l'Observation de la Terre* (SPOT) for remote sensing.

August 12 First launch of Japanese H-I rocket puts Experimental Geodetic Satellite into circular orbit.

May 15, 1987 USSR stages first flight of its *Energiya* heavy launcher, designed to lift 100 tons into low-Earth orbit.

November 15, 1988 USSR makes first launch of thirty-ton shuttle *Buran* using *Energiya* rocket.

February 14, 1989 Launch of first Block II GPS satellite begins an operational constellation.

January 17, 1991 What the Air Force calls "the first space war," Operation Desert Storm, opens with air attacks.

October 29 Galileo swings within 10,000 miles of *Gaspra*, snapping first close-up images of an asteroid.

May 13, 1992 The first trio of spacewalking astronauts, working from the shuttle *Endeavour*, rescues *Intelsat 6* from useless low orbit.

January 13, 1993 USAF Maj. Susan Helms, flying aboard *Endeavour*, becomes first US military woman in space.

July 19 Launch of a DSCS Phase III satellite into geosynchronous orbit provides the first full five-satellite DSCS III constellation.

December 2–13 USAF Col. Richard O. Covey pilots shuttle *Endeavour* on successful \$674 million mission to repair \$2 billion Hubble Space Telescope, a mission for which the crew wins the 1993 Collier Trophy.

January 25, 1994 Launch of the 500-pound unpiloted *Clementine* spacecraft marks the first post-Apollo US lunar mission.

February 7 First Titan IV–Centaur booster launches first *Milstar* Block I satellite into orbit.

March 13 First launch of *Taurus* booster (from Vandenberg AFB), which places two military satellites into orbit.

June 29 First visit of a US space shuttle to a space station, the Russian *Mir*.

The Year in Space

July 16–22, 1994

Comet Shoemaker-Levy 9, composed of at least twenty-one fragments, collides with Jupiter, giving astronomers an unprecedented opportunity to observe and collect valuable data about such a collision from both ground- and spacebased observatories.

August 3

NASA announces establishment of a committee, chaired by Dr. Eugene Shoemaker, to plan identification and cataloging, to the extent practicable within ten years, of all comets and asteroids that might threaten Earth.

Using a Pegasus rocket launched from a B-52 off the California coast, Air Force Space and Missile Systems Center's Space Test and Small Launch Vehicle Programs Office successfully orbits an Advanced Photovoltaic and Electronic Experiments satellite as part of an effort to improve the power capacity and efficiency of future spacecraft.

August 4

Brig. Gen. Roger G. DeKok, Air Force Space Command director of Plans, commissions a one-month study on "Reinventing Air Force Space," which aims to trim procurement and support costs for space systems by as much as twenty-five percent.

August 5

President Clinton signs the National Space Transportation Policy, assigning primary responsibility for expendable launch vehicles to DoD and primary responsibility for reusable launch vehicle technologies to NASA. He also directs DoD to support NASA's efforts on reusable launch vehicles and to develop an approach for evolution of an existing expendable launch vehicle.

August 29

Defense Meteorological Satellite Program (DMSP) Flight 12 is launched from Vandenberg AFB, Calif. (Flight 12 will be declared operational September 19, 1994.)

September 30

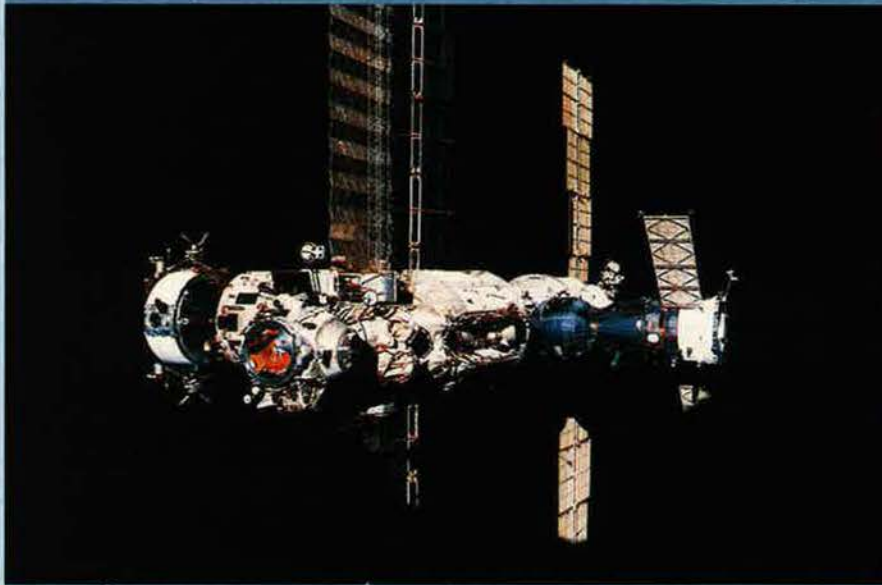
Shuttle *Endeavour* launches the second Space Radar Laboratory mission, which repeats many of the April 1994 investigations, allowing scientists to observe the impact of seasonal changes in different ecological settings.

October 3

An Integrated Program Office is established at Silver Spring, Md., for the new National Polar-Orbiting Operational Environmental Satellite System, successor to the existing military and civilian polar-orbiting weather satellite systems—*i.e.*, DMSP and National Oceanic and Atmospheric Administration.

October 12

NASA loses radio contact with the *Magellan* spacecraft as it plunges into the atmosphere of Venus after circling the planet approximately 15,000 times, transmitting radar images of ninety-eight percent of its cloud-covered surface and producing a ninety-five percent complete gravity-field map.



A cargo bay camera on the space shuttle Discovery captured this view of the Russian space station Mir over the Pacific Ocean during a February 1995 rendezvous. This mission set the stage for the dramatic docking of the US and Russian spaceships in July.

NASA

October 25–28

The Milstar Block II satellite successfully undergoes a critical design review.

November 1

The first Milstar satellite, launched in February 1994, successfully completes initial operational test and evaluation, and the Air Force contracts for acquisition of Milstar satellites 5 and 6 at a projected cost of \$25 million.

November 5

Ulysses, the first probe to explore the Sun's environment at high latitudes, completes its pass over the Sun's southern pole and reveals that the solar wind's velocity at high latitudes (*i.e.*, about two million mph) is nearly twice its velocity at lower latitudes. (Ulysses would begin traversing the Sun's northern pole June 19, 1995.)

December 10

Deputy Secretary of Defense John M. Deutch establishes the position of deputy under secretary of defense for Space Acquisition and Technology.

December 22

A Titan IV rocket with an Inertial Upper Stage launches Defense Support Program (DSP) Flight 17 from Cape Canaveral AS, Fla., into geosynchronous orbit.

January 11, 1995

Three Russian cosmonauts successfully test Mir space station's automatic docking system, clearing the way for a June 1995 linkup with space shuttle *Atlantis*.

January 28

The fourth ultrahigh-frequency Follow-On satellite, the first in the series to incorporate a low-data-rate extremely high frequency capability, is launched from Cape Canaveral atop the first Atlas II-Centaur combination.

January 31

Harris Corp. delivers to the Air Force the

initial production version of the low-rate Small Tactical Terminal for receiving, processing, and displaying weather data from DMSP satellites.

February 6

Two 100-ton spaceships, the shuttle *Discovery* and the space station *Mir*, orbit in formation thirty-seven feet apart for approximately thirteen minutes, the first US-Russian space rendezvous in twenty years. During this *Discovery* mission, Air Force Lt. Col. Eileen Collins becomes the first woman to pilot a US spaceship.

February 17

Based on streamlined procedures that cut processing time in half, Space and Missile Systems Center issues a request for proposals to develop a Spacebased Infrared System to support early warning of missile launches, missile defense, battlespace characterization, and technical intelligence.

March 10

AFSPC's 11th Space Warning Squadron's Attack and Launch Early Reporting to Theater system, which relies heavily on DSP satellites, achieves initial operational capability.

March 14

US astronaut Norman Thagard becomes the first American to accompany Russian cosmonauts aboard *Soyuz TM-21* spacecraft and, on March 16, 1995, becomes the first American to inhabit the *Mir* space station. March 14–18, 1995, is the date of a new record for the most people in space at one time: thirteen aboard *Mir*, *Endeavour*, and *Soyuz TM-21*.)

March 16

Air Force and Western Commercial Space Center officials sign a seventy-six-page agreement granting the latter a twenty-five-year lease on a 100-acre site at Vandenberg AFB for a commercial spaceport.

March 18

Endeavour lands at Edwards AFB, Calif., after setting a new record for the longest shuttle flight to date—sixteen days, fifteen hours.

March 22

After 438 days in space, a new world record, Russian cosmonaut Valery Polyakov returns to Earth.

March 24

The last Atlas E booster (a converted ICBM) in the Air Force inventory lifts an \$84 million DMSP satellite (Flight 13) into polar orbit from Vandenberg AFB.

April 6

The White House Office of Science and Technology Policy launches an inter-agency effort to replace the national space policy drafted by the Bush Administration in 1989.

April 18

T. Keith Glennan, named by President Dwight D. Eisenhower as first NASA administrator in 1958, dies at age 89.

May 22–26

AFSPC and Phillips Laboratory, Kirtland AFB, N. M., join a dozen US, Russian, and Chinese organizations in sponsoring the first "Planetary Defense Workshop" on protecting the terrestrial biosphere from the devastating impact of large-scale asteroids and comets.

June 29

Atlantis (STS-71) docks with *Mir*, the first docking of US and Russian spacecraft since July 1975.

July 7

Astronaut Norman Thagard sets a US space endurance record of 115 days.

Major Military Satellite Systems

Global Positioning System (GPS)

Constellation of twenty-four satellites used by many organizations to determine a precise location on Earth. A small receiver takes signals from three or more GPS satellites within view and calculates a position. First widespread wartime use in the Persian Gulf War, creating increased demand for receivers, which military suppliers had trouble meeting. Since then, DoD has deployed GPS terminals to many more users. GPS is used by a large number of civilian organizations worldwide, and DoD can broadcast both a highly accurate signal for use by specially equipped military receivers and a degraded signal for public use. Highly precise signal gives location within sixteen meters; the degraded signal is accurate to within 100 meters. GPS is finding wide applications within weapon systems, and a growing DoD concern has been the enemy's use of GPS during a future conflict.

crosslinks instead of potentially vulnerable intermediate ground stations. Low-data-rate payload on all satellites will provide seventy-five bps to 2.4 kbps communications. Last four Milstar satellites (Milstar II) will also include a medium-data-rate payload, providing data rates from 4.8 kbps to 1.544 mbps. First Milstar satellite was launched February 7, 1994. Second satellite launch planned for fall 1995. The first Milstar II launch planned for Fiscal Year 1999.

Defense Support Program (DSP)

Infrared detectors aboard these satellites have provided early warning of ballistic missile attack to NORAD since the 1970s. During Operation Desert Storm, operators at Space Command used DSP data to provide warnings of Scud attacks to theater commanders, though the satellite was not designed to spot and track smaller missiles. Information on procurement situation, number of satellites launched, and number to be launched is classified.

other specialized data, such as atmospheric temperature and moisture, snow cover, precipitation intensity and area, and oceanographic and solar-geophysical information for DoD air, sea, land, and space operations.

Fleet Satellite Communications (FLTSATCOM)

Constellation of five satellites operated by USN, USAF, and the presidential command network. A secure link among the three, providing ultrahigh-frequency (UHF) communications. Satellites carry experimental extremely high frequency (EHF) payloads, plus twenty-three channels for communications with naval forces, nuclear forces, and national command authorities. In operation since 1978 in geostationary orbit, with a minimum of four satellites needed for worldwide coverage.

UHF Follow-On (UFO) Satellites

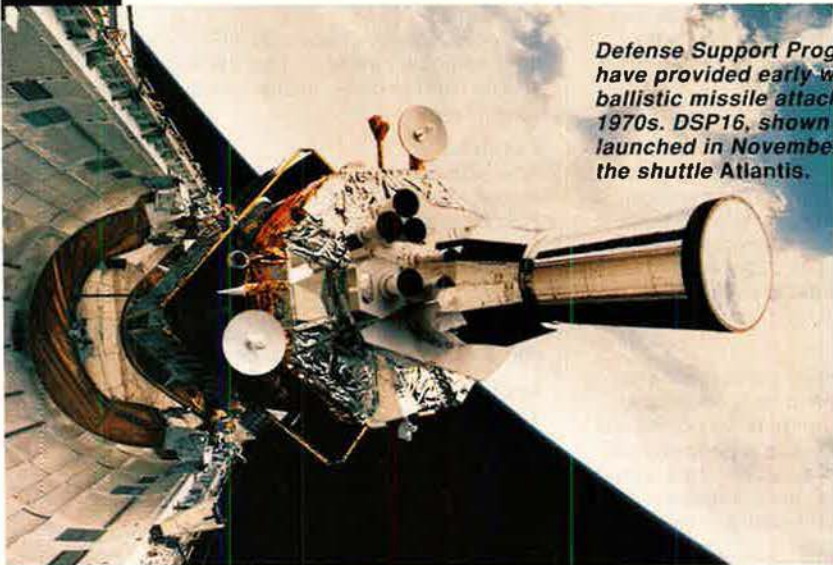
New generation of satellites providing UHF communications to replace FLTSATCOM satellites. UFO satellites have thirty-nine channels—compared to the twenty-three on the FLTSATCOM—are bigger, and have higher power. Compatible with the same terminals used by the earlier systems. UFO-4 was first in the series to include an EHF communications payload with enhanced antijam telemetry, command, broadcast, and fleet interconnectivity. EHF packages constitute an additional eleven channels. Ten UFO satellites were ordered.

Leasesat

Spacecraft that have been providing Navy UHF satellite communications since first launch in 1984 to augment FLTSATCOM. Three satellites, each with thirteen channels, are deployed in roughly the same position as FLTSATCOM spacecraft.

Dark and Spooky

An undisclosed number and type of intelligence satellites are operated by the intelligence agencies in cooperation with the military. The satellites, which monitor Earth with radar, optical sensors, and electronic intercept capability, have been treated as closely guarded secrets since the start of the space age. Even the names of satellites like LaCrosse (radar imaging), Keyhole (optical imaging), White Cloud (ocean reconnaissance), and Aquacade (electronic ferret) are secret and cannot be confirmed by the intelligence agencies. However, the move to declassify the space systems has begun, leading in the last year to the release of extensive information about one now-obsolete spy satellite called Corona. The intelligence community also will release selected archival images obtained by older spy satellites for scientific use. Some observers believe more military space secrets will be disclosed as the Cold War fades.



Defense Support Program satellites have provided early warning of ballistic missile attack since the 1970s. DSP16, shown here, was launched in November 1991, aboard the shuttle Atlantis.

Defense Satellite Communications System (DSCS)

Constellation of five DSCS spacecraft provides voice, data, digital, and television transmissions between major military terminals and national command authorities. Secure voice and high-data-rate communications, operating in superhigh frequency, primarily for high-capacity fixed users.

Military Strategic and Tactical Relay (Milstar)

Provides survivable, enduring, essential communications for the command and control of strategic and tactical forces through all levels of conflict. With a constellation of four near-geosynchronous satellites, will provide worldwide coverage between 65° north and 65° south latitude. Worldwide connectivity will be established using satellite-to-satellite

Spacebased Infrared (SBIR) System

Advanced early-warning satellites to replace the DSP spacecraft if USAF can win approval to move from conceptual stage to production and launch. SBIR is the latest early-warning-satellite proposed by USAF. Recent predecessors were the Follow-On Early Warning System and Alert, Locate, and Report Missiles, which were terminated.

Defense Meteorological Satellite Program (DMSP)

Military weather satellites operating in low-Earth orbit that collect and disseminate global weather information via groundbased systems for armed forces and government agencies. Operating in a two-satellite constellation, each spacecraft collects high-resolution cloud imagery (visible and infrared) from a 1,800-mile wide area beneath it. Satellites collect

Major US Civilian Satellites in Military Use

Advanced Communications Technology Satellite (ACTS)

NASA's ACTS was launched in 1992 on the space shuttle to demonstrate Ka-band communications and on-board switching equipment. Military use of the technology demonstration satellite included communications service to US Army troops deployed in Haiti in 1994.

Geostationary Operational Environmental Satellite (GOES)

NOAA operates GOES-7, GOES-8, and GOES-J, which was launched in late May. A European Meteosat 3 weather satellite augments the system. Satellites hover at 22,300 miles altitude over the equator, monitoring storms and tracking their movements for short-term forecasting. Satellites are a new design that has improved spatial resolution and full-time operational soundings of the atmosphere.

International Telecommunications Satellite Organization (INTELSAT)

Established in 1964 to own and operate a global constellation of communications satellites. Had 134 members and twenty-four satellites as of early June. US signatory to INTELSAT is Comsat Corp. US military use of the system is for routine communications and to distribute the Armed Forces Radio and TV Services network.

International Maritime Satellite (INMARSAT)

Established in 1979 to own and operate satellites for mobile communications. Has seventy-seven member-countries. US signatory is Comsat Corp. By 1995,

INMARSAT operated five satellites, used by US military forces equipped with briefcase-sized satellite phone terminals to communicate from Somalia, Saudi Arabia, Haiti, and other theaters of operation.

Landsat

US government's civilian remote sensing satellite system. Used in polar orbit since 1972. Carries a multispectral scanner able to operate at a resolution of thirty meters and provide imagery that can be computer enhanced to show deforestation, expanding deserts, crop blight, urban sprawl, and other phenomena. Operated by a private company, Earth Observation Satellite Co. Relies on an aging Landsat 5, and the government plans to launch a Landsat 7 satellite in 1998. Military use of Landsat imagery has included mapping and planning for tactical operations.

NOAA-12 and NOAA-14

Two polar orbit satellites for long-term forecasting of weather, operated by NOAA. The satellites fly in a 450-nautical-mile orbit, carrying visible and infrared radiometry imaging sensors and ultraviolet sensors to map ozone levels in the atmosphere. Provide weather updates for all areas of the world every six hours.

Satellite Pour L'Observation de la Terre (SPOT)

Remote sensing satellite system developed by the French space agency, CNES. Owned and operated by the commercial firm, SPOT Image S. A. of Toulouse. SPOT's three satellites

produce images with resolution as fine as ten meters and can be used for stereoscopic viewing for three-dimensional terrain modeling. DoD is one of the company's largest customers, purchasing the images for mission-planning systems, terrain analysis, mapping, and humanitarian relief missions. The images also can be used in weapon-guidance systems.

Tracking and Data Relay Satellite System (TDRSS)

NASA operates six TDRSS satellites to form a global network that allows low-Earth orbiting spacecraft, such as the space shuttle, to communicate with a control center without an elaborate network of ground stations. The geostationary TDRSS, with its ground station in New Mexico, allows mission control in Houston, Tex., to maintain nearly constant contact with the shuttle. Other satellites using TDRSS include the Hubble Space Telescope, Compton Gamma Ray Observatory, Earth Radiation Budget Satellite, and military satellites. TDRSS satellites have been used since 1983. A next-generation system is being built for use with the shuttle, the space station, and satellites.

Transit/NNSS

First Transit orbited in April 1960. Several lofted in early 1960s for use by US Navy submarines and surface ships. Powered by small nuclear generators called System for Nuclear Auxiliary Power. Renamed Navy Navigation Satellite System. Function now augmented by the newer Navstar GPS satellites. Expected to operate through 1990s.

Military Functions in Space

Communications

Provide communications from national command authorities to Joint Force Commander. Provide communications from JFC to squadron-level commanders. Permit transfer of imagery and situational awareness to tactical operations. Permit rapid transmission of JFC intent, ground force observations, and adaptive planning.

Environmental/Remote Sensing

Use space systems to create topographical, hydrographic, and geological maps and charts and develop systems of topographic measurement.

Meteorological Support

Operate weather satellites to provide data on worldwide and local weather systems affecting combat operations.

Missile Defense

Employ space assets to identify, acquire, track, and destroy ballistic and cruise missiles launched against forward-deployed US forces, allied forces, or US territory.

Navigation

Operate Global Positioning System network and certain smaller Navy systems, enable commanders to determine precise locations of friendly and enemy forces and targets. Permit accurate, timely rendezvous of combat forces. Map minefields and other obstacles.

On-Orbit Support

Track and control satellites, operate their payloads, and disseminate data from them.

Reconnaissance and Surveillance

Identify possible global threats and surveillance of specific activity that might be threatening to US or allied military forces or US territory. Reduce effectiveness of camouflage and decoys. Identify "centers of gravity" in enemy forces. Accurately characterize electronic emissions.

Space Control

Control and exploit space using offensive and defensive measures to ensure that

friendly forces can use space capabilities, while denying their use to the enemy. This mission is assigned to USCINCSpace in the Unified Command Plan.

Spacelift

Prepare satellite and booster, joining the two. Conduct checkout prior to launch, carry out launch, and conduct on-orbit checkout.

Strategic Early Warning

Operate satellites to give national leaders early warning of all possible strategic events, including launch of intercontinental ballistic missiles. Identify launch locations and impact points. Cue area and point defense systems.

Tactical Warning/Attack Assessment

Discharge the North American Aerospace Defense Command mission calling for use of all sensors to detect and characterize an attack on US territory. US Space Command carries out similar tactical warning in other theaters.

Major US Agencies In Space

Central Imagery Office (CIO)

Headquarters: Vienna, Va.
Established: May 6, 1992
Director: Dr. Annette J. Krygiel

Mission, Purpose, Operations

Ensure responsive imagery support to the national intelligence community, DoD, National Security Council, and other US government departments and agencies; also, as a DoD combat support agency, ensure timely imagery support to military operations. Does not own imagery products but has management and oversight responsibility for imagery. Intelligence imagery continues to be archived at the CIA's National Photographic Interpretation Center. However, if the proposed National Imagery Agency is formed, the CIO likely would be the focal point, gaining staff and assets from other organizations.

Structure

Plans, Policy, and Program Directorate
Operations and Tasking Directorate
Systems Technology and Standards Directorate
Support Directorate

Personnel

Active Duty	29
Officers	28
Enlisted	1
Reserve component	0
Civilians	245
Total	274

Central Intelligence Agency (CIA) Office of Development and Engineering

Headquarters: Washington, D. C.
Established: 1973
Director: Edmund Nowinski

Mission, Purpose, Operations

Develop systems from requirements definition through design, testing, and evaluation to operations. Works with systems not available commercially. Disciplines include laser communications, digital imagery processing, real-time data collection and processing, electro-optics, advanced signal collection, artificial intelligence, advanced antenna design, mass data storage and retrieval, and large systems modeling and simulations. Work includes new concepts and systems upgrades.

Structure: Classified

Personnel: Classified

National Aeronautics and Space Administration (NASA)

Headquarters: Washington, D. C.
Established: 1958
Administrator: Daniel S. Goldin

Mission, Purpose, Operations

Explore and develop space for human enterprise, increase knowledge about Earth and space, and conduct research in space and aeronautics. Operate the space shuttle and lead an international program to build a permanently occupied space station, which will be launched starting in 1997. Launch satellites for space science, Earth observations, and a

broad range of technology research and development. Conduct aeronautical research and development.

Structure

Ten centers around the US, including Johnson Space Center, Houston, Tex.; Marshall Space Flight Center, Huntsville, Ala.; Kennedy Space Center, Fla.; Lewis Research Center, Cleveland, Ohio; Langley Research Center, Hampton, Va.; Ames Research Center, Mountain View, Calif.; Dryden Flight Research Center, Edwards AFB, Calif.; Stennis Space Center, Bay Saint Louis, Miss.; the Jet Propulsion Laboratory, Pasadena, Calif.; and Goddard Space Flight Center, Greenbelt, Md.

Personnel

Civilians	21,100
Contractors	180,000

National Oceanic and Atmospheric Administration (NOAA)

Headquarters: Washington, D. C.
Established: October 3, 1970
Director: Dr. D. James Baker

Mission, Purpose, Operations

Provide satellite observations of the global environment by operating a national system of satellites. Explore, map, and chart the global ocean and its resources and describe, monitor, and predict conditions in the atmosphere, ocean, and space environment. Its National Environmental Satellite, Data, and Information Service processes vast quantities of satellite images and data. Its prime customer is NOAA's National Weather Service, which uses satellite information to create forecasts.

Structure

Headquarters
National Environmental Satellite, Data, and Information Service
National Weather Service
National Ocean Service
National Marine Fisheries Service
Office of Oceanic and Atmospheric Research
NOAA Corps
Office of Sustainable Development and Intergovernmental Affairs
Office of Global Programs
Coastal Ocean Program

Personnel

National Environmental Satellite, Data, and Information Service	816
Other NOAA employees	13,001
Total	13,817

National Reconnaissance Office (NRO)

Headquarters: Washington, D. C.
Established: September 1961
Director: Jeffrey K. Harris

Mission, Purpose, Operations

Provide satellite reconnaissance to the US government to ensure that the US has the technology and assets to acquire worldwide intelligence. NRO satellites collect intelligence to support monitoring of arms-control agreements, military operations and exercises, events of

national interest, natural disasters, and environmental issues.

Structure

NRO is a DoD agency, funded through the portion of the National Foreign Intelligence Program known as the National Reconnaissance Program. Both the Secretary of Defense and Director of Central Intelligence have approval of the program. Six offices and three directorates reporting up to the level of the director. Offices are management services and operations, technology, plans and analysis, systems applications, space launch, and operational support. Directorates are space systems acquisition and operations, communications systems acquisition and operations, and imagery systems acquisition and operations.

Personnel

Staffed by CIA and military and civilian DoD employees.

National Security Agency (NSA)

Headquarters: Fort Meade, Md.
Established: 1952
Director: Vice Admiral J. M. McConnell, USN

Deputy Director: William P. Crowell

Mission, Purpose, Operations

Protect US communications and produce foreign intelligence information. Supply leadership, products, and services to protect classified and unclassified information from interception, unauthorized access, and technical intelligence threats. In the foreign signals intelligence area, the central point for collecting and processing activities conducted by the US government, with authority to produce signals intelligence in accord with objectives, requirements, and priorities established by the CIA director with the advice of the National Foreign Intelligence Board.

Structure

Established by a presidential directive in 1952 as a separate agency within DoD under the direction, authority, and control of the Secretary of Defense, who serves as the executive agent of the US government for the production of communications intelligence information. The Central Security Service was established in 1972 by a presidential memorandum to provide a more unified cryptological organization within the Defense Department. The NSA director also serves as chief of the CSS and controls the signals intelligence activities of the military services.

Personnel: Classified

Other Agencies

The White House Office of Science and Technology Policy; Defense Department's Advanced Research Projects Agency; Ballistic Missile Defense Organization; US Space Command and the component commands of the Air Force, Navy, and Army; North American Aerospace Defense Command; and the US Transportation Department's Office of Commercial Space Transportation.

Russian Space Activity, 1994

	Launches	Payloads
Communications	15	25
Military reconnaissance	7	7
Unmanned space station resupply	5	5
Navigation	5	11
Manned flight	3	3
Remote sensing	2	2
Early warning	2	2
Electronic intelligence	2	2
Meteorology	2	2
Science	2	2
Geodetic	1	1
Military ocean surveillance	1	1
Test/development	1	1
Total	48	64

Russian Launch Site Activity, 1994

Spacecraft	Number of launches
Baikonur Cosmodrome, Tyuratam, Kazakhstan	
Proton-4	13
Soyuz	11
Zenit-2	4
Tsyklon-2	1
Rokot	1
Total	30
Plesetsk Cosmodrome, Plesetsk, Russia	
Tsyklon-3	6
Kosmos	5
Soyuz	4
Molniya	3
Total	18

In the tables, "Russia" is used for simplicity but includes the former USSR, current Russia, and other members of the Commonwealth of Independent States.

US Space Funding

(Millions of current dollars)

FY	NASA	DoD	Other	Total
1959	\$ 261	\$ 490	\$ 34	\$ 785
1960	462	561	43	1,066
1961	926	814	69	1,809
1962	1,797	1,298	200	3,295
1963	3,626	1,550	259	5,435
1964	5,016	1,599	216	6,831
1965	5,138	1,574	244	6,956
1966	5,065	1,689	217	6,971
1967	4,830	1,664	216	6,710
1968	4,430	1,922	177	6,529
1969	3,822	2,013	141	5,976
1970	3,547	1,678	115	5,340
1971	3,101	1,512	127	4,740
1972	3,071	1,407	97	4,575
1973	3,093	1,623	109	4,825
1974	2,759	1,766	116	4,641
1975	2,915	1,892	107	4,914
1976	4,074	2,443	142	6,659
1977	3,440	2,412	131	5,983
1978	3,623	2,738	157	6,518
1979	4,030	3,036	178	7,244
1980	4,680	3,848	160	8,688
1981	4,992	4,828	158	9,978
1982	5,528	6,679	234	12,441
1983	6,328	9,019	242	15,589
1984	6,648	10,195	293	17,136
1985	6,925	12,768	474	20,167
1986	7,165	14,126	368	21,659
1987	9,809	16,287	352	26,448
1988	8,302	17,679	626	26,607
1989	10,098	17,906	444	28,448
1990	12,142	15,616	387	28,145
1991	13,036	14,181	566	27,783
1992	13,199	15,023	624	28,846
1993	13,077	14,106	559	27,742
1994	13,022	13,166	465	26,653
Totals	203,977	221,108	9,047	434,132

Russian Operational Spacecraft, 1994

Mission	Type	Number
Communications	Kosmos (Strela-3)	30
	Raduga/Raduga-1	14
	Gorizont	10
	Molniya-1	8
	Molniya-3	8
	Kosmos (Geizer)	4
	Kosmos (Strela-2)	3
	Gorizont/RIMSAT	3
	Kosmos (Luch)	2
	Ekran-M	2
	Ekspress	1
	Gals	1
	Radio Rosto	1
Navigation	Kosmos GLONASS	16
	Kosmos (military)	6
	Kosmos/Nadezhda (civil)	4
Meteorology	Meteor-2	2
	Meteor-3	2
	Elektro (GOMS)	1
Early warning	Kosmos (Okko)	6
	Kosmos (Prognoz)	4
Electronic intelligence	Kosmos (Tselina-2)	6
	Kosmos (EORSAT)	4
	Kosmos (Tselina-D)	2
Photoreconnaissance	Kosmos (5th generation)	2
	Kosmos (7th generation)	1
Remote sensing	Okean-O	2
	Resurs-O1	1
Geodesy	Kosmos (Etalon)	2
	Kosmos GEO-IK	1
Radar calibration	Kosmos	1
	Mir	1
Space station activity	Kvant-1	1
	Kvant-2	1
	Kristall	1
	Soyuz TM	1
	Progress M	1
Scientific activity	Kosmos	1
	Coronas-I	1
	Granat	1

Older spacecraft sometimes are placed in orbital standby mode.

Figures are expressed in current dollars and are rounded. NASA totals represent space activities only. "Other" category includes the Departments of Energy, Commerce, Agriculture, Interior, and Transportation; the National Science Foundation; the Environmental Protection Agency; and other agencies.

Worldwide Launches by Site 1957-94

Launch Site	Nation	Launches
Plesetsk	Russia	1,409
White Sands Missile Range, N. M.	US	1,050
Tyuratam/Baikonur	Russia	971
Vandenberg AFB, Calif.	US	502
Cape Canaveral AS, Fla.	US	492
Poker Flat Research Range, Alaska	US	257
JFK Space Center, Fla.	US	85
Kapustin Yar	Russia	83
Kourou	French Guiana	69
Tanegashima	Japan	26
Shuang Cheng-tzu/Jiuquan	China	22
Uchinoura	Japan	21
Wallops Flight Facility, Va.	US	19
Xichang	China	14
Indian Ocean Platform	Kenya	9
Sriharikota	India	6
Edwards AFB, Calif.	US	5
Hammaguir	Algeria	4
Woomera	Australia	2
Taiyun	China	2
Yavne	Israel	2
Total		5,050

Military vs. Civilian Launches

Year	Military		Civilian	
	US	Russia	US	Russia
1957	0	0	0	2
1958	0	0	5	1
1959	5	0	5	3
1960	10	0	6	3
1961	19	0	10	6
1962	31	5	21	15
1963	26	7	12	10
1964	32	15	25	15
1965	28	25	35	23
1966	32	27	41	17
1967	24	46	34	20
1968	20	49	25	25
1969	16	51	24	19
1970	15	55	14	26
1971	10	60	22	23
1972	11	53	20	21
1973	8	58	15	28
1974	6	52	18	29
1975	7	60	21	29
1976	7	74	19	25
1977	9	69	15	29
1978	8	60	24	28
1979	4	60	12	27
1980	5	64	8	25
1981	5	59	13	39
1982	6	68	12	33
1983	7	58	15	40
1984	12	63	10	34
1985	6	64	11	33
1986	3	63	3	28
1987	6	62	2	33
1988	6	53	6	37
1989	13	42	5	32
1990	13	45	14	30
1991	9	30	9	29
1992	12	32	16	22
1993	13	26	10	21
1994	12	26	14	22
Total	456	1,581	571	882

Manned Spaceflights

Year	US		Russia	
	flights	persons	flights	persons
1961	2	2	2	2
1962	3	3	2	2
1963	1	1	2	2
1964	0	0	1	3
1965	5	10	1	2
1966	5	10	0	0
1967	0	0	1	1
1968	2	6	1	1
1969	4	12	5	11
1970	1	3	1	2
1971	2	6	2	6
1972	2	6	0	0
1973	3	9	2	4
1974	0	0	3	6
1975	1	3	4	8
1976	0	0	3	6
1977	0	0	3	6
1978	0	0	5	10
1979	0	0	2	4
1980	0	0	6	13
1981	2	4	3	6
1982	3	8	3	8
1983	4	20	2	5
1984	5	28	3	9
1985	9	58	2	5
1986	1	7	1	2
1987	0	0	3	8
1988	2	10	3	9
1989	5	25	1	2
1990	6	32	3	7
1991	6	35	2	6
1992	8	53	2	6
1993	7	41	2	5
1994	7	42	3	8
Total	96	434	79	175

Payloads By Mission, 1957-94

Category	US	Russia
Platforms	0	462
Earth orbital science	214	205
Automated lunar, planetary	55	85
Moon	25	34
Mercury	1	0
Venus	8	33
Mars	9	18
Outer planets	4	0
Interplanetary space	8	0
Applications	394	481
Communications	270	270
Weather	97	74
Geodesy	20	34
Earth resources	7	94
Materials processing	0	9
Piloted activities	135	222
Earth orbital	85	84
Earth orbital (related)	13	130
Lunar	20	0
Lunar (related)	17	8
Launch vehicle tests	11	22
General engineering tests	44	4
Reconnaissance	421	1,070
Photographic	246	792
Electronic intelligence	90	127
Ocean electronic intelligence	38	79
Early warning	47	72
Minor military operations	44	161
Navigation	79	195
Theater communication	0	535
Weapons-related activities	2	56
Fractional orbital bombardment	0	18
Antisatellite targets	2	18
Antisatellite interceptors	0	20
Other military	16	1
Other civilian	2	1
Total	1,417	3,500

Spacefarers

(As of end of 1994)

Nation	Persons	Nation	Persons
Afghanistan	1	Mexico	1
Austria	1	Mongolia	1
Belgium	1	Netherlands	1
Bulgaria	2	Poland	1
Canada	3	Romania	1
Cuba	1	Russia	80
Czechoslovakia	1	Saudi Arabia	1
France	5	Switzerland	1
Germany	7	Syria	1
Hungary	1	United Kingdom	2
India	1	United States	204
Italy	1	Vietnam	1
Japan	3	Total	323

Payloads in Orbit

Launcher/operator	Objects	Launcher/operator	Objects
Argentina	1	Japan	51
Australia	7	Luxembourg	4
Brazil	5	Mexico	4
Canada	16	NATO	8
China	15	North Korea	2
Czechoslovakia	1	Portugal	1
ESA	25	Russia	1,320
France	26	Saudi Arabia	3
France/Germany	2	Spain	3
Germany	14	Sweden	3
India	11	Thailand	2
Indonesia	6	Turkey	1
Italy	5	United Kingdom	22
ITSO ¹	45	United States	656
		Total	2,259

¹International Telecommunications Satellite Organization

Other Spacefaring Nations

For eight years after Sputnik went into orbit in October 1957, the superpowers alone were able to launch spacecraft. France broke the monopoly in 1965, establishing an independent capability. China, India, Japan, and Israel also have hurled satellites into space using indigenously built rockets. European capabilities are embodied in the European Space Agency (ESA), a group of thirteen nations.

China launched its first satellite in 1970 and has at least thirty-eight satellites on orbit. China also launches science and military reconnaissance satellites and has made commercial launches for other nations. Its primary launch site is near Jiuquan, in northern China; a newer site is near Xichang in southeastern China, and a third is at Taiyun. The launch program relies on the Long March series of rockets, one version of which has a cryogenic upper stage. Chinese astronauts were in training in the 1970s, but the country has indefinitely deferred manned space flight.

ESA was formed in 1975 for civilian activities only. It has thirteen members: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland, and the UK. A major activity is development of the Ariane rocket. France led development of the booster, which is

launched from Kourou, French Guiana. The heavy-payload Ariane 5 rocket, to debut in fall 1995, will be a significant addition to ESA capabilities. Arianespace, a private company, markets Ariane and manages launches. France, Italy, and Germany all have strong programs.

India launched its first satellite, Rohini 1, into orbit in July 1980. The Indian Space Research Organization operates an offshore Sriharikota Island launch site in the Bay of Bengal. India's booster program includes the Satellite Launch Vehicle, Augmented Satellite Launch Vehicle, and Polar Satellite Launch Vehicle. The latter is capable of placing spacecraft into polar orbit. India is particularly interested in remote sensing for resource, weather, and reconnaissance purposes. An Indian cosmonaut flew on a Soviet Soyuz mission in 1984.

Israel launched its first test satellite, Ofeq 1, into orbit September 1988. Believed to have been launched from Yavne in the Negev Desert, satellites in the Ofeq series are thought to be dedicated to military purposes. Ofeq is seen as a step toward creation of a military satellite reconnaissance system. The prime booster is Shavit, possibly based on the Jericho 2 missile.

Year	Launches					
	France	China	Japan	Europe	India	Israel
1965	1					
1966	1					
1967	2					
1968						
1969						
1970	2	1	1			
1971	1	1	2			
1972			1			
1973						
1974			1			
1975	3	3	2			
1976		2	1			
1977			2			
1978		1	3			
1979			2	1		
1980			2		1	
1981		1	3	2	1	
1982		1	1			
1983		1	3	2	1	
1984		3	3	4		
1985		1	2	3		
1986		2	2	2		
1987		2	3	2		
1988		4	2	7		1
1989			2	7		
1990		5	3	5		1
1991		1	2	8		
1992		3	1	7	1	
1993		1	1	7		
1994		5	2	6	2	
Total	10	38	47	63	6	2

Japan put its first satellite into orbit in 1970 and has made at least forty-seven successful satellite launches. Communications, remote sensing, weather, and scientific satellites are on orbit. Japan's satellite program is run by the National Space Development Agency and the Institute of Space and Astronautical Science. Main launch sites are

Kagoshima, on Kyushu, southwest of Tokyo, and Tanegashima, an island south of Kyushu. The Mu series of launch vehicles is used to orbit scientific satellites and toss spacecraft into deep space. N-1 and N-2 rockets were based on the US Delta. The H-1 has begun to replace the N-1 and N-2 boosters. The H-2 booster was first launched in 1994.

Space and Missile Badges



Space Operations



**Senior
Space Operations**



**Master
Space Operations**



Astronaut Pilot*



**Senior
Astronaut Pilot**



**Command
Astronaut Pilot**



Missileer



**Senior
Missileer**



**Master
Missileer**



Missile Operations



**Senior
Missile Operations**



**Master
Missile Operations**

*The astronaut designator indicates a USAF rated officer qualified to perform duties in space (fifty miles and up) and who has completed at least one operational mission. Pilot wings are used here only to illustrate the position of the designator on the wings.

Air Force Space Command Headquarters, Peterson AFB, Colo.

(As of July 1, 1995)

Commander
Gen. Joseph W. Ashy

Space Warfare Center • Falcon AFB, Colo.
Commander **Col. Howard W. Fry, Jr.**

14th Air Force • Hq., Vandenberg AFB, Calif.
Commander **Brig. Gen. (Maj. Gen. selectee) David L. Vesely**

- 21st Space Wing, Peterson AFB, Colo.
- 30th Space Wing, Vandenberg AFB, Calif.
- 45th Space Wing, Patrick AFB, Fla.
- 50th Space Wing, Falcon AFB, Colo.
- 73d Space Group, Falcon AFB, Colo.

20th Air Force • Hq., F. E. Warren AFB, Wyo.
Commander **Maj. Gen. Robert W. Parker**

- 90th Missile Wing, F. E. Warren AFB, Wyo.
- 91st Missile Group, Minot AFB, N. D.
- 321st Missile Group, Grand Forks AFB, N. D.
- 341st Missile Wing, Malmstrom AFB, Mont.
- 351st Missile Wing, Whiteman AFB, Mo.

Air Force Space Acquisition Organizations

Air Force Materiel Command • Wright-Patterson AFB, Ohio
Commander **Gen. Henry Viccellio, Jr.**

Space and Missile Systems Center • Los Angeles AFB, Calif.
Commander **Lt. Gen. Lester L. Lyles**

- Defense Meteorological Satellite SPO¹
- Launch Programs SPO
- Space Test and Experimentation Programs
- Satellite and Launch Control SPO
- Navstar Global Positioning System JPO²
- Phillips Laboratory, Kirtland AFB, N. M.
- Defense Dissemination Program

Air Force Acquisition Executive • Washington, D. C.
Darleen A. Druyun (Acting Director)

Program Executive Officer for Space Programs
Vacant

- MILSATCOM System JPO
- Titan SPO
- Spacebased Early Warning SPO
- Evolved Expendable Launch Vehicle SPO

¹System(s) Program Office

²Joint Program Office

Recent Space Issues and Developments

Commercial remote sensing

At least three private concerns were pursuing commercial high-resolution satellite programs in 1995, following a White House decision to allow US companies to launch such satellites, sell imagery, and even sell turnkey satellite systems under certain conditions. By 1998, the public should be able to purchase satellite images with objects as small as one meter clearly visible. Although satellite operators say the market for the images is primarily nonmilitary users who buy aerial photography, the pictures will be as good as some spy satellite photos and thus have military use. Defense and intelligence communities were working with commercial firms to establish policy and procedures that would allow the US ventures to lead the international market for the images at the same time national security concerns were being addressed.

Civilian vs. military control of Global Positioning System (GPS)

With the increasing reliance of civilian

users on GPS and a desire by air traffic controllers around the world to use satellite navigation, the idea of turning GPS operations over to a civilian agency, such as the FAA, has been raised. In March 1995, DoT and DoD reached an agreement on civil use of corrected GPS signals.

Launcher development: X-34, X-33, EELV

Three programs to improve US access to space were endorsed in a September 1994 launch policy statement from the White House. Since then, NASA and the Air Force have begun working on all three. NASA is managing the X-34 and X-33 programs. The X-33 could ultimately lead to a low-cost reusable launch vehicle to replace the space shuttle, though there are questions about whether NASA can afford the launcher's development costs. The agency was spending study money on the initiative in 1995 and 1996. The X-34 is a smaller reusable launcher being developed by Orbital Sciences Corp. and Rockwell International Corp. with the

support of NASA (see "Delta Clipper" below). The Air Force manages the Evolved Expendable Launch Vehicle (EELV) program, aimed at fostering the evolution of a current launcher into a family of rockets with reduced launch costs to replace the current DoD medium and heavy launchers. In 1995, the Air Force began a competition to select several companies to work toward the EELV goal, intending to select a single contractor in a few years. The military was to award \$120 million worth of contracts to get the EELV effort started. The medium variant of the EELV is scheduled to begin operations in 2002 with the heavy variant in 2005.

Declassification of imagery

In February 1995, President Clinton signed an executive order authorizing more than 800,000 satellite photos taken in the 1960s and 1970s to be declassified. The images—the total may actually be seven million—are from the Keyhole series of satellite reconnaissance cameras, numbered KH-1 through KH-6. The Defense Department was to take

about eighteen months to prepare the images for release, with the photos due to become publicly available by August 1996. They will be obtainable through the US Geological Survey, the National Archives, and on several Internet and World Wide Web sites.

Delta Clipper

McDonnell Douglas resumed suborbital test flights of its DC-X Delta Clipper-Experimental rocket May 16, 1995, after a one-year hiatus. The suborbital rocket is demonstrating technology that could be used to build an orbital single-stage-to-orbit launcher with greatly reduced costs. The program has been supported by the Ballistic Missile Defense Organization and Phillips Laboratory, Kirtland AFB, N. M. NASA is sponsoring an upgrade to the rocket, which will be tested in 1996 under Phillips Lab management.

Early warning satellites

The drive to put space assets directly into the hands of warfighters, pushed hard by former US Space Command Commander in Chief Gen. Charles A. Horner, has resulted in organizational and programmatic changes at USSPACECOM in the last year. At Air Force Space Command's Space Warfare Center (SWC), formerly classified TENCAP (Tactical Exploitation of National Capabilities) programs were being turned into systems and user equipment for pilots and ground crews in tactical conflicts. ALERT (Attack and Launch Early Reporting to Theater), a TENCAP program to provide rapid warning and targeting information for

theater missile attack, was activated and turned over to a new squadron. A Joint Space Warfare Center was being established by USSPACECOM to be collocated with the SWC in Colorado Springs, Colo.

BMDO and ARPA wind down space ops

With continuing cutbacks in military spending, two agencies that funded extensive military space research and

experimentation during the previous decade have virtually dropped out of the space business. Both the Ballistic Missile Defense Organization (formerly the Strategic Defense Initiative Organization) and the Advanced Research Projects Agency have eliminated most of their space programs. The remaining space research and development work for the military is concentrated at Phillips Lab.

Space Leaders

(As of July 1, 1995)

Directors, National Reconnaissance Office

Joseph V. Charyk	Sept. 6, 1961-Mar. 1, 1963
Brockway McMillan	Mar. 1, 1963-Oct. 1, 1965
Alexander H. Flax	Oct. 1, 1965-Mar. 11, 1969
John L. McLucas	Mar. 17, 1969-Dec. 20, 1973
James W. Plummer	Dec. 21, 1963-June 28, 1976
Thomas C. Reed	Aug. 9, 1976-Apr. 7, 1977
Hans Mark	Aug. 3, 1977-Oct. 8, 1979
Robert J. Hermann	Oct. 8, 1979-Aug. 2, 1981
Edward C. Aldridge, Jr.	Aug. 3, 1981-Dec. 16, 1988
Martin C. Faga	Sept. 26, 1989-Mar. 5, 1993
Jeffrey K. Harris	May 19, 1994

Commanders, Air Force Space Command

Gen. James V. Hartinger	Sept. 1, 1982-July 30, 1984
Gen. Robert T. Herres	July 30, 1984-Oct. 1, 1986
Maj. Gen. Maurice C. Padden	Oct. 1, 1986-Oct. 29, 1987
Lt. Gen. Donald J. Kutyna	Oct. 29, 1987-Mar. 29, 1990
Lt. Gen. Thomas S. Moorman, Jr.	Mar. 29, 1990-Mar. 23, 1992
Gen. Donald J. Kutyna	Mar. 23, 1992-July 1, 1992
Gen. Charles A. Horner	July 1, 1992-Sept. 13, 1994
Gen. Joseph W. Ashy	Sept. 13, 1994

Proposals and Prospects

Launcher Concepts

Sea Launch

Boeing Commercial Space Co. and three foreign partners teamed in 1995 to develop Sea Launch, a system that will use a rocket built in Ukraine and launched from a ship at sea to put payloads weighing 5,900 kilograms (13,000 pounds) into geosynchronous transfer orbit (GTO). Sea Launch is scheduled to become available in February 1998. Boeing's partners in the venture are RSC Energiya, a Russian firm that will supply the vehicle's third stage, a Block DM, and integration and support equipment; NPO Yuzhnoye, a Ukrainian aerospace firm that will provide the Zenit rocket for use as the first two Sea Launch stages; and Kvaerner, a European company with experience in North Sea offshore oil platform operations that will build the launch platform and command ship.

X-33

An experimental vehicle under study by NASA that could be the precursor to a

single-stage-to-orbit launcher for the next century. A subsequent phase of the program, if it is pursued, would feature a reusable launch vehicle capable of reducing launch costs by a factor of ten by 2012. NASA selected three aerospace company teams to study X-33, with plans to choose one to begin building a small demonstrator in July 1996. The five-year budget for the project was tentatively set at \$650 million, with some \$5 billion to \$18 billion needed to develop the operational version.

X-34

Orbital Sciences Corp. and Rockwell International Corp. were selected by NASA in March to develop the X-34, a low-cost, reusable small launcher, with \$70 million in government funds and \$100 million to come from the companies' coffers. The two-stage X-34 will be launched from an aircraft back in the direction of the runway where the reusable winged booster will land after the mission. The contract with NASA calls for flight tests starting in 1998, with operations to begin around 1999.

Delta III

A new intermediate-class launcher, the Delta III is being developed without government financial support by McDonnell Douglas Corp. for a first launch in the first half of 1998. Hughes Aircraft Co., a commercial satellite builder, bought ten Delta III launches in 1995 to give McDonnell Douglas a customer base for the rocket and bring down the cost of launch. Delta III will be able to boost 8,400 pounds to GTO, more than twice what the Delta II can lift. The rocket will have a new cryogenic upper stage and larger fairing.

Med Lite

McDonnell Douglas is in negotiations with NASA for the Medium Light Expendable Launch Vehicle Services program to fill the gap between the small launch vehicle market and the medium-class market. Med Lite's objective is to support the Mars Surveyor and Discovery programs. Details on the vehicle options selected by NASA were under negotiation in June.

Satellite Concepts

Combined weather satellites

In May 1994, President Clinton approved merging the civil and military polar satellites into a single system. This would reduce the number of US satellites from four to three and save \$300 million through 1999. DoD's Defense Meteorological Satellite Program (DMSP) Block 6 procurement was to be coordinated with the National Oceanic and Atmospheric Administration's purchase of NOAA O, P, and Q satellites. A tri-agency memorandum among NOAA, DoD, and NASA directs an integrated program office for the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) to take responsibility for DMSP as soon as practical. The primary site at Suitland, Md., will take over operational control in the second quarter of 1998, with the backup site at Falcon AFB, Colo., to be operational in the third quarter. The first NPOESS satellite is scheduled for launch in 2004.

Tactical Support Satellites

The Advanced Research Projects Agency began developing Tactical Support Satellites in 1994. This year, Congress provided \$70 million for ARPA and Phillips Lab, Kirtland, N. M., to continue the project.

Brilliant Eyes

An advanced satellite concept for using smaller satellites in low orbit to track theater ballistic missiles with infrared sensors. Also called the Space and Missile Tracking System. Two Brilliant Eyes demonstrator satellites were to be developed by 1998 under an Air Force contract to TRW awarded in May. Deployment of the system depends in part on resolution of issues involving compliance with the Antiballistic Missile Treaty.

The Golden Age of NASA

Name
Duration
Cost
Distinction
Highlight
Number of flights
Key events

Project Mercury
November 3, 1958–May 16, 1963
\$392.1 million (cost figures are in current dollars)
First US manned spaceflight program
Astronauts are launched into space and returned safely to Earth
May 5, 1961 Lt. Cmdr. Alan B. Shepard, Jr., makes first US manned flight, a suborbital trip of fifteen minutes.
February 20, 1962 Lt. Col. John H. Glenn, Jr., becomes first American to orbit Earth.
May 15, 1963 Maj. L. Gordon Cooper, Jr., begins flight of twenty-two orbits in thirty-four hours.

Name
Duration
Cost
Distinction
Highlight
Number of flights
Key events

Project Gemini
January 15, 1962–November 15, 1966
\$1.3 billion
First program to explore docking, long-duration flight, rendezvous, spacewalks, and guided reentry
Dockings and rendezvous techniques practiced in preparation for Project Apollo
Ten
June 3–7, 1965 Flight in which Maj. Edward H. White II makes first spacewalk.
August 21–29, 1965 Cooper and Lt. Cmdr. Charles "Pete" Conrad, Jr., withstand weightlessness.
March 16, 1966 Neil A. Armstrong and Maj. David R. Scott execute the first space docking.
September 15, 1966 Conrad and Richard F. Gordon, Jr., make first successful automatic, computer-steered reentry.

Name
Duration
Cost
Distinction
Highlights
Number of flights
Key events

Project Apollo
July 25, 1960–December 19, 1972
\$24 billion
Space program that put humans on the moon
Neil Armstrong steps onto lunar surface. Twelve astronauts spend 160 hours on the moon.
Eleven
May 28, 1964 First Apollo command module is launched into orbit aboard a Saturn 1 rocket.
January 27, 1967 Lt. Col. Virgil I. "Gus" Grissom, Lt. Cmdr. Roger B. Chaffee, and White die in a command module fire in ground test.
October 11–22, 1968 First manned Apollo flight proves "moonworthiness" of spacecraft.
December 21–27, 1968 First manned flight to moon and first lunar orbit.
July 16–24, 1969 Apollo 11 takes Armstrong, Col. Edwin E. "Buzz" Aldrin, Jr., and Lt. Col. Michael Collins to the moon and back. Armstrong and Aldrin make first and second moon walks.
December 7–19, 1972 Final Apollo lunar flight produces sixth manned moon landing.

Selected NASA Projects Fiscal Year 1996 Proposal, Current Dollars

■ **AXAF, \$237.6 million.** Space science. The Advanced X-Ray Astrophysics Facility spacecraft to study the composition and nature of galaxies, stellar objects, and interstellar phenomena. Craft Critical Design Review in February 1996.

■ **Cassini, \$191.5 million.** Space science. Spacecraft mission to Saturn. Seeks data on formation of solar system, possible presence of basis for chemical evolution of life. Scheduled launch October 1997.

■ **Discovery, \$103.8 million.** Space science. Spacecraft missions. Mars Pathfinder and Near Earth Asteroid Rendezvous. Mars Pathfinder launch scheduled for December 1996. Near Earth Asteroid Rendezvous scheduled for February 1996. Intended as low-cost, quick design-to-flight plans.

■ **Earth Observing System, \$591.1 million.** Mission to Planet Earth environmental project. Series of satellites to document global climatic change and observe environmental processes. Scheduled launches start 1998.

■ **Explorer, \$129.2 million.** Space science. Four missions and spacecraft development. Study of X-ray sources, solar corona, organic compounds in interstellar clouds. Scheduled launches in 1995, 1997, and 1998.

■ **Galileo, \$72.1 million.** Space science, planetary exploration. Funds to be expended to support operation and science data analysis for spacecraft due to arrive in Jupiter orbit December 7, 1995.

■ **Lunar Prospector, \$59 million.** Mission to map surface chemistry of the moon. Scheduled launch June 1997.

■ **Mars Surveyor, \$108.5 million.** Space science. Development of spacecraft for new Mars exploration strategy. Orbiter, small payload, communications orbiters, landers. Scheduled launch 1998.

■ **New Millennium Spacecraft, \$30 million.** Space science. Flight technology demonstration to produce new microspacecraft with reduced weight and life-cycle costs. Technology demonstration flight test expected in 1997.

■ **Relativity (Gravity Probe-B), \$51.5 million.** Space science. Major test of Einstein's general theory of relativity. Development of a gravity probe. Because of agency budget constraints, continuation of this mission beyond Fiscal 1995 is under review.

■ **Space Shuttle, \$3.3 billion.** Spaceflight. Program emphasizes continuing

improvement of safety margins, vehicle modifications that enable it to operate with the international space station, and launch of seven flights for Fiscal 1996.

■ **Space Station, \$1.83 billion.**

Spaceflight. International manned space facility. Capacity for six persons.

Systems design review was completed in 1994. Efficiencies gained through design changes and invitation to the Russians to enter into the international partnership.

■ **US/Russian Cooperative Program, \$129.2 million.** Spaceflight. Program

provides \$100 million funding of contract with Russian Space Agency and mission costs for provision of Spacehab, Spacelab, and shuttle flights to Mir. The second, third, and fourth of seven joint shuttle-Mir missions scheduled for Fiscal 1996.

■ **Other Spacecraft, \$556.4 million.**

Space science. Operation of Hubble Space Telescope, Extreme Ultraviolet Explorer, International Ultraviolet Explorer, Pioneer 10, Voyagers 1 and 2, Ulysses, and many others.

Upcoming Shuttle Flights

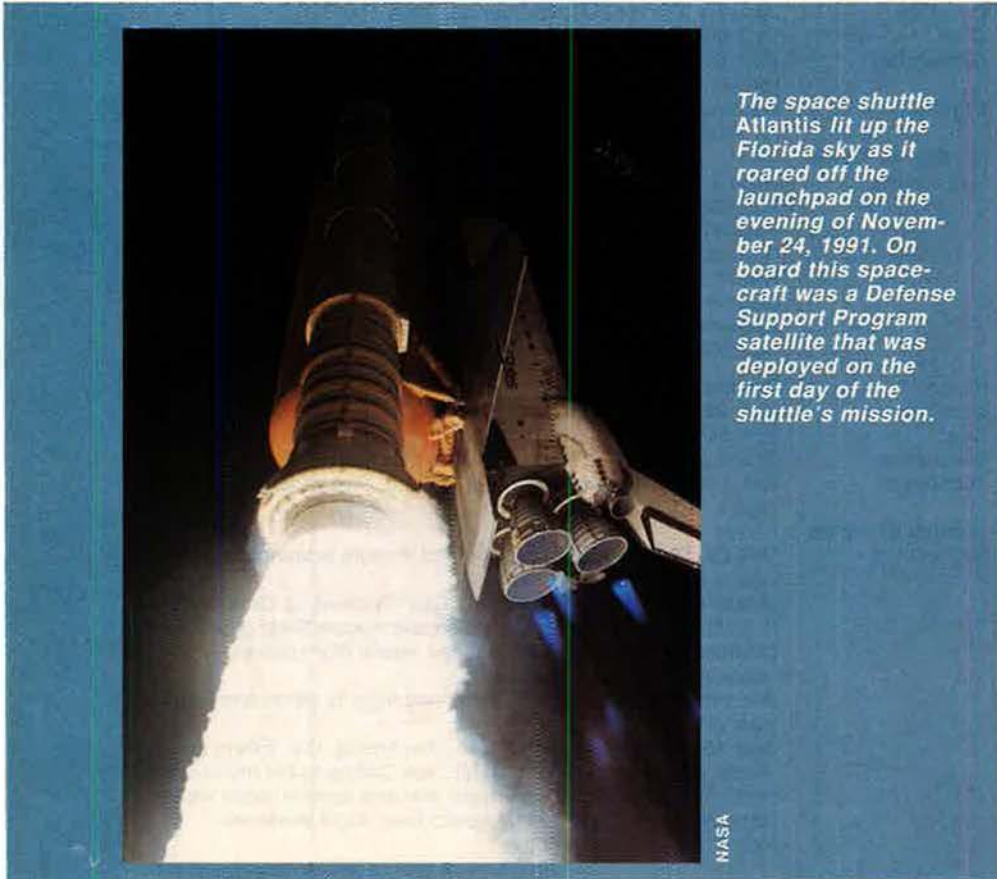
FY 1996 Proposal

Month/Year, Mission	Name
October 1995, STS-74	Atlantis
November 1995, STS-72	Endeavour
February 1996, STS-75	Columbia
March 1996, STS-76	Atlantis
April 1996, STS-77	Endeavour
June 1996, STS-78	Columbia
August 1996, STS-79	Atlantis

NASA Space Spending on Major Missions

FY 1996 Proposal, Current Dollars

Project Office	Request
Spaceflight	\$5,509,600,000
Space sciences	1,958,900,000
Mission to Planet Earth	1,341,100,000
Aeronautics	917,300,000
Space communications	780,700,000
Advanced concepts and technology	705,600,000
Life and microgravity sciences	504,000,000
Safety and mission assurance	37,600,000
Total	11,754,800,000



The space shuttle Atlantis lit up the Florida sky as it roared off the launchpad on the evening of November 24, 1991. On board this spacecraft was a Defense Support Program satellite that was deployed on the first day of the shuttle's mission.

NASA

US Space Command Headquarters, Peterson AFB, Colo.

Component	Personnel	Budget, Fiscal 1996	Activities
Air Force Space Command Peterson AFB, Colo.	39,091	\$1,729,000,000	Operates military space systems, groundbased missile-warning radars and sensors, missile-warning satellites, national launch centers, and ranges; tracks space debris; operates and maintains the USAF ICBM force (as a component of US Strategic Command). Budget includes funding for 12,100 contractor personnel and operations and maintenance for six bases and fifty worldwide sites.
Naval Space Command Dahlgren, Va.	548	\$56,000,000	Operates assigned space systems for surveillance and warning; provides spacecraft telemetry and on-orbit engineering support.
Army Space Command Colorado Springs, Colo.	553	\$47,900,000	Provides input for DoD space plans; manages joint tactical uses of DSCS; conducts planning for national and theater missile defense; operates the Army Theater Missile Defense Element force projection Tactical Operations Center; develops leading-edge technologies in support of warfighter needs; manages the Army Astronaut Program.

Current US Launchers



Titan II

Titan II (Lockheed Martin Astronautics)

Modified ICBM, used by NASA for the Gemini flights. Fourteen missiles have been modified; five have been launched successfully. Puts 4,200 pounds into polar low-Earth orbit (LEO). The Air Force uses it for DMSP launches.

Titan IV (Lockheed Martin Astronautics)

Heavy-lift launcher, adapted from an ICBM as an expendable launch system. First launch in 1989. Carries DSP, Milstar, and classified satellites. With Centaur G-prime upper stages, lifts 10,200 pounds to geosynchronous Earth orbit (GEO), 39,000 pounds to LEO, and 32,000 pounds into polar LEO. Titan IVB, with upgraded solid rocket motors, will have twenty-five percent better performance when it begins launches in 1996. The Air Force has contracted for forty-one Titan IVs; twelve have flown.

Atlas II (Lockheed Martin Astronautics)

Newest version of nation's first ICBM carries DSCS satellites and commercial payloads. Latest configuration, Atlas IIA, lifts 19,050 pounds to LEO from Cape Canaveral AS, Fla. The range of payloads Atlas II through IIA can lift into geosynchronous transfer orbit (GTO) from the Cape is 5,000–8,500 pounds and 12,200–15,700 pounds to LEO from Vandenberg AFB, Calif. Final assembly of the Atlas will have moved from San Diego, Calif., to Denver, Colo., by the end of 1995.



Titan IV

Lockheed Launch Vehicle (Lockheed Martin Astronautics)

Family of commercially developed boosters with varying configurations of solid motors that allow payloads weighing one to four tons to be placed into LEO, with plans to develop future versions for geosynchronous orbits and planetary trajectories. The LLV-1 rocket, a two-stage version, was to fly its first mission in late June. The design is for "stack and shoot," which means the rocket can be launched within fifteen days of arrival at the SLC-6 launch site at Vandenberg AFB.



Lockheed Launch Vehicle



Atlas II



Delta II

Delta II (McDonnell Douglas)

Medium launcher, in operation since 1989. Payloads include Navstar GPS satellites and commercial satellites. Launcher for a variety of NASA scientific payloads under the Medium Expendable Launch Vehicle Services program. Launch capability from both Cape Canaveral AS and Vandenberg AFB. Available in two- and three-stage configurations. Latest model lifts 11,100 pounds to LEO, 4,010 pounds to GTO.

Pegasus (Orbital Sciences Corp.)

Winged small launcher, dropped from a modified L-1011 Tristar aircraft or B-52 to carry payloads weighing 850–1,050 pounds to LEO of 100 nautical miles, 28.5° inclination. Two versions, priced at \$10 million to \$12 million, are available, including the more powerful XL, which failed in each of its first two flights. Pegasus flew eight missions between 1990 and spring 1995. Scheduled for six to eight launches per year in the future.

Taurus (Orbital Sciences Corp.)

Ground-launched, four-stage rocket with some Pegasus commonality and a Peacekeeper or Castor 120 motor as the first stage. Capable of boosting 3,200 pounds to LEO of 100 nautical miles, 985 pounds to GTO. The rocket flew its first mission March 13, 1994, and a second flight has been scheduled for late 1996. Price is \$18 million to \$20 million.



Space Shuttle

Space Shuttle (Rockwell International)

Manned space transportation system operated by NASA from Kennedy Space Center, Fla., lifts 46,000 pounds to 160-nautical-mile, 28.5°-inclined orbit. The delta-winged orbiter has flown more than seventy missions since its first use April 12, 1981. The military has stopped using the shuttle for satellite launch since the 1986 *Challenger* disaster.



Pegasus

US Space Launch Sites

Orbital Sites

Cape Canaveral AS, Fla.

Located 28.5° N, 80° W. Primary US space-launch site. Handles piloted, lunar, and planetary launches and launches of satellites into geostationary orbit. First US satellite in space, first manned spaceflight, first flight of a reusable spacecraft all originated here. Scene of more than 3,000 launches since 1950. Formerly a US Navy outpost, vast tract covers 15,000 acres, with large populations of alligators, wild boar, eagles, and deer.

John F. Kennedy Space Center, Fla.

Located 28° N, 80° W. NASA's primary launch base for the space shuttle. Occupies 140,000 acres of land and water on Merritt Island, adjacent coastal strand, and the Indian and Banana Rivers and Mosquito Lagoon surrounding the center. NASA holdings include 84,031 acres. The Merritt Island location was better suited than nearby Cape Canaveral to serve as a launch site for the Apollo program's 363-foot-tall Saturn V, the largest rocket ever built. With the 1972 completion of the Apollo lunar landing program, KSC's Complex 39 was used to launch four Skylab missions and for the Apollo spacecraft for the Apollo-Soyuz Test Project. In the mid- to late 1970s, the Kennedy facilities were modified to accommodate the space shuttle program.

Vandenberg AFB, Calif.

Located 35° N, 121° W. Secondary US launch site. Used for satellites (mostly weather, remote sensing, navigation, reconnaissance) that must go into polar orbits. Provides basic support for R&D tests for DoD, USAF, and NASA space, ballistic

missile, and aeronautical systems. Furnishes facilities and essential services to more than sixty aerospace contractors on base. Base covers 98,400 acres. Originally Army's Camp Cooke, taken over by USAF on June 7, 1957.

Suborbital Sites

Poker Flat Research Range, Alaska

Located 65° N, 147° W. Owned by the University of Alaska. Established 1968. Operated by the Geophysical Institute under contract to NASA/Goddard Space Flight Center, Wallops Flight Facility. Only US launch facility in polar region. Conducts launches primarily to investigate aurora borealis and other middle- to upper-atmosphere phenomena. Site of more than 250 launches.

Wallops Flight Facility, Va.

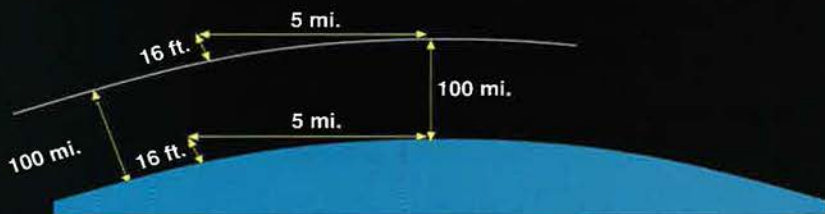
Located 38° N, 76° W. Founded in 1945 on Wallops Island, Va. One of the oldest launch sites in the world. First research rocket launched July 4, 1945. Minor launch site for small payloads; no orbital launches for years. Site for launches of NASA's suborbital sounding rockets and the like. Conducts about thirty-five launches per year. Covers 6,166 acres on Virginia's eastern shore.

White Sands Missile Range, N. M.

Located 32° N, 106° W. Established July 9, 1945, as White Sands Proving Ground. Site of July 16, 1945, Trinity shot, world's first test of atomic bomb, and of postwar test and experimental flights with captured German V-2 rockets. Scene of February 24, 1949, launch of Bumper rocket, whose second stage achieved altitude of 244 miles—becoming the first man-made object in space. Now used for launches of suborbital sounding rockets.

Orbits

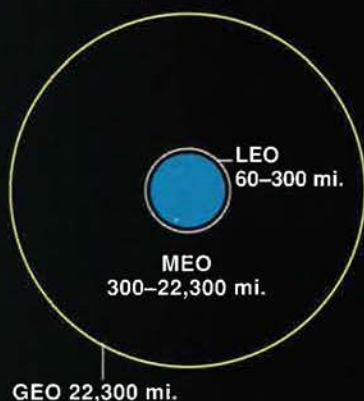
Orbits result from the mutual attraction of any two bodies with a force proportional to the product of their individual masses and inversely proportional to the square of the distance between them. The curvature of the Earth, on average, drops sixteen feet below the horizontal over a distance of about five miles. A spacecraft circling above would "fall" that same amount over the same distance. It travels five miles in one second if gravitational pull equals one G. Therefore, spacecraft velocity of five miles per second (18,000 mph) produces perpetual orbit at constant altitude, unless the spacecraft's flight is upset by perturbations, such as solar wind or mechanical anomalies.



Orbital Radii

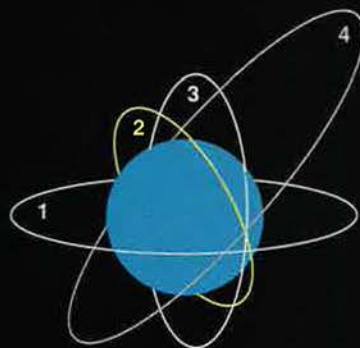
LEO—Low-Earth orbit
MEO—Medium-Earth orbit
GEO—Geosynchronous orbit
HEO—High-Earth orbit

HEO 22,300–60,000 mi.

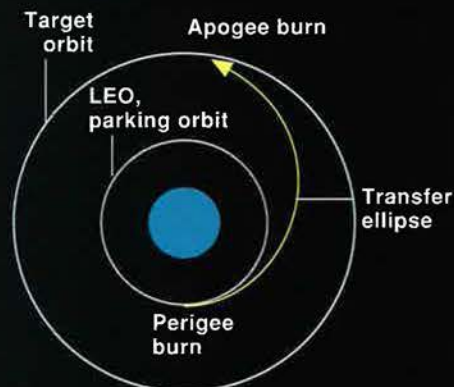


Orbital Inclinations

1 Equatorial
2 Sun-synchronous
3 Polar
4 Eccentric



Geosynchronous Transfer Orbit



It is common procedure to pick an initial "parking" orbit, usually at LEO, then boost payloads to higher altitude. Engines are fired first (at perigee) to reach the apogee of an elliptical transfer orbit and then are fired again to put the spacecraft into a circular orbit at that higher altitude.

Illustrations are not drawn to scale.

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The top-secret mission was to keep terrorists, black marketeers, and other hostile powers from grabbing nuclear-grade weapon material out of Kazakhstan's Ulba Metallurgical facility. Here, loadmasters position canisters filled with the highly enriched uranium aboard a C-5 Galaxy for transport to a safer haven in the US.

PROJECT SAPPHIRE

DURING the Persian Gulf War, US officials worried that Iraq might have succeeded in processing a few tens of grams of uranium into nuclear weapons-grade material—enough to make a single low-yield bomb. Later, the CIA became alarmed that North Korea had generated enough nuclear material for two or three bombs.

Imagine, then, the shock to the US government when it learned in fall 1993 that roughly 600 kilograms of highly enriched uranium (HEU)—almost pure U-235, much of it directly applicable to weapons—was sitting in an ill-protected facility at Ust’Kamenogorsk in Kazakhstan. This was more than half a ton of

fissile material. To someone with even limited knowledge of atomic bomb-making, it would be enough for twenty weapons. A skilled bomb-maker would be able to produce fifty.

Kazakhstan’s revelation, made secretly to the US, seemed to signal that the nightmare age of “loose nukes” truly had arrived. Ever since the dissolution of the Soviet Union, the West had feared that poorly protected nuclear materials from the Soviet arsenal would reach the hands of black marketeers and then those of terrorists or hostile powers. The stockpile in Kazakhstan suddenly made these fears palpable.

Thus began more than a year of intense cooperation to stave off that nightmare and prevent a nuclear catastrophe. From the beginning, the US Air Force was deeply involved in the operation, code-named “Sapphire.”

Kazakh authorities discovered the enriched uranium in the Ulba Metallurgical Facility in Ust’Kamenogorsk in 1992 while they were assessing the nuclear legacy left on their soil by the fallen Communist regime in Moscow.

Kept in the Dark

The Ulba facility was located in a “closed city” because of the highly sensitive work done there. Even local authorities had been kept in the dark about the plant. They could only speculate about the extent of dangerous nuclear testing that had been going on in their back yard. These nuclear tests, performed with few or no safeguards, had produced terrible environmental and health consequences over the previous forty years.

Once inside the Ulba plant, Kazakh officials discovered about 2,000 tons of radioactive material. They found within this stockpile the 600 kilograms of HEU, which was contained in a beryllium alloy. Soviet scientists had intended to use it in a research reactor dedicated to development of new Soviet naval nuclear propulsion systems, a project abandoned when the USSR dissolved.

When the Kazakhstan government understood what it had, it quickly realized that it could not care for it properly. “They wanted to be responsible about it,” said Jeffrey M. Starr, the Pentagon’s principal director for Threat Reduction Policy.

“They didn’t want to sell to aspiring nuclear states.”

He added that the Kazakhs “did what they could” to secure the facility with locks, gates, and militiamen with dogs, “but they knew it wasn’t enough.” Whereas such measures might have been “reasonable by the standards of forty years ago,” said Mr. Starr, they likely could not stand up to a dedicated assault by a modern terrorist team or even well-armed thugs from organized crime. Despite their good intentions, the cash-poor Kazakhs lacked the resources to protect the material in the long run.

“There were threats” to the security of the material, Mr. Starr said. “We found it to be vulnerable.”

He explained that there was “information to suggest that Iran was aware of the Ulba facility.” Unconfirmed reports have alleged that Iranian operatives attempted to contact Kazakh officials about possible sale of the material.

The Kazakhs “knew the interest was not limited to just the Iranians,” Mr. Starr added. As knowledge about the uranium spread, it would inevitably come to the attention of terrorists, who might find it an irresistible target.

Kazakhstan’s revelation of the existence of the Ulba material—as well as an urgent request for assistance in either caring for it or disposing of it—came quietly to William H. Courtney, the US Ambassador to Kazakhstan. He passed on the request to Washington.

Soon, the United States dispatched a specialist from the Department of Energy’s Oak Ridge, Tenn., nuclear storage and processing facility to assay the material and determine “just what we were talking about,” Mr. Starr said. The visit was not hard to keep under wraps; there already was a good deal of traffic from the US to Kazakhstan relating to the Strategic Arms Reduction Treaty and various programs to dismantle old Soviet weapons.

The DoE specialist returned after a couple of weeks. With him came protected samples of the HEU, transported by diplomatic pouch to prevent the scrutiny of US Customs officers and others without a “need to know.”

Based on the specialist’s assay and reports, the National Security Coun-

By John A. Tirpak, Senior Editor

US C-5s flew secretly into central Asia to bring out a vulnerable stockpile of weapons-grade uranium.

cil (NSC) determined that the Department of Defense should take the lead in a coordinated effort—with the Departments of State and Energy—to secure the fissile material and, if necessary, remove it to a safe storage site in the US. Mr. Starr was appointed to head a “tiger team” to accomplish the mission.

Phoenix and Sapphire

Given the extreme sensitivity and danger of the situation, tight security was clamped on what the Pentagon first code-named “Project Phoenix.” Eventually, the project would be known as “Sapphire”—its State Department code name.

The team initially considered keeping the material where it was, only with tighter security. This option was quickly rejected because of the huge investment required to beef up security at Ulba. This step would also have required routine infusions of upkeep money because the Kazakhs simply could not afford to pay the high price for it. Besides, Mr. Starr noted, “there would always be some [US] uncertainty about how secure it was.”

US officials determined that the material could be easily accommodated at DoE’s Oak Ridge facility, where it would represent a relatively small fraction of the total stockpile of nuclear materials already stored there. The Y-12 facility had just been certified by the International Atomic Energy Agency as “safe” for storage of large quantities of nuclear material.

In the end, the NSC decided to bring the material out of Kazakhstan, a conclusion with which Kazakhstan quickly agreed. The nations further decided that, in order to ensure that the project would have a low profile, no negotiating teams would shuttle between Washington, D. C., and Almaty, the Kazakh capital. All negotiations were to be carried out quietly, using embassy personnel.

By February 1994, the project was well advanced. Officials in Washington and Kazakhstan concluded that it was time to consult with Russia because Russia had inherited virtually all the nuclear facilities and weapons of the Soviet Union and might lay claim to the uranium. Moreover, Russian cooperation—however tacit—was an absolute requirement. Any airlift mission to remove the material would have to cross Russian airspace. As Mr. Starr

put it, a covert operation that kept Russia in the dark “was out of the question.”

Low-Level Shakedown

Initial contacts with Russian authorities led many in the US government to believe that the Ulba material had been forgotten. A low-level official at Minatom, the Russian atomic energy agency, asked for a “cut” of whatever revenue the Kazakhs might get from the transfer. “We thought maybe these were not the right people to ask,” Mr. Starr said of the response.

As a result, the US took further steps to ensure that Russians at high levels were aware of the impending transfer “in generic terms,” Mr. Starr said. Vice President Al Gore wrote to Russian Prime Minister Victor Chernomyrdin explaining that the US had been contacted by Kazakhstan and had been “asked to assist in the safekeeping” of the nuclear material.

The letter was carefully worded to make it clear “we were not asking permission,” said one Pentagon official. Russia, he explained, “would have no veto power.”

In addition to these rather awkward communications, Kazakhstan President Nursultan Nazarbayev simply picked up his phone and called Russian President Boris Yeltsin to explain what was in the offing. Mr. Yeltsin assured him that Russia would not interfere.

Still, alerting the Russian authorities carried some risk. Corruption in post-Soviet Russia had reached such heights that US officials worried that information about the impending transfer might be sold to precisely the people both Kazakhstan and the US wanted to keep in the dark.

The two sides developed a plan for the transfer. First, the uranium had to be put into a transportable form. Though it was already in some 1,000 canisters and 6,000 sample bottles, it was still in a corrosive, “wet” form. Technicians had to remove the material from the containers, then “bake” and “dry” it to remove water and oils so that they could work with it.

Next, the material had to be placed in special metal containers—about the size of a spray-paint can—which in turn would be put into canisters the size of a fifty-five gallon drum. Finally, the drums would have to be

transported to the local airport, loaded aboard aircraft, and flown to the United States.

At every step of the process, danger loomed. The drums made the uranium safe to handle; the containers could survive an airplane crash without breaking apart. But that also meant that no special equipment was needed to move it—or to steal it. Once in the canisters, the uranium could be handled by anybody. Security would have to be tight on where the material would be and when it would move.

The US recruited a team of thirty-two volunteers for the processing and “recontainerization” phase. Of them, twenty-seven were technicians at Oak Ridge, four were Russian linguists from the US On-Site Inspection Agency, and one was a physician.

“We had no trouble getting volunteers,” Mr. Starr said. “They recognized that this was important work.”

The team, led by Alex Riedy, an Oak Ridge technician, put together a transportable, collapsible processing facility the size of a three-car garage. Team members practiced dry runs and emergency drills with it throughout the summer of 1994.

In August, an assessment team traveled to Ust’Kamenogorsk to determine if the local airfield could accommodate Air Force C-5 Galaxy airlifters, which would be needed to transport the necessary people to and from Kazakhstan.

“Things to Consider”

Meanwhile, USAF officials summoned Lt. Col. Mike Foster, operations officer of the 9th Airlift Squadron, Dover AFB, Del., to Air Mobility Command headquarters for a classified briefing. Colonel Foster and a handpicked loadmaster went to the Tanker Airlift Control Center at Scott AFB, Ill., where they received a top-secret briefing on the mission and were instructed to develop a list of “things to consider” that would affect the success of the operation.

Number one on the list was weather.

If there were ice, Colonel Foster wondered, would the runway be long enough? Would there be adequate deicing equipment at the field? How would they get permission to fly through the airspace of other countries to get in and out of Kazakhstan? The leaders of Project Sapphire hadn’t thought of some of these

questions, but Colonel Foster got in touch with the US military attaché in Kazakhstan, Lt. Col. Dan Perry, for the answers. None of the problems posed an insurmountable barrier to the operation.

In September, US security officials drafted a top-secret presidential order authorizing American personnel to initiate Project Sapphire and go into Kazakhstan to bring out the half-ton of HEU for ultimate disposition at Oak Ridge's Y-12 facility.

Carrying out the proper consultations and providing necessary assurances took some time. The presidential order was not issued until October 7, and Project Sapphire got under way in earnest.

Colonel Foster, leading a flight of three C-5Bs, launched from Dover AFB on October 8. One of the enormous Galaxys carried support crews, offloading equipment, and a detachment of Air Force Security Police personnel. The others carried DoE's processing plant, the Oak Ridge team, the ovens to bake the uranium, and the 1,400 containers to hold it. Aboard all aircraft were USAF pilots fluent in Russian.

The flight path taken into and out of Kazakhstan remains a secret; nations that permitted overflights are still sensitive about publicly acknowledging their cooperation with the United States in the venture. For their help, said Mr. Starr, these countries received nothing more than "the hearty thanks of the US government."

The 8,000-foot runway at Ust'Kamenogorsk was "like a bucking bronco," Colonel Foster reported. Though it was not up to Western standards, the runway proved adequate for the huge transports. The C-5s landed and unloaded without mishap and headed home the following day, thus completing the first phase of the Air Force operation.

Sliding Toward Winter

Next came phase two: preparing the uranium and hauling it out of Kazakhstan on another C-5 flight. The lateness of the presidential order threatened to turn Colonel Foster's worst-case scenario into reality. The departure time—originally set for November 1, to beat the arrival of winter—was slipping into mid- to late November, when the bitterly cold weather could seriously imperil the extraction mission. Snow

removal capabilities at the field were "not great," Mr. Starr admitted.

Finally, a week before Thanksgiving, technicians completed the processing of the uranium and packed it into the canisters. Colonel Foster and his team began the second flight to Kazakhstan.

The weather had turned very bad. In its first attempt, the C-5 group had to turn back because of blizzard conditions along the way. On a later try, only the first of the four aircraft that were launched actually made it to Kazakhstan. The others had to divert to other bases. Visibility and runway conditions were below minimums.

The first airplane, however, landed at 4:00 a.m. At the same moment, a convoy of trucks set out from the Ulba facility on the eighteen-mile trip to the airport. On board the trucks were the uranium-filled canisters, the DoE team, militiamen, police, and Special Forces from the Kazakh Army.

Originally, there was to be only one convoy, to capitalize on the element of surprise should bandits attempt to waylay the shipment. Because a second C-5 had not made it through to the airfield, however, officials decided to break the shipment up into two convoys. The second convoy would stay put until the arrival of another C-5 airplane.

Along the route to the airport, all roads were closed and every available light was turned on to illuminate the path.

The Loadout

With the convoy en route, the C-5 crew unloaded 40,000 pounds of relief items collected by families and friends of the Oak Ridge team in the US for donation to local orphanages. This humanitarian shipment was possible because the C-5s hadn't been modified for the mission; the canisters made it possible to handle the uranium like any other cargo. Even so, when the convoy arrived, crew members exercised extra care, and the loading took several hours. Security Police ringed the operation side by side with Kazakh Special Forces personnel.

USAF team members wore dosimeters, made periodic checks of radiation levels, and looked for any damage that might have been done to the canisters during loading. They found not a scratch.

Meanwhile, Kazakh workers cleared the runway with a novel device—a truck-mounted jet engine, which literally blew ice and snow off the hard surfaces. "We laughed, but it worked," said Colonel Foster.

As the first aircraft finished loading, the second arrived, and the second convoy set out from the Ulba complex.

The first C-5 prepared to launch and head home. The weather was worse than Colonel Foster could have imagined. The airfield was pummeled by sleet, ice, and rain, but the runway was usable, and the Galaxy had no difficulty getting airborne.

The flight home took twenty hours and required five air refuelings. On the way, said Colonel Foster, "we were sitting there in the cockpit, writing Tom Clancy novels in our heads about what would happen if we had to go down."

Fortunately, the flight proved uneventful, and all the aircraft arrived at Dover AFB with crews and cargo intact. There, the material was loaded on unmarked Department of Energy tractor-trailers and sent by varying routes to Oak Ridge's Y-12 facility, where it was to be blended into low-enriched form and used as source material in commercial nuclear power plants.

The value of this material is hard to estimate, but it certainly is far less than the billions of dollars Kazakhstan could have reaped had it chosen to sell the HEU on the black market. That nation will receive a cash grant and US aid to help clean up the problems created by Soviet nuclear operations there.

Once the material arrived at Oak Ridge and was safely stored at Y-12, Washington finally let the world in on the story. Defense Secretary William J. Perry, Secretary of State Warren M. Christopher, and Energy Secretary Hazel R. O'Leary issued a sketchy joint statement announcing the unprecedented venture.

The mission, said Secretary Perry, had succeeded in putting the bomb-grade material "forever out of the reach of . . . black marketeers, terrorists, or a new nuclear regime." The Sapphire team "not only completed a highly complex, sensitive mission with great success, they have done a great deal to make the world safer from nuclear danger." ■

A B-17 combat leader recalls the air war over Europe.

Fifty Years Ago, Looking Back

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

FIFTY YEARS after an event marks a good, and perhaps the last, point from which to stop and look back. There are still those around who remember—and the young can learn firsthand if they are interested—a little ancient history.

This past May was a good time to be in England. Even the weather turned balmy for this salute to World War II. The celebrations in Hyde Park were on a grand scale and carefully scripted with the sensitivities of the war's survivors in mind. The songs sung were the old ones, and the bands tried their best to sound like Glenn Miller's. If the ceremony at Madingley, the American Memorial Cemetery near Cambridge, was on the banal side, with speeches out of touch with the fellows lying in the graves behind the speaker's stand, it was because they *were* out of touch. The dwindling number of old friends who had come by for a visit were not the ones making the speeches. And, while London was Britain's stage for celebrating V-E Day, American veterans made their way to places closer to their war.

My old unit, the 384th Bomb Group, forty strong, went back to Grafton

Underwood, a village in Northamptonshire, where our base once was. The base is gone now, back to farmland, as are most of the bases that were clustered in the Midlands. There were sixty-eight of them in 1943, so close together that assembly in the dark and murk was a real hazard. Now and then, there was a midair collision. Why there weren't more is probably ascribable to the carefree RAF theory that there was a lot of room in the air. I recall one pitch-black morning when I popped up through the clouds to fly head-on through the entire formation of the 303d Bomb Group.

The war in Europe was three years old when the first B-17s arrived in England, the last bit of territory on that side of the Atlantic either not under Hitler's thumb or neutral. The first few months were tentative ones



of shallow raids, exhibition games so to speak, in preparation for the real contests later. Daylight bombing was a controversial idea and, in the opinion of the RAF, a near-suicidal concept if we had serious targets in mind. They had tried it, and so had the Germans, with equally disastrous results.

Encounter With LeMay

The spring of 1943 saw the real buildup of Eighth Air Force. Air Transport Command had, with misgivings, opened the North Atlantic route to combat crew deployments, and off we went to Presque Isle, Me., Gander Lake, Canada, and, when the winds were right, Prestwick, Scotland. Not three years earlier, the left seats of B-17s were zealously guarded by the old hands, off limits to junior birdmen. Pearl Harbor changed all that, and second lieutenants were shown the mysteries and given the controls of what few modern airplanes we had. I remember a check-out in the LB-30, a British version of the B-24, with Lt. Col. Curtis LeMay, who had a fearsome reputation among the junior officers. To my delighted relief, he was a relaxed and reassur-

ing (though exacting) instructor, a trait he concealed in his public image but one that lay behind his success as a commander.

The newly minted bomb groups, formed with the thinnest layer of experience, arrived in England to take the war to Hitler's Fortress Europe in broad daylight. The early ventures across the Channel were easy, with just enough action from the Luftwaffe to make things interesting. But if they were easy, they were also misleading. As spring turned into summer, the targets began to be farther away, though still on the perimeter of Hitler's Reich. There were the submarine pens at Saint-Nazaire, France, a long haul over the Bay of Biscay invariably enlivened by a swarm of FW-190s as we turned inland for the bomb run. The Luftwaffe rarely ventured out to sea, so that was our safe haven, and our bombs did no damage to the twenty-foot-thick concrete structures of the sub pens, so nothing very important took place. Still, it was good practice for the real work that lay ahead.

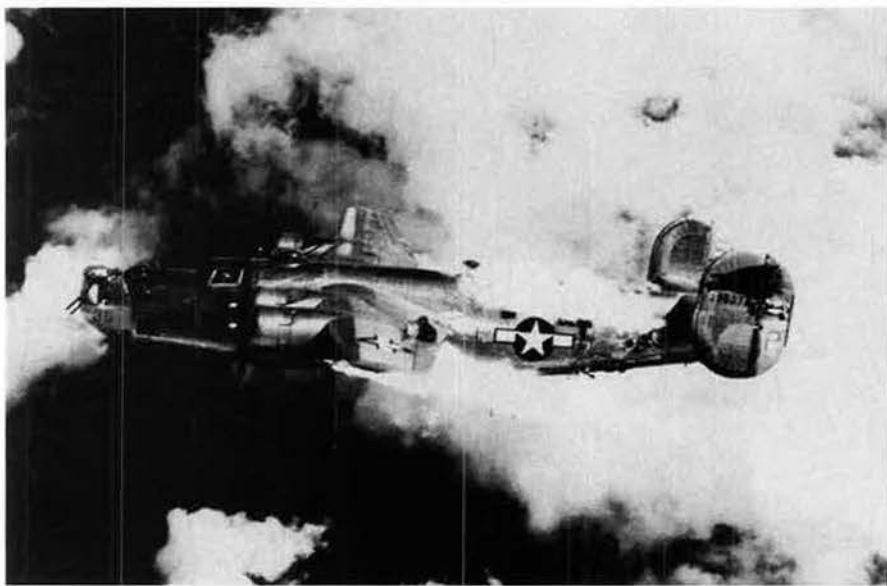
Meanwhile, the RAF streamed out night after night—Lancasters, Hali-

faxes, Wellingtons, the ponderous Stirlings, in no discernible order—on their way to flatten some part of Germany. As we watched them pass overhead, it was clear we were the bumpkins from the colonies, nipping around the edges, while the RAF took the war to Hitler's doorstep. All the while, the buildup continued.

When summer came, the war, for us, began in earnest, with forays to the Ruhr region, Bremen, and the Kiel Canal on the Baltic. We went to Norway and also took part in the immolation of Hamburg. By this time, the P-47s had their drop tanks, so we had fighter escort part of the way, but the losses, even on the unescorted legs, were mostly tolerable. The daylight bombing concept was beginning to develop credibility.

Schweinfurt and Regensburg

Then came August and the first deep penetration into the heart of Germany. The target was the ball bearing plant at Schweinfurt with an aircraft factory at Regensburg, Bavaria, laid on as a diversionary effort. This latter force was to proceed on to North Africa as further evidence of the wide-ranging ability of



Death in the air during World War II could be as swift and violent as it was on the ground. Weather was often another enemy to contend with, especially for Eighth and Ninth Air Force aircrews flying out of England.

Eighth Air Force. An aroused Luftwaffe exacted a heavy price—almost sixty bombers down—and the bombing at Schweinfurt had not been up to expectations, although the Regensburg force had bombed with spectacular results. A convalescent period of easier raids followed, but the ball bearing plant remained high on the list of essential and vulnerable targets. And so, on October 14, the briefing officers drew back the curtains on their maps to a chorus of sighs: The objective was once again Schweinfurt.

The weather was foul in England that day, making for a confused assembly. My own partly *ad hoc* formation, made up of elements of the 91st and 305th Bomb Groups and whoever else wanted to come along, was handed the lead in mid-Channel by the designated leader who fell in behind, thus giving me an unobstructed view of a sunny continent, the glittering wings of a Luftwaffe welcoming committee, and the distinct feeling of Lucky Pierre.

A day later, Maj. Gen. Ira Eaker came to Bassingbourn, England, to learn what we had been up to. But first, in that gracious manner of his, he put us at ease. We found ourselves talking to an understanding friend, who just happened to be Eighth Air Force commander.

We did a good job of bombing that day, those of us who got there, but the Eighth took a terrible beating: sixty

B-17s lost, almost a fourth of those that had actually crossed the Channel. Because no military force could long sustain that kind of loss, the concept of precision bombing, which required daylight in those days, and thus, the concept of strategic airpower, both were in jeopardy. The P-51, arguably the most important weapon of the European war, arrived at the eleventh hour to save the day.

The tempo increased through the winter of 1943 and into 1944, and the Luftwaffe occasionally scored a

round, but the war was now clearly going our way. There were definite signs that the ground troops assembling in England would soon cross the Channel, and late that spring, Gen. Dwight D. Eisenhower came to our base at Bassingbourn. It was close to London and had the most elegant facilities, so it was chosen as the meeting place for Ike and his air commanders.

The Supreme Allied Commander arrived in his special train. His limousine, its radiator decorated with miniature Allied flags, was driven off a flatcar by his chauffeur, Miss Kay Summersby.

Frankly, My Dear . . .

General Eisenhower made a tremendous impression on us that day as he toured the base, asking pointed questions, and christening an airplane, *General Ike*, with Mississippi River water. He told us of the impending invasion and what he expected of us—all routine enough, except that he spoke in an inspiring way and with a voice oddly reminiscent of Clark Gable's. A USAAF captain, Gable was in England making a gunnery film and had flown with me on a mission to the Ruhr, Rhett Butler himself on the intercom.

That same spring, Gen. Carl A. "Tooe" Spaatz called some of us together after a mission critique. "The old man," he said, meaning Gen.



The strain of such grueling daylight bombing raids as Schweinfurt is etched on the faces of these aircrews listening to a postmission debrief. The relentless pace of combat could wear down even the most energetic young flyer.



Having liberated the skies over Europe (below), the crews of Eighth Air Force and Ninth Air Force were scheduled to move to Pacific coral outcrops (above) to help defeat Japan, when the war ended abruptly fifty years ago this month.

Henry H. "Hap" Arnold, "is coming over soon. He has worked his heart out getting you everything you need. He will ask you if you have any problems. The purpose of this meeting is to remind you that you don't have any." That was an object lesson in the famed Spaatz brevity, and we got the message.

A Strange Contrast

When the order for D-Day finally came in on the teletype, it was almost anticlimactic. The troop carriers droned over in the early morning darkness, towing their gliders, and we loaded up for our part in the great event. It was a milk run for the Allied air forces, with no Luftwaffe in sight and only sporadic flak, a strange contrast to the death struggle going on down below. A few days later, we watched a long line of ambulances passing by our base on their way to the hospital up the road.

There is much to remember about those days, and some of the memories are not happy. But, as wars go, that one had its points. We knew



why we were fighting, and we had no doubt about the rightness of the cause or of our support back home. And coming home to England after a day over the continent was truly like coming home. We were foreigners but not in the usual sense, for the

British took us in as though we were still part of their domain, with an odd provincial accent, no doubt, but intelligible with a little effort. Admittedly, we were a bit flamboyant at times and overpaid by comparison with British forces, so it was not all without occasional rancor. But the people in the villages adopted us as their own, counting the airplanes on their way to war and the ones that came back. Besides, there was always London.

There are so many memories: Hub Zemke's 56th Fighter Group, when things weren't going well, cheering us all up with a campaign pledging 100 victories by Sadie Hawkins Day; Eighth Air Force Commander Lt. Gen. Jimmy Doolittle arriving for a base visit after a low pass and a chandelle; the V-1s and V-2s hitting randomly and our frustrating efforts

to knock out the launch sites; and, most of all, just the atmosphere of wartime England, something easy to remember but impossible to recapture.

The ongoing war against Japan, of course, cast a shadow on that first V-E Day. The Eighth was moving to the Pacific, and many of us had orders designed to get us there via a retraining period in the States. Hiroshima and Nagasaki ended that, and we began a headlong, disorderly demobilization. Three years later, we learned that the war hadn't really ended, just the shooting part had, and now there was a new enemy. ■

Gen. T. Ross Milton, USAF (Ret.), is a longtime contributor to Air Force Magazine. General Milton graduated from West Point in 1940, completed pilot training in 1941, and served in Eighth Air Force. In addition to the October 1943 raid on Schweinfurt, he led the first daylight raid on Berlin and various other missions. He later served as Chief of Staff, Combined Berlin Airlift Task Force in 1948-49, commander of 41st Air Division and of 13th Air Force, USAF Inspector General, and USAF Comptroller. In 1985, he received the Thomas D. White National Defense Award.

Operating a dedicated instrumented range, the 125th Fighter Group takes on all comers.

Instant Replay

Photographs by Lans Stout



Near Jacksonville IAP, Fla., an F-16 from the Florida Air National Guard's 125th Fighter Group and an F/A-18D from Marine All-Weather Fighter Attack Squadron 533 (VMFA-533), MCAS Beaufort, S. C., move off to find a piece of airspace to mix it up.





Most ANG units must travel some distance to reach a training site, but the skills the 125th FG's pilots have mastered for the art of air combat can be constantly practiced and refined in their own backyard. Since the early 1980s, the 125th has trained at an Air Combat Maneuvering Instrumentation (ACMI) range off the Florida-Georgia coast. The ACMI and its sophisticated equipment attract visitors—units from the Guard, Reserve, and active-duty Air Force and other services. Training with Navy, Marine, and other Air Force pilots, flying alongside aircraft of different speeds, sizes, or missions, the 125th keeps the edge it needs for its air defense mission.

The 125th is always ready to train with ACMI visitors, so it frequently conducts dissimilar air combat training. Above, one of the unit's F-16s takes off for a sortie. At right, a visiting F-15 from the 2d Fighter Squadron, Tyndall AFB, Fla., taxis out with an F-16 from the 125th. The size difference between the two aircraft is clear. Below, the F-15 pilot gives a thumbs up before the day's flight.

The 125th's F-16s are A models that have been modified for the unit's air defense mission. They replaced F-106 Delta Darts in 1987. Col. Craig McKinley, 125th Fighter Group commander, said the unit has been on twenty-four-hour alert since the 1950s.

During the Cold War, it scrambled against Tu-95 "Bear" bombers and other Russian aircraft. Today, the 125th FG's Detachment 2 sits on active air defense alert at Key West, Fla., while its regular facilities are being rebuilt at Homestead ARB.

Even though the last Bear scramble was in 1990, the unit is still on alert. The 125th has flown eighty-three scrambles in the first six months of 1995.





Above, a Marine F/A-18D from VMFA-533 follows a 125th F-16 out to the ACMI range. At right, Maj. Al Rutherford from the 125th checks with his wingman prior to engine start before the next sortie. Maj. Rick Phelps, 125th FG ACMI program manager, said the unit flies an average of 100 sorties a month over the range.

"It was very apparent from the start that the ACMI was going to bring a new level of expertise to us that we were just not able to get before," said Colonel McKinley, who also serves as an AFA National Director. "The level of debriefing and critiquing of our missions just improved markedly overnight." Before the ACMI began operation at Jacksonville, the 125th FG trained at ACMI ranges at Tyndall AFB and at Eglin AFB, Fla. "But that only got a few of our pilots through that program every other year or so," he continued. "Now having [a range] here full time, around the clock, every one of our pilots gets a chance to fly ACMI weekly, and with the kind of training available to us here in the squadron, we've become very competitive with our [active-duty] counterparts."





In the debriefing theater above, several elements of ACMI range training come together. From left, Capt. Ed Clarke, Lt. Shawn Daughy, Major Phelps, and Capt. Scot Studer discuss the day's engagement. The partially obscured pilot (far left) is Lt. Col. Andy Hofheimer. On the wall behind them to the right is flight data, and on the left is a map providing a three-dimensional view of their flight. It is generated from raw data gathered by an ACMI pod (like the one shown at right, carried on one of the plane's launch rails), in combination with groundbased sensor stations. This information tells the participants how their mission unfolded and progressed, explained Lt. Col. Chuck Ickes, operations group commander for the 125th. It reveals how well the missions were structured, whether or not they were set up correctly, and if they were terminated at the right time. The pilots can also evaluate objectives, support, shots, and tactics. "You can say whatever you want out on the range," said Major Phelps, "but when you come back and see that, no, in fact you didn't see it the way you thought it was—that's where the real learning comes in."



Jacksonville is an ideal location for an ACMI, Colonel Ickes said. Along with Navy and Marine aircraft, "snowbirds" from McConnell AFB, Kan., and Niagara Falls IAP, N. Y., have used the facility. Colonel Ickes called the range "a prime training aid" for units that go into Savannah, Ga., on summer camp missions. The range is also within easy reach for the huge 325th Fighter Wing training facility at Tyndall AFB and the 33d Fighter Wing at Eglin AFB. At right, a two seat F-15 from the 2d FS takes to the sky for an encounter with the 125th.



Photos by Lane Slout



There is plenty of room to turn and burn in the sky over the Atlantic. "We have probably the best range space on the East Coast," said Colonel Ickes. "Within fifty miles of Jacksonville, we have unlimited airspace from the surface to 50,000 feet." The range has the airspace needed for Advanced Medium-Range Air-to-Air Missile setups. The 125th also conducts high-value asset missions that need as much as 150 miles of straight airspace, the Colonel said. "We have more than enough airspace to make that all happen."

For the offensive counterair units that visit this ACMI, the 125th provides defensive counterair realism, Colonel McKinley said. In turn, it receives realistic training for its air defense mission, preparing it to deal with a variety of sophisticated adversaries. "We can certainly be better air defenders by having this range here," he said, "and we're certainly better able to handle our mission of strategic air defense and air sovereignty." The variety of adversaries that train at the ACMI range "really gives our pilots an edge over those who don't get an opportunity to train like we do." ■



Here's how the Pentagon's version of managed health care works out for the active force, dependents, and retirees.

Sizing Up Tricare

By Suzann Chapman, Associate Editor

IS THE Pentagon's version of managed health care in stable condition, or should it be placed in intensive care? The answer depends on whether you are listening to congressional analysts, Pentagon officials, advocacy groups, or military retirees.

The Tricare system—so called because it combines the medical programs of the Air Force, Army, and Navy—has become the focus of a major Washington debate, one that extends well beyond the specifics of the plan itself. Issues surrounding the program include fundamental questions about the proper size of the nation's post-Cold War defense medical establishment, as well as the promise of lifetime health-care benefits to military retirees and dependents.

One concern centers on what would happen if DoD decides to slash the size of its dedicated medical force, keeping only enough to carry out wartime functions. That move would seriously jeopardize the stability of the Tricare system. Even now, before the imposition of such a major reduction, military retirees have trouble gaining access to the system. They claim they are being shut out as a result of base

closures and the overall drawdown of recent years.

In addition, there is the issue of retirees who, at age sixty-five and over, are eligible for Medicare and who up to now have been able to use the military medical system. Under Tricare, these retirees will be bumped out of the defense medical system altogether. (See "Base Closure and Retiree Health Care," July 1995, p. 74, and "Health Care in the Lurch," July 1995, p. 3)

The Road to Tricare

Tricare is the successor to the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), which actually has been incorporated into the new program as one of three basic health-care options.

Congress created CHAMPUS in 1966 under Public Law 89-614 specifically to handle the needs of active-duty dependents and military retirees and their dependents. Before 1966, those beneficiaries who could not get treatment in a military facility had to arrange and pay for their own medical care through the private sector.

Until the mid-1960s, this was not a big problem. Few beneficiaries experienced problems of access because

space-available health care in a military facility was plentiful. The main reason was that, for most of the nation's history, the number of active-duty members, dependents, and retirees using the system has been small.

In the mid-1960s, however, the situation began to change dramatically. During the Cold War, the nation for the first time maintained a large standing military force, which eventually produced a major numerical increase in retirees, dependents, and survivors. Moreover, the number of married active-duty members increased greatly, creating a corresponding rise in the number of dependents and placing a large new demand on the medical system.

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Tripler Army Medical Center
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For this growing pool of patients, access to military health care began to grow more difficult. It became apparent that many retirees could not gain access to military health-care facilities even though they were too young to enter the Medicare system, and they did not have the same advantages as

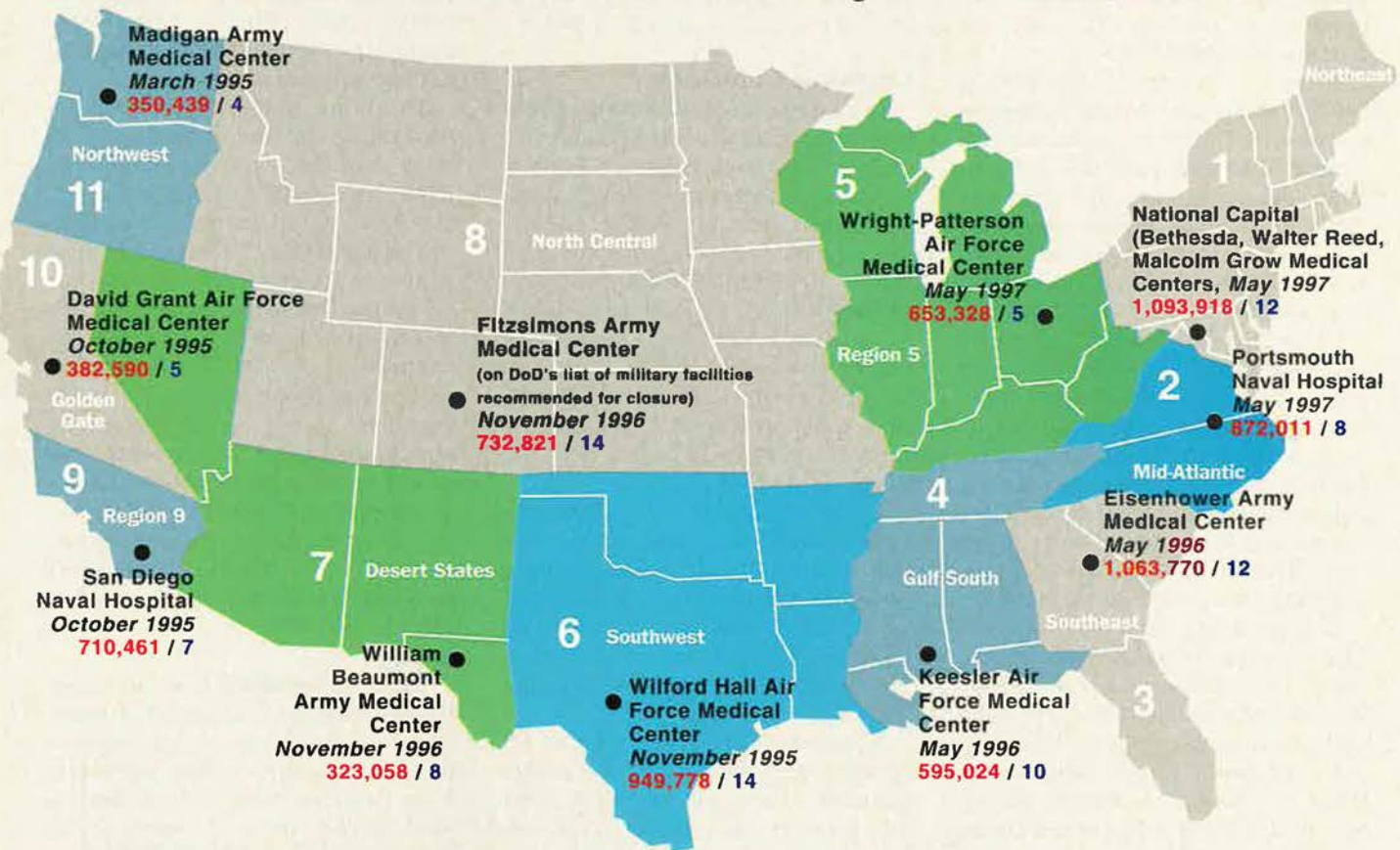
require premiums, but beneficiaries do share the cost of coverage. (See table on p. 68 for cost-sharing amounts.)

Unfortunately, in the late 1970s and 1980s, overall costs for military health care, including CHAMPUS, began to rise at a much greater rate than was the case in the private sector.

billion during the late 1980s and early 1990s.

The GAO report, while noting that there had been a broad, nationwide rise in medical costs, went on to cite two additional specific problems that had helped produce the increased costs of CHAMPUS service.

DoD Health Service Regions



● Lead agent and *Tricare* implementation date
 Beneficiary population / number of hospitals and medical centers

Note: *Tricare* Europe is under development.

federal civilian workers with their health-care plan.

Congress, seeking to redeem what it termed "the fading promise" of health care to retirees and to provide care to active-duty dependents not located near a military medical facility, passed the law that authorized CHAMPUS. It became effective January 1, 1967.

CHAMPUS was the military's version of a private indemnity (fee for service, or FFS) health-insurance plan, providing coverage to active-duty dependents, retirees and their dependents under age sixty-five, and survivors (also under age sixty-five) of deceased service members, when they could not get care at a military facility. Unlike private health plans, CHAMPUS does not

A March 1995 General Accounting Office (GAO) report, "Defense Health Care: Issues and Challenges Confronting Military Medicine," stated that the cost of military health care rose some 225 percent in recent years, compared to 166 percent for the nation as a whole. The medical portion of the defense budget doubled, rising from three percent to six percent; much of the increase stemmed from the growing cost of CHAMPUS service, which rose by 350 percent.

Unexpected Crunch

DoD had not predicted this major new spending requirement, which caused shortfalls in CHAMPUS funding that totaled more than \$3

The first was the expansion and changed nature of the beneficiary pool. The larger pool contained a higher percentage of people actually using CHAMPUS; the number of users went up by 162 percent between 1981 and 1990. Outpatient visits increased by 200 percent. In fact, a separate DoD study found that military beneficiaries use health-care services some fifty percent more frequently than do civilians in standard FFS health-care plans.

The second problem cited by GAO was an alleged propensity of military hospitals to increase their work loads to get additional funding. Traditionally, DoD allocated funds to hospital commanders based on historical trends in the work load, providing incentives

for administrators to hospitalize patients for periods longer than necessary.

The recent GAO report also stated that prior to implementation of the Defense Enrollment/Eligibility Reporting System (DEERS) in 1981, the CHAMPUS program was vulnerable to fraud and abuse. Before DEERS, estimates indicate, DoD lost \$40 million annually in the form of services provided to persons who were not eligible for medical benefits.

Large cost overruns in the military health-care system prompted Congress to authorize DoD to experiment with a number of alternative health-care programs during the late 1980s and early 1990s. (For details on these programs, see "The Tricare Era in Military Medicine," October 1994, p. 38.) Those tests led the Defense Department in 1993 to establish Tricare, a managed health-care program comprising twelve joint-service geographical regions within the US. The Pentagon expects Tricare to provide more equitable service, improve its members' access to care, preserve a choice of medical-care providers, and help contain costs. It incorporates the current CHAMPUS program and some private-sector practices.

DoD published the proposed rule for Tricare in the Federal Register in February 1995, although it had already been negotiating contracts for private-sector health-care services. According to Dr. Stephen C. Joseph, assistant secretary of defense for Health Affairs, who testified before House and Senate committees in March, publication of the final rule this summer should answer questions that had been raised in February.

Additionally, DoD will publish some "basic marketing materials" that each of the twelve regions will receive. However, the details of each region's health-care delivery plan have been left to the "lead agents" of the twelve regions and the commanders of associated military treatment facilities (MTFs). The lead agent for a region is a commander of one of the military medical centers located within the region. The map on p. 64-65 shows the regions, lead agents, number of potential beneficiaries, and number of hospitals or medical centers within each region.

Under the Tricare program, regions with large populations of CHAMPUS-eligible beneficiaries will offer a health maintenance organization (HMO) option called Tricare Prime.

DoD awarded the first Tricare Prime contract in March, nearly two years after beginning the process. David Baine, GAO's director of Federal Health-Care Delivery Issues, told Congress on March 28, "So far, DoD's experience with contracting for private-sector health-care services is proving to be cumbersome, complex, and costly, resulting in contractor protests, schedule delays, and an overall lengthy procurement process."

Lucrative Contracts

Meanwhile, three contracts have been awarded. The first, covering Region 11 and starting March 1, went to Foundation Health Federal Services, of Rancho Cordova, Calif., for \$438.1 million. The second contract, valued at \$2.5 billion, was awarded to QualMed, Inc., of Pueblo, Colo., for Regions 9, 10, and 12 with implementation scheduled for October 1. Foundation Health also won the third contract, valued at \$1.8 billion, covering Region 6. It goes into force November 1. The last two contracts run for five years.

Dr. Joseph, the Pentagon's top health-care official, said that, when fully implemented, the Pentagon will have seven fixed-price, at-risk contracts covering the twelve regions. Officials expect to have Tricare Prime operating in all twelve regions by summer 1997.

Since *Air Force Magazine* first reported details of Tricare in October 1994, the Pentagon has made some changes to Tricare costs and schedules. The system provides an eligible beneficiary with three options. The table on p. 68 outlines the basic costs for each. The map on p. 64-65 shows the current schedule for Tricare implementation in each region.

Tricare Prime. This option is the key to and principal focus of the new health program. Basically, it is an HMO option employing an MTF and a network of civilian health-care providers.

Tricare Prime covers all active-duty members automatically, while others will have to enroll. There is no fee for active-duty dependents, but other eligible beneficiaries will pay an annual enrollment fee up front of \$230 per person or \$460 per family. Although the fee can be paid quarterly, the payer incurs an additional charge of \$5 per payment.

Each individual who enrolls in Tricare Prime chooses a primary-care manager to provide or arrange for his

or her health care. The PCM, or someone from the PCM's team, will treat most ailments and arrange for follow-ups or referrals to specialists. Because access to military facilities may be limited, the standard priority system will continue, providing care first for active-duty members, then their dependents, and finally retirees and their dependents. This system will have the effect of placing some Tricare Prime enrollees with civilian providers. However, those civilian providers will fill out any necessary paperwork.

The Prime option also offers low copayment features, including lower costs than the other two options for inpatient care at a civilian facility. Currently, enrollment is for one year.

Tricare Extra. This second option features a preferred-provider discount of five percent whenever a beneficiary selects a medical provider from the contractor's network. The beneficiary pays no up-front fee, but he or she does have to pay annual deductibles and make higher copayments than would be the case under the Tricare Prime option. Civilian providers will fill out claims forms for beneficiaries, who will not be forced to use network providers exclusively but instead can elect to use them on a case-by-case basis.

Tricare Standard. The third option is CHAMPUS under a new name. This program allows the greatest freedom in selecting civilian physicians but entails the highest costs. The annual deductible is the same as for Tricare Extra, but both outpatient and inpatient care cost more. Moreover, beneficiaries who receive treatment from a non-CHAMPUS civilian provider must file the necessary paperwork themselves.

Beyond the Tricare Promise

Tricare Prime appears to have the highest potential for providing comprehensive and fairly inexpensive coverage. However, the Pentagon may have to limit the number of applicants it can accept. GAO's Mr. Baine testified that "DoD expects that availability will be limited, and not all eligible beneficiaries will be permitted to enroll."

Further complicating matters, he said, is this fact: When it comes to receiving treatment in a military facility, military retirees—even those enrolled in Tricare Prime—will have a lower priority than active-duty depen-

dents who are not enrolled. This means that retirees may have to use civilian providers.

Some even question the Defense Department's ability to find enough civilian health-care provider networks to cover all twelve areas of the country. If it doesn't, beneficiaries in those areas will be limited to Tricare Standard.

The ongoing process of base closure and realignment has also caused some uncertainty about continuing

million and could pay an extra \$500 million.

"Based on a range of assumptions about how key factors would affect costs," said Mr. Singer, "CBO concludes that, if Tricare was fully operational in 1996, the total cost of DoD's peacetime health-care mission would probably increase by about three percent or about \$300 million."

Of major concern, said CBO, is the lack of control by lead agents. Ostensibly in charge of a region, lead agents

MTFs. Almost all active-duty members and their families, totaling 4.2 million, use military medical facilities. Only about two-thirds of the three million military retirees and their dependents under age sixty-five use MTFs regularly. About one-third of beneficiaries over age sixty-five, some 1.2 million, regularly use a military health-care facility.

The chart at left shows the projected trend in the beneficiary population through 2000.

Private-Sector Funding Technique

The Pentagon believes that Tricare will weather these difficulties. This optimism stems in part from use of incentives in funding, which contrasts with DoD's traditional "historical work load" approach. DoD began using what is called "capitated budgeting" in October 1993 and expects it to help contain health-care costs.

Capitated budgeting essentially allocates a fixed dollar amount on a per capita basis. DoD uses biannual surveys to estimate the number of beneficiaries who will use the military health-care system during a specific period, then determines payment amounts based on that estimated patient pool.

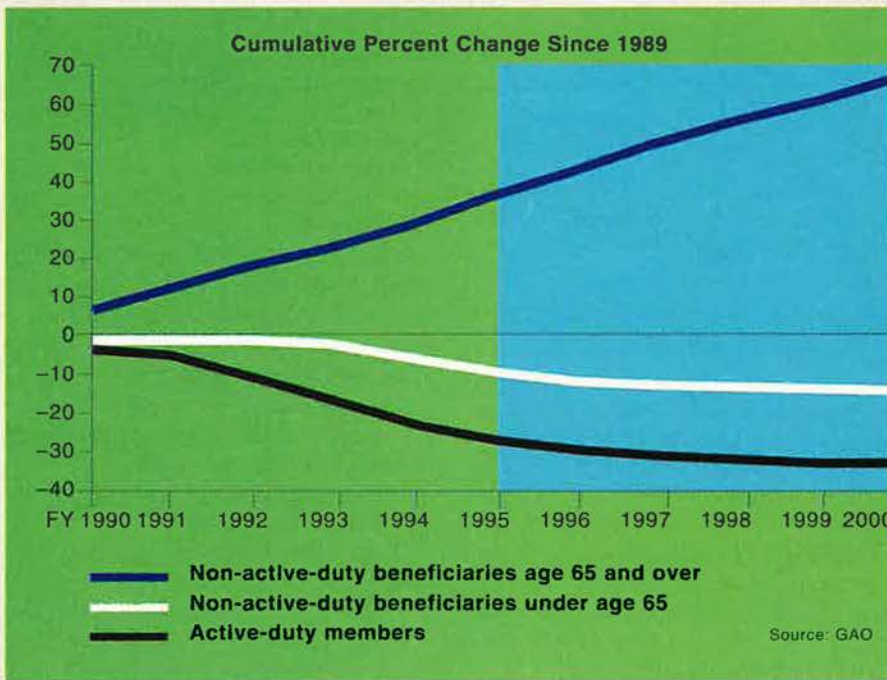
Secretary Joseph said that capitated budgeting "will spark decisions designed to ensure [that] only necessary care is provided and that care will be received in the appropriate setting." He added that it gives health-care managers "a much improved ability to predict health-care expenditures."

However, CBO cautioned that DoD's capitated budgeting method could retain existing inefficiencies because the Pentagon based its per capita rates on past spending levels, which may have been artificially inflated.

At the same time that the Pentagon began developing its Tricare program, Congress directed DoD, through Section 733 of the National Defense Authorization Act of Fiscal 1992 and Fiscal 1993, to analyze the fundamental economic issues bearing on the size of the military medical system. Specifically, Congress wanted to know whether it was cheaper to provide direct medical care to beneficiaries or to reimburse military beneficiaries for care obtained in the private sector.

Wartime Needs Only

After studying the contentious issue for nearly two years, the Pentagon



availability of military health care. Dr. Joseph said that, in most base-closure areas, the military has created preferred-provider networks for CHAMPUS participants. Additionally, both CHAMPUS- and Medicare-eligible beneficiaries in those areas can participate in either a retail pharmacy network or a mail-in pharmacy program. DoD just expanded the mail-in program to cover ten more Air Force bases and two Army posts. (See "Aerospace World," July 1995, p. 28.)

Even more worrisome is that DoD's health-care costs under Tricare may go up. Neil M. Singer, the Congressional Budget Office's deputy assistant director of the National Security Division, told Congress in March that the effects of Tricare are likely to range between additional costs of about six percent to savings of less than one percent—meaning that the Pentagon will save no more than \$100

will have little real authority over hospital commanders, who will still be controlled by their own service.

DoD plans to incorporate a utilization management program, similar to those found in private-sector managed-care plans, that will include prospective review, concurrent review, discharge planning, case management, and retrospective review. The CBO report pointed out, however, that decisions about use made by a military hospital commander will not be binding on the private contractor.

Additionally, about thirty percent of eligible beneficiaries, some two million people, do not currently use military health care. The existence of this huge "ghost population" has always hampered the Pentagon's efforts to plan, according to CBO's Mr. Singer.

The Defense Department estimates that roughly 6.4 million of 8.2 million eligible beneficiaries currently use

Tricare Options Comparison

Category	Tricare Standard (CHAMPUS)	Tricare Extra	Tricare Prime
Annual Enrollment Fees			
Active duty	\$0	\$0	Automatic enrollment; \$0
Active-duty dependents	\$0	\$0	Must enroll; \$0
Retirees, military survivors, and dependents	\$0	\$0	Must enroll; \$230 / person or \$460 / family
Annual Deductibles			
E-4 and below	\$50 / dependent; \$100 / family	\$50 / dependent; \$100 / family	\$0
E-5 and above	\$150 / dependent; \$300 / family	\$150 / dependent; \$300 / family	\$0
Retirees and dependents	\$150 / person; \$300 / family	\$150 / person; \$300 / family	\$0
Outpatient Care at MTF			
Active duty	\$0	\$0	\$0
Active-duty dependents	\$0	\$0	\$0
Retirees and dependents	\$0	\$0	\$0
Outpatient Care at Civilian Doctor			
Active-duty E-4 and < dependents	20%	15%	\$6
Active-duty E-5 and > dependents	20%	15%	\$12
Retirees and dependents	25%	20%	\$12
Inpatient Care at Civilian Hospital (General)			
Active-duty dependents	\$9.50	\$9.50	\$11
Retirees and dependents	\$323 / day + 25% of doctor's bill	\$250 / day + 20% of doctor's bill	\$11

in April 1994 released its report, known as the "733 Study." Previously, DoD had based the size of its medical establishment on the military's wartime requirements. During the Cold War, those requirements called for a medical capacity that actually exceeded what it needed to provide day-to-day care for active-duty troops, leaving plenty of capability to care for non-active-duty beneficiaries. Basing its findings on the current strategy of fighting two nearly simultaneous major regional conflicts, the 733 Study found the wartime requirement greatly reduced.

An unclassified summary of the report stated that "medical demands in CONUS [continental US] could be met by about one-third of the 30,000-bed capacity of the MTFs planned to be operating in FY 1999. Similarly, about half of the active-duty physicians projected to be available in FY 1999 would be needed to meet wartime requirements."

The study pointed out that, if the Pentagon reduces its medical establishment to a size needed for wartime missions, it will also diminish its peacetime capability and force more beneficiaries from the direct-care system into CHAMPUS or Tricare. William J. Lynn, the Pentagon director of Program Analysis and Evaluation who presented the 733 Study to Congress, said that the threshold issue is whether

such a shift would reduce or increase DoD health-care costs overall.

The study concluded that MTFs can provide health care "less expensively on a case-by-case basis than can CHAMPUS." In fact, the study "found a price advantage of ten to twenty-four percent" for a given work load through an MTF as opposed to CHAMPUS. Mr. Lynn attributed this advantage to five factors:

- MTFs provide care in more austere settings than civilian facilities do.
- The military system, with some exceptions, is under less pressure to adopt unproven technologies, thereby slowing the pace of technology-driven cost growth.
- DoD has no financial responsibility when malpractice claims are upheld in court.
- DoD is responsible for almost no indigent care.
- Because military physicians are salaried employees, they have less incentive to prescribe greater amounts of testing and treatment that may be of marginal benefit.

Having noted the potential savings from going to more "in-house" medical care, the 733 Study then switched course and explained how increasing MTF usage would actually raise costs.

With expanded access to the military medical system, it claimed, beneficiaries who had previously

chosen not to use DoD health care, whether through an MTF or CHAMPUS, would start to use the system. According to a RAND Corp. study, for every ten patients pulled into MTFs from CHAMPUS, the MTFs would also see about six patients who would have sought care through third-party insurance or would have deferred care entirely—creating a total new work load of sixteen while saving only the costs of the ten from CHAMPUS.

The RAND analysts also found a secondary effect: With expanded opportunity for free MTF care, those who had been using the system would do so more frequently. That would add yet another three cases for every ten pulled from CHAMPUS.

Thus, the total increase would actually be nineteen, not ten—generating what DoD terms "the demand effect"—nearly doubling the original CHAMPUS work load potentially transferred to MTFs. The demand effect would wipe out any cost advantage.

GAO's Mr. Baine used that same logic to suggest that "an improved health-care benefit option, such as that offered in Tricare Prime, may attract more people than the system can accommodate without increasing total costs."

He added, however, that the 733 Study was based on data taken largely from a Tricare predecessor, the CHAMPUS Reform Initiative, and that specific projections therefore would "have little direct applicability to the new program."

So pervasive and heated is the issue of military health care that the Commission on Roles and Missions of the Armed Forces also reviewed the situation. The commission did endorse Tricare "as an important step to a total quality medical program," but it stated that "Tricare currently does not provide the degree of choice needed to establish a competitive environment that will foster more efficient health care."

That seems to be the congressional view, as well. At least Congress did ask CBO to study a Tricare alternative featuring the Federal Employees Health Benefit Program. Several groups, including the Commission on Roles and Missions and the National Military Family Association believe FEHB would be less costly and more equitable for beneficiaries.

Evidently, the debate still is wide open. Meanwhile, Tricare marches on. ■

By John L. Frisbee, Contributing Editor

Big Week: Day One

2d Lt. Frederick Rawson's B-24 crew would fly its first, and last, combat mission, and copilot 2d Lt. James Lewis displayed valor that exemplified the week's operations.

FEBRUARY 20, 1944, was the first day of Big Week, the all-out Allied assault on German aircraft production. It was expected that these attacks, together with losses of defending German fighters, would so weaken the Luftwaffe that the Allies would gain relative freedom of the air over Germany.

The weather had been forecast to be good for several days, but as so often happened, the forecast was a bust. Throughout the night of February 19–20, weather reconnaissance planes reported ceilings over the UK of 8,000 feet with severe icing in the clouds. Because daylight was brief at that time of year at that latitude, the strike force would have to take off before dawn, climb through heavy icing, and form up in the dark. The go/no go decision was up to Gen. Carl "Tooeey" Spaatz, commander of US Strategic Air Forces in Europe. Supported principally by his deputy for operations, Maj. Gen. Frederick L. Anderson, General Spaatz made the agonizing decision to launch sixteen wings of Eighth Air Force bombers—more than 1,000 in all—against aircraft plants in Germany, escorted by seventeen fighter groups.

As B-17s and B-24s taxied out for takeoff at bomber bases throughout the UK on that cold February morning, a few veteran crews had been called on to lead the way and form up under these hazardous conditions. The members of 2d Lt. Frederick Rawson's 44th Bomb Group crew, however, were not veterans. They were on their first mission, flying B-24 serial number 42-1003734 and assigned to a target at Helmstedt, while a larger force would hit the Bf-109 factories at Leipzig. Rawson's new boys were tail-end Charlies in their formation, directed to bomb from

13,000 feet, then climb to 18,000 for their return to the UK.

All went better than some had expected until "bombs away," when things began to fall apart as clouds of flak surrounded the formation. One of the early bursts knocked out Rawson's right engine and did undetermined structural damage to the B-24. Rawson was not able to hold formation on the climb to higher altitude. The straggler came under attack by swarms of Luftwaffe fighters. A Bf-109 in the first wave set fire to the tail section, wounding the tailgunner, Sgt. Russell Wapensky. Successive attacks damaged the rudder controls, jammed the elevators, knocked out the intercom, and silenced some of the bomber's guns. One waist gunner, Sgt. Robert Shultz, was killed instantly; the other, Sgt. John Hoffman, was wounded, as were ball turret gunner Sgt. Julian Winfree and flight engineer SSgt. Richard McCoy.

The burning B-24 was barely controllable. Lieutenant Rawson sent copilot 2d Lt. James Lewis to the rear of the aircraft to give a bail-out order. The wounded waist gunner, flight engineer, and ball turret gunner already had taken to their chutes. Navigator 2d Lt. William Johnston and bombardier 2d Lt. Bill Richardson went out the nose wheel door.

As Lieutenant Lewis prepared to jump, he saw that pilot Rawson, who was fighting to keep the B-24 under control until the crew could bail out, could not get out of his seat. The release of his flak jacket was jammed, and his parachute nowhere in sight. Lewis released Rawson from his seat, found the pilot's chute, and buckled it on him. Satisfied that Rawson could make it out of the shot-up plane, Lewis entered the bomb bay to be sure all crew members had left or were able to parachute out. There he saw Sergeant Wapensky, the wounded tailgunner, standing on the catwalk, his clothing smoldering and his chute riddled by 20-mm shells. There was no spare chute aboard.

Lieutenant Lewis would not leave the wounded man to die in the immi-



nent flaming crash. He saw only one alternative. Lewis hoisted Wapensky onto his back and dove out of the bomb bay. The shock of the chute opening broke Wapensky's grip from around Lieutenant Lewis's neck, and the tailgunner fell to his death.

The men who had successfully bailed out landed in farm country and immediately were rounded up by armed German civilians. The body of navigator Johnston, whose chute did not open, lay nearby. Winfree and McCoy were taken to a hospital but did not survive their wounds. Rawson, Lewis, Richardson, Hoffman, and radio operator SSgt. Gerald Reader, were sent to Frankfurt for interrogation and remained POWs until the end of the war.

The five days of Big Week marked the most concentrated period of operations for Eighth Air Force up to that time. On its opening day, the Eighth mounted its first 1,000-plane raid. It flew 3,300 bomber sorties in those five days, accompanied by coordinated Fifteenth Air Force bombing attacks and nightly RAF Bomber Command strikes. It was a week marked by many heroic deeds, among them Lt. James Lewis's gallant attempt to save his tailgunner by sharing a chute with the wounded man.

By the end of Big Week, German aircraft production had declined, though only temporarily, by fifty percent. The achievement of Allied air superiority and eventual collapse of the Third Reich were in sight over a still-distant horizon. ■

Thanks to Will Lundy, 44th Bomb Group historian.

When missions are rising and no real options remain to cut force structure or procurement, the Air Force has only one way to move—buying cheaper.

Buying Cheaper

IF THE armed services are on a fixed income, and you can't cut force structure, readiness, or procurement, but your missions are increasing, what do you do? You either buy cheaper systems, or you buy systems more cheaply.

How the armed forces can buy and maintain equipment more cheaply was the prime topic at the Air Force Association's acquisition symposium, held in Dayton, Ohio, in May. And though "acquisition reform" has been a rallying cry of nearly every administration since creation of the Defense Department, optimism was widespread that success may actually be at hand.

"I am truly excited" about reforms now under way, said Gen. Ronald W. Yates, the outgoing commander of Air Force Materiel Command, Wright-Patterson AFB, Ohio.

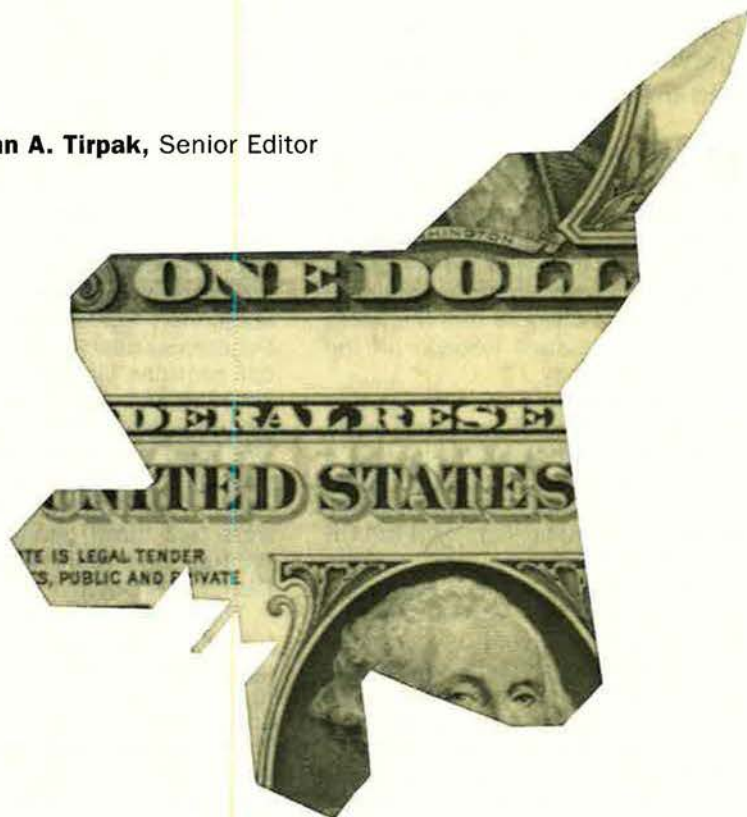
General Yates, ending his Air Force career after two years as head of Air Force Systems Command and three as commander of AFMC, vigorously endorsed the Pentagon adoption of "integrated process and product development" concepts, pioneered in AFSC and AFMC in the F-22 fighter program.

These concepts shift management emphasis away from simply checking on and grading the progress of a program. Instead, they focus on bringing into the process everyone who has a stake in the program's outcome, at every step, to create what a DoD directive calls "continuous teamwork and assistance."

"This is extraordinarily different," General Yates said.

The forthcoming change to the

By John A. Tirpak, Senior Editor



acquisition system was the centerpiece subject at the AFA symposium, "Opportunities and Challenges in Acquisition and Logistics."

In addition to General Yates, Air Force speakers included Lt. Gen. Charles E. Franklin, commander of AFMC's Electronic Systems Center, Hanscom AFB, Mass.; Maj. Gen. Stephen P. Condon, commander of AFMC's Ogden Air Logistics Center, Hill AFB, Utah; and Col. Richard V. Reynolds, manager of the B-2 System Program Office, Wright-Patterson AFB.

Also participating were R. Noel Longuemare, Jr., principal deputy

under secretary of defense for Acquisition and Technology; Sherri W. Goodman, deputy under secretary of defense for Environmental Security; Harry C. Stonecipher, president and CEO of McDonnell Douglas Corp.; and Richard E. Pinckert, head of McDonnell Douglas's Environmental Assurance Division.

Good Guys and Bad Guys

General Yates, returning to the process theme, said the change will transform the role of program "nitpickers." For some time, he said, the nitpickers were viewed as heroes, coming up with "a question, germane or not, that will stump the program director and stop the program." Now, he said, such individuals will be viewed as "the bad guys" who failed to get involved in a program early enough and raise major questions soon enough, before the onset of a milestone review.

The General explained that now when the Pentagon holds a Defense Acquisition Board meeting, it will not want to run into surprise questions from program evaluators. "The guy who says, 'I hadn't worked any of this out, and here is a stumper for the program director,' gets an F," said General Yates.

General Yates said he expects a "thirty to forty percent improvement" in program costs, rather than "marginal" savings of a few percent, because the new system will help prevent costly delays and configuration changes.

The new rules "will change our lives," General Yates said. "These will make our programs successful" because the true drivers of cost, schedule, and performance typically "lie outside the purview of the program directors"—that is, with industry or government. Now, all concerned entities will have a voice and be involved at every stage of a program's progress.

General Yates said that such an idea would have been considered "sedition" a few years ago but that "this is a breath of fresh air, and we owe it to the current [Defense Department] leadership. We have a chance, here, and I am excited about it."

General Yates blasted moves in Congress to economize by centralizing all of the DoD's acquisition functions into a single entity. He directly criticized the Roth-Kasich bill—

named for its sponsors, Sen. William V. Roth, Jr. (R-Del.), and Rep. John R. Kasich (R-Ohio)—as a potential major problem for acquisition.

Creating a centralized "acquisition corps," as the bill proposes, would be "horribly destructive" and would undermine the hard-won superiority of US weapon systems, General Yates said. Such an idea would block out the very people who most need to be involved in acquisition—field supporters, scientists, testers, and, "most importantly, the warfighters."

Exactly Wrong

The General called the bill "exactly the wrong thing for us to be thinking about and for us to be doing."

No one has been able to offer him "a single example" of a nation that has benefited from a consolidated acquisition corps, General Yates said.

The "team" concept works far better, but "most of the time there is no way to evaluate leadership and teamwork," so it often presents "no value . . . for the analyst." Centralization, however, has proven to be "the wrong answer," said the General. "I believe [the Roth-Kasich bill] . . . is fundamentally flawed."

General Yates said that programs will likely be improved by reducing the specification load on contractors. By imposing specs later in a program rather than earlier, the contractor would have a longer time to be "free . . . to innovate and also to be open to more commercial practices."

Still at issue, though, are the ramifications of putting all of a contract's emphasis on meeting performance goals rather than matching specifications.

"How are you going to pass a performance spec down to your subcontractors?" General Yates asked. "We haven't answered that question among ourselves."

Imposing performance requirements on subcontractors without specifications involves a certain degree of risk, which in turn "represents increased cost in a form of some insurance. . . . If we are to start dealing with each other in performance specs, which I think is the right way," he continued, "we are going to have to understand . . . what

it means to our cost performance, or prices."

Getting maximum use of the resources at hand is another way to cut costs, and General Franklin, Electronic Systems Center commander, presented a primer on how ESC is trying to make the various Defense Department information systems talk to each other and become truly interoperable.

An Interoperability Office has existed for sixteen months, and General Franklin said it has been hard at work setting standards and creating architectures that all the services can use without having the same equipment. Before the work started, standards "were a disaster."

One key effort entails bringing USAF warfighters to a laboratory dubbed "Fort Franklin" and getting them to explore ways of communicating and working together electronically without going through elaborate protocols and "stovepipes," General Franklin said. He wants the warfighters to "think broader."

Overall, the effort is aimed at trying to "accelerate the data flow so we always turn within the decision loop of the enemy."

The effort is also nearly one-of-a-kind among the services. General Franklin said his shop has been asked to put together an interoperability proposal for the Office of the Secretary of Defense, "and we are building that proposal right now."

General Yates is leaving AFMC with an as-yet-unimplemented idea to have contractors bid processes along with their products. This way, "we could do away . . . with a lot of government oversight once we bought the process" by simply certifying that the contractor knows how to build an item correctly.

Far Apart

General Yates has long been at the center of controversy over the division of depot labor between government and industry. The two groups "are not on the same frequency" when the subject turns to privatization of depot work.

To General Yates, privatization means "I am going to take work that is in a government depot . . . and put it out to industry for industry to bid on competitively, without the depot bidding." In the view of General Yates, industry thinks "privatization"

means giving work on a sole-source basis to a company.

"I'm not interested in that deal," said the General. "I will fight you every step of the way."

The central problem, he said, concerns proprietary data rights. While General Yates recognizes that "intellectual capital is part of [industry's] dearest assets," and should be afforded some protection, "the question is how much, how long?"

He went on to say government is "willing to play ball" but not if industry resists efforts to cap the length of its data rights and insists that any privatization must go sole-source to the prime contractor. In such a situation, "the only people who can compete with you are organic depots. That is the reverse of privatization." Moreover, he added, "we are not happy with the price that we are getting from industry" for allowing data rights to be made available to other bidders.

General Yates noted that the computer industry recognized the need to release control over data in order to prosper.

"Can't we do this?" asked General Yates. "Are we so enslaved to the paradigm of proprietary data that we will destroy ourselves by not being able to break out of it? We've got to be better than that."

Mr. Stonecipher, president and CEO of McDonnell Douglas, agreed with General Yates that industry has the wrong perception about the depot and privatization issue.

"I learned something" from General Yates's comments, Mr. Stonecipher said. "The perception is that industry is going to compete with the depots. That's where most of the rhetoric is taking place."

He allowed that "We always think our data rights are worth a lot more than most people do, so we should be able to solve that problem."

Holding out his company as an example of what the industry must do to survive post-Cold War defense austerity, Mr. Stonecipher said he is trying to break bad industry habits of always assuming the "next thing" will cost more, even if it is better.

Instead, he has been "hammering home" a message that "if you are building a product that costs 'X,' then next year it must cost 'X' minus 'Y' and even less the following year.

In other words, zero contribution for inflation . . . and Class II improvements."

Industry, he said, "must stop running to [the Air Force] for money every time we see a change coming down the road."

Concentrating the Mind

To motivate his engineers and managers, Mr. Stonecipher said the company has told them that their bonuses will go up or down by thirty-three percent, depending on whether they achieve the "ambitious cost-reduction targets" he sets for them on various programs.

"When you talk about money, it concentrates the mind," he added.

Mr. Stonecipher also said he is committed to doing things differently, not just better, because now better may not be good enough.

For example, he said he's trying to reduce "the complexity of the product" with hundreds of thousands of parts and the miles and miles of wiring that go into the making of an aircraft.

"All things being equal, the more complex the product, the harder it is to develop, to build, to operate and maintain," he said. While larger and more capable, the newest version of the Navy/Marine Corps F/A-18 will have one-third fewer structural parts than its predecessors.

McDonnell's "Phantom Works" research and development department is working on a new composite tail for the advanced C-17 transport. It is an experimental version that has eighty percent fewer parts, seventy-eight percent fewer fasteners, and twenty percent less overall weight. It costs half as much as the standard tail.

Mr. Longuemare, the principal deputy under secretary of defense for Acquisition and Technology, told the Dayton gathering that there is "very much of an upbeat mood" in industry and government about the chances for changing and improving the acquisition system.

"A lot of the tools needed to make these changes are in place," he said. "I don't think there's any doubt we have a major commitment on the part of all the leadership in the department, and we have already made some moves toward these changes."

Mr. Longuemare noted, "The amount

of money we are putting into the procurement accounts right now . . . is at an all-time low," and, while the services have held the inventory at a fairly flat average age by "very adroitly" eliminating the older pieces of equipment, "come 1997, we are going to be at the bottom of the barrel."

Because the US armed forces depend on having a technological edge, he said, investments must not be cut further, but prospects for new infusions of money do not look good.

"Hockey Stick" Plans

Budgets planned for the remainder of this decade and the beginning of the next look like "the old hockey stick"—flat for a long time, with a sharp upturn at the end—which promises that conditions will get better, financially, Mr. Longuemare continued.

"That is the exact shape of our investment accounts in current budget predictions," he said, but "we believe that the likelihood of that happening is not very high." He later added, "It would be unwise for us to assume we are going to get some tremendous relief and a large influx of new money."

Because support operations account for sixty to eighty percent of the cost of a given weapon system, "this is an area that needs a tremendous amount of attention," the Secretary said. Economies in support will have to deliver the funds necessary "to remodernize our forces . . . with much smaller budgets."

Government red tape was recently found to add eighteen percent to the cost of a program, Mr. Longuemare said, "and I believe it is . . . probably on the order of twenty percent." He pledged that DoD would try to eradicate "non-value-added work," particularly in oversight.

He also said much more can be—and will be—done in the field of cross-servicing and avoiding duplication of effort in areas where it is not advantageous. Cross-servicing will help wipe out redundant non-recurring costs and "each service having a unique logistics tail."

Though the services need to have different capabilities, he said, in many areas, particularly electronics and subsystems, "there is absolutely no reason" for differences among

the equipment of the different armed forces. New information technology will help by making it possible "to understand where the assets are, determine what is needed, what their condition is, and how many are required in certain locations."

Mr. Longuemare railed against the fact that, while cost reduction should be "a never-ending process," the Pentagon now finds that "our contractual structure is such that they tend not to encourage that."

Cost can no longer be a trade-off in system design, he asserted. "One thing we must not do is exceed [target] price. It can be done, and we can achieve, in my view, two-to-one cost reductions in the equipment we buy, compared to our historical record."

Penalizing contractors by demanding money back when milspecs are eliminated is unfair, and some way must be found to give contractors an incentive to offer better methods without worrying that it will cost them money. "We need to find a win-win situation. There is no reason we shouldn't be able to share half of that savings with industry," said Mr. Longuemare.

Both General Yates and Mr. Stonecipher said that last year's Federal Acquisition Streamlining Act would have little immediate impact on the acquisition system, but "it was a tremendous step in the right direction," Mr. Longuemare said. "It gave us tremendous flexibility to implement many of the things that need to get done."

New Cost-Cutter?

A major portion of the symposium was devoted to environmental compliance as a cost-cutter in the acquisition and support field.

While some in Congress have recently questioned whether this should be a consideration in defense programs, Ms. Goodman, the Pentagon's top environmental official, claimed that environmental considerations can be a major driver of cost savings and performance improvements. "Through pollution prevention, we can protect our scarce defense dollars because it means less cost down the road in the large clean-up-and-compliance bills we have today," she explained.

The Defense Department must obey the law regarding release of toxic chemicals and must also be

cognizant of the legal liabilities of spills and accidents. Ms. Goodman said, simply, "We either pay now or pay more later."

As an example of pollution prevention that cuts costs and improves performance, she noted that cadmium plating of aircraft components, done to reduce corrosion, can be replaced by coating them with ion-vapor-deposited aluminum. This process "not only eliminates the volatile organic compounds, which is a significant health hazard, but also offers superior corrosion control and is a lighter-weight coating." New aircraft painting procedures not only reduce emissions but cut aircraft turnaround time, she added.

Based on current laws and regulations, "every time you spend one dollar on buying a hazardous material, you have \$10 in costs associated with it," Ms. Goodman said. "The more we can do to limit our use of hazardous materials, obviously, the better off we will be."

She pointed out that, in order to reduce acquisition and logistics costs, "we really need . . . to be focused as much on the back-end costs of our weapon systems—the sustainment phase, logistics, and environmental—as we have [been] on the front end."

Ms. Goodman pointed to the B-2 bomber as a "model" of how pollution avoidance, when made an equal consideration early in the program, can be a real cost-saver.

Built under the most environmentally restrictive laws in the country—California's—the B-2 could have been an ecological nightmare. Northrop Grumman, by building pollution avoidance into the program, reduced its hazardous waste management and disposal costs from \$3.7 million in 1990 to \$600,000 in 1993.

The B-2 program manager, Colonel Reynolds, credited the company and the Air Force with making pollution avoidance a priority right from the start, though the B-2 was a "deeply black program" and USAF management could have "treated [pollution prevention] as an adjunct." Instead, he noted, "it was an explicit decision to put it in the mainstream."

Both the company and USAF saw the inevitability of complying with environmental laws and costs, he said, so "it was easy to generate a

strong sense of commitment across the program."

Because pollution avoidance worked out so well on the B-2, "I have a lot of contingent liability money that the Air Force and Department of Defense want to take," Colonel Reynolds said. He added that pollution considerations have been so important a part of costs to the Air Force and profit to Northrop Grumman, "from where I sit, without relating pollution prevention to that bottom line, we could not have arrived at where we are today."

General Condon, commander of Ogden Air Logistics Center, reported "dramatic" progress in reducing the amount of hazardous materials Ogden ALC uses.

"We have . . . a pharmacy concept where we have a centralized point for issuing hazardous materials, and they are issued only in the quantities necessary to execute the processes they are used in. We have implemented a very rigorous tracking process, so we know where those hazardous materials are and who has them."

Ogden has managed to cut its use of ozone-depleting substances by seventy-seven percent in two years and has a goal to eliminate ODSs in repair processes "by the end of this year."

Dr. Pinckert, of McDonnell Douglas's Environmental Assurance Division, said his company's goal is to reduce hazardous waste "ninety percent by the year 2000." The point, he said, is not just to be environmentally friendly but to avoid fines and eliminate the considerable costs of disposing of hazardous materials.

He advised industry to incorporate pollution avoidance "in the initial design," but the challenge is to do so "and still remain competitive." Cutting pollution cuts life-cycle costs, but these are hard to measure because it is tough to know how much material will be disposed of over the life of the program and harder still to know how much it will cost "to dispose of an entire weapon system thirty years from now."

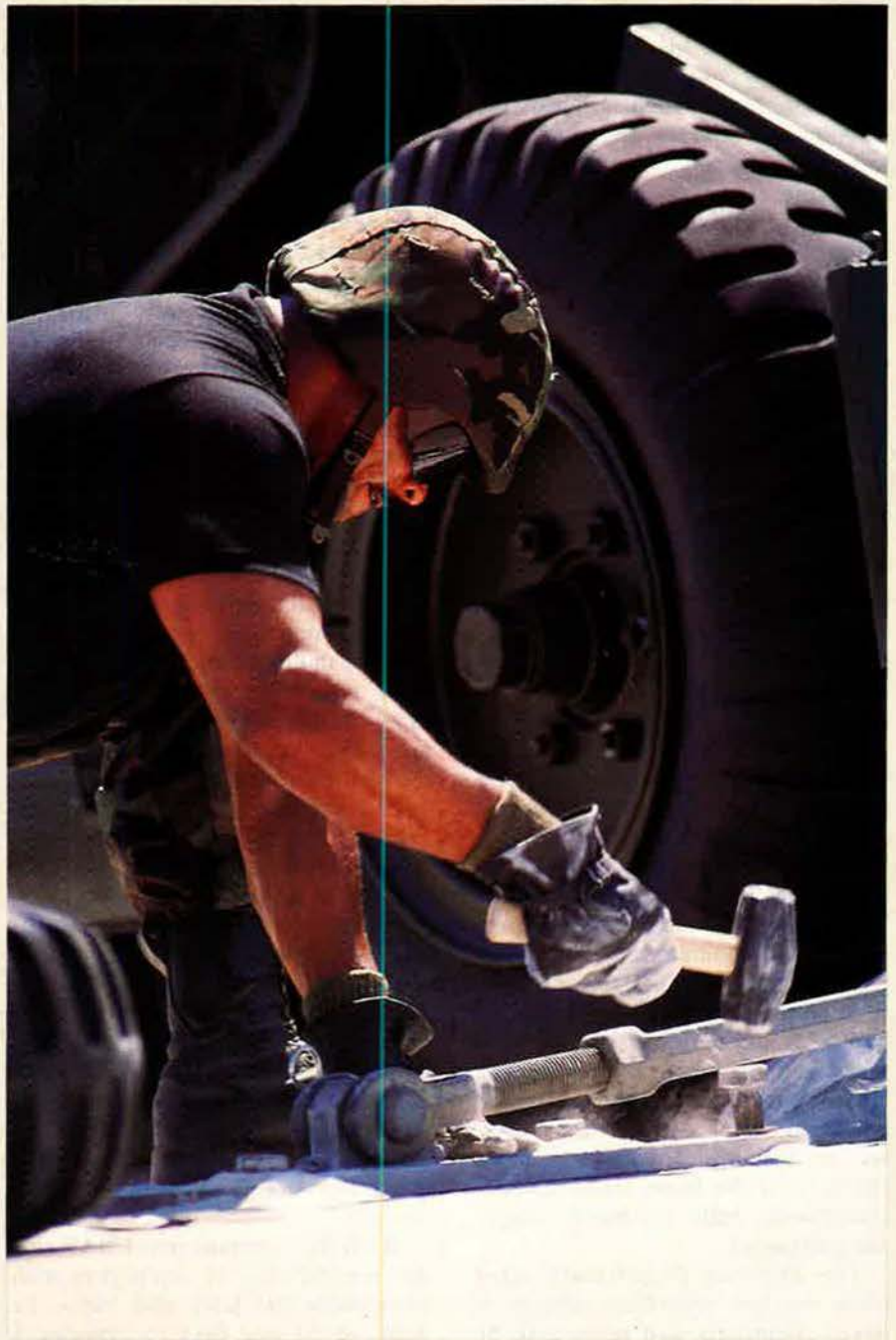
Dr. Pinckert noted that industry has had some success in cooperatively dividing up pollution problems, investing in research to overcome them or switching to cleaner alternatives, and sharing the results for all to use. ■

At Readiness Challenge, building something from nothing was a normal day at the office.

Just Build It

For a week in April, thirteen teams of Air Force civil engineers and services personnel competed in Readiness Challenge V at Tyndall AFB, Fla. They came from every major USAF command, the Guard and Reserve, two direct reporting units, and a Canadian Forces wing. The competition gave them a chance to sharpen their skills and evaluate their readiness for wartime contingencies and humanitarian relief missions, demonstrating their role as important support elements in the projection of airpower.

USAF photos by SrA Diane Robinson





No distinguished visitors' quarters for these CEs. To add realism, they lived in tents during the five-day competition. Readiness Challenge began with an event to test the speed and skill of the twenty-seven-member teams in erecting solid-floor tents. Above, hammers and saws move furiously as the teams compete, often head to head and against the clock. At top, the 4th Wing from Cold Lake, Alberta, gets out the heavy equipment for the runway repair portion of the competition.

For CEs and services personnel, making a unit operational means going in first and being responsible for everything from the runway to the cook stove (below). At right, competitors from the 11th Wing, Bolling AFB, D. C., test water samples. In addition to the hammer-and-nail events, the biennial Readiness Challenge also featured fire search and rescue; M16 marksmanship; defuzing ordnance; nuclear, biological, and chemical warfare detection; and camouflage, concealment, and deception. The awards listed below represent only the top levels of the many honors earned at the competition.



USAF photo by SrA. Diane Robinson

Top Team

10th Air Base Wing (USAFA), Colo.
 16th Special Operations Wing (AFSOC), Hurlburt Field, Fla.
 96th Air Base Wing (AFMC), Eglin AFB, Fla.

Top Prime Base Emergency Engineering Force (BEEF) Team

10th Air Base Wing (USAFA), Colo.
 354th Fighter Wing (PACAF), Eielson AFB, Alaska
 96th Air Base Wing (AFMC), Eglin AFB, Fla.

Top Competitor

SMSGt. John Seely, 10th Air Base Wing (USAFA), Colo.

Maj. Gen. James E. McCarthy Readiness Trophy

16th Special Operations Wing (AFSOC), Hurlburt Field, Fla.
 100th Air Refueling Wing (USAFE), RAF Mildenhall, UK
 354th Fighter Wing (PACAF), Eielson AFB, Alaska

Canadian Trophy

130th Airlift Group (ANG), Charleston, W. Va.
 4th Wing, Canadian Forces, Cold Lake, Alberta
 10th Air Base Wing (USAFA), Colo.

Base Recovery After Attack

10th Air Base Wing (USAFA), Colo.
 16th Special Operations Wing (AFSOC), Hurlburt Field, Fla.
 96th Air Base Wing (AFMC), Eglin AFB, Fla.

Top Prime Readiness in Base Services (RIBS) Team

16th Special Operations Wing (AFSOC), Hurlburt Field, Fla.
 96th Air Base Wing (AFMC), Eglin AFB, Fla.
 554th Support Group (ACC), Nellis AFB, Nev.

Force Beddown

10th Air Base Wing (USAFA), Colo.
 96th Air Base Wing (AFMC), Eglin AFB, Fla.
 341st Missile Wing (AFSPC), Malmstrom AFB, Mont.

USAF photo by SrA. Ken Bergman





Given forty-five minutes to stack 600 sandbags, the Air Force Space Command team launches from the starting line at the sandbag revetment construction event. In the top photo, a competitor helps install a mobile aircraft arresting system. At Readiness Challenge, CE and services teams displayed their abilities to establish and sustain air base operations. ■

Congressional **Veterans'** **Affairs** Establishment

An Air Force Magazine Directory (Members arranged by seniority in committee)

Senate Committee on Veterans' Affairs

Republicans



Alan K. Simpson
Chair
Wyoming



Strom Thurmond
South Carolina



Frank H. Murkowski
Alaska



Arlen Specter
Pennsylvania



James M. Jeffords
Vermont



Ben Nighthorse
Campbell
Colorado



Larry E. Craig
Idaho

Democrats



John D. Rockefeller IV
Ranking Minority Member
West Virginia



Bob Graham
Florida



Daniel K. Akaka
Hawaii



Byron L. Dorgan
North Dakota



Paul Wellstone
Minnesota

House Committee on Veterans' Affairs

Republicans



Eob Stump
Chair
Arizona



Christopher H. Smith
New Jersey



Michael Bilirakis
Florida



Floyd D. Spence
South Carolina



Tim Hutchinson
Arkansas



Terry Everett
Alabama



Steve Buyer
Indiana



Jack Quinn
New York



Spencer Bachus
Alabama



Cliff Stearns
Florida



Bob Ney
Ohio



Jon D. Fox
Pennsylvania



Michael P. Flanagan
Illinois



Bob Barr
Georgia



Jerry Weller
Illinois



J. D. Hayworth
Arizona

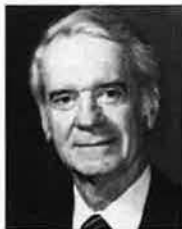


Wes Cooley
Oregon



Dan Schaefer
Colorado

Democrats



G. V. "Sonny" Montgomery
Ranking Minority Member
Mississippi



Lane Evans
Illinois



Joseph P. Kennedy II
Massachusetts



Chet Edwards
Texas



Maxine Waters
California



Bob Clement
Tennessee



Bob Filner
California



Frank Tejeda
Texas



Luis V. Gutierrez
Illinois



Scotty Baesler
Kentucky



Sanford D. Bishop, Jr.
Georgia



James E. Clyburn
South Carolina



Corrine Brown
Florida



Mike Doyle
Pennsylvania



Frank R. Mascara
Pennsylvania

The site will be on Arlington Ridge, a few hundred yards from the scene of the first military flight in history.

Clearing the Way for the Air Force Memorial

The foreground in the photo below shows the proposed location of the Air Force Memorial in Arlington, Va., with a view of the Potomac River, the Lincoln Memorial, and the Washington Monument. Opposite is an aerial map illustrating the position of the memorial relative to the Marine Corps Iwo Jima Memorial and the Netherlands Carillon. The site is not far from Fort Myer, Va., where Orville Wright first taught the US military how to fly.

© 1995 Bob Knudsen Photography



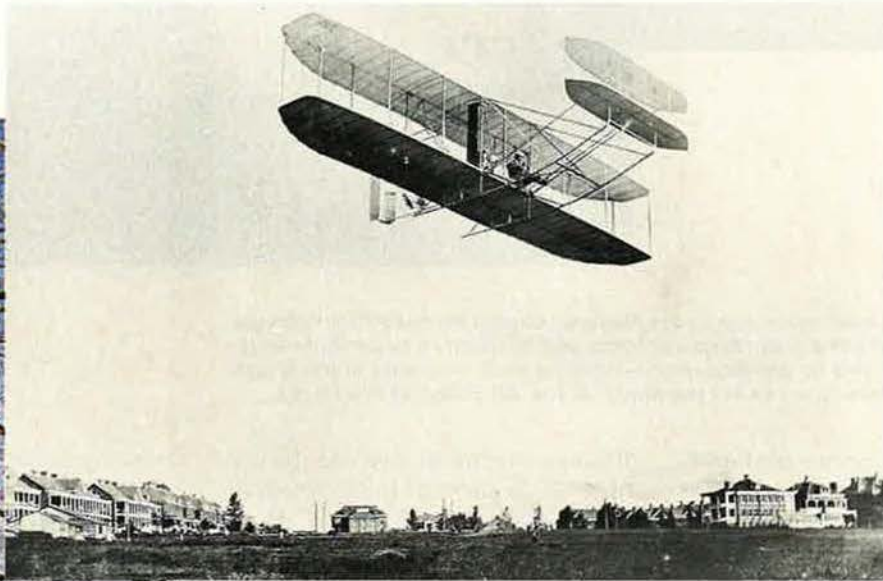
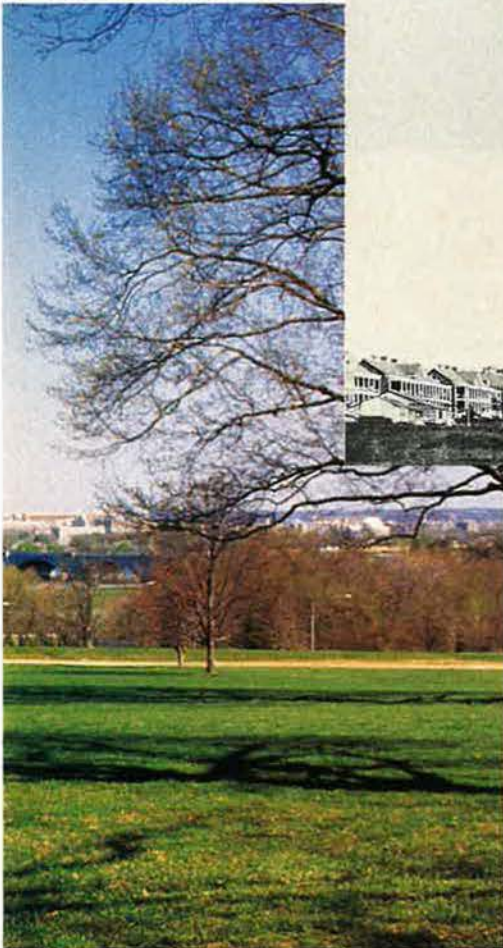
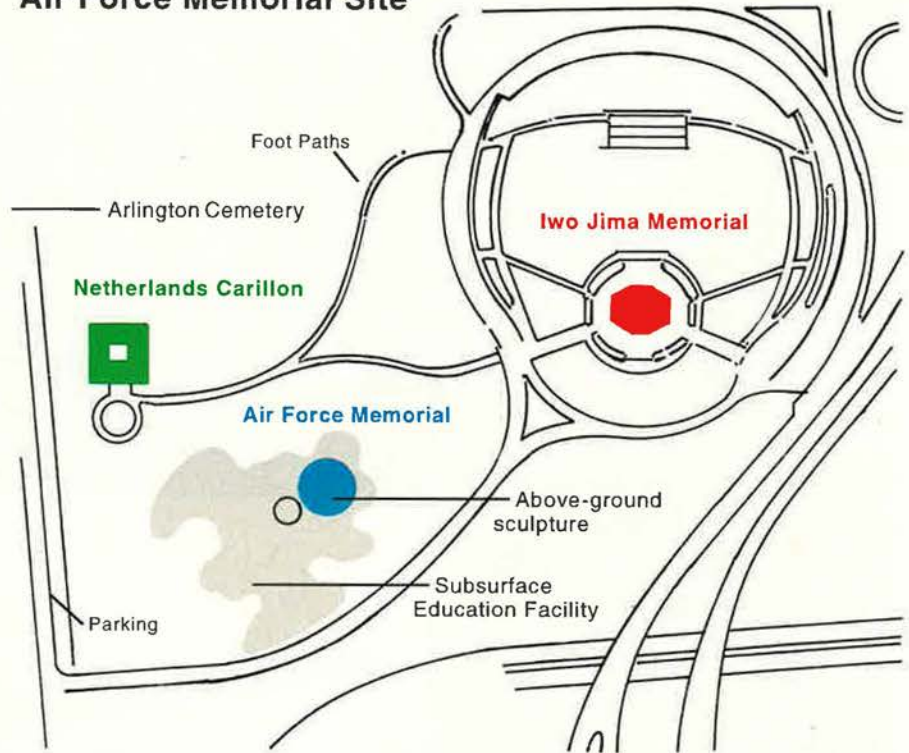
A COMBINATION of recent events has reinvigorated the campaign to create a distinctive United States Air Force Memorial in Washington, D. C.

For years, USAF has been the only major military service lacking its own memorial in the national capital's monument area. The drive to remedy that situation, however, received a major boost May 4 when the National Capital Planning Commission approved use of a historic Virginia grove for such a structure.

The commission's decision clears the way for the National Park Service to set aside the land at the preferred location on Arlington Ridge, situated on the Virginia side of the Potomac River adjacent to Arlington Cemetery. Under current plans, the completed memorial would stand only a few hundred yards from Fort Myer, Va., scene of the nation's first military flight in 1908.

The famous Marine Corps Iwo Jima

Air Force Memorial Site



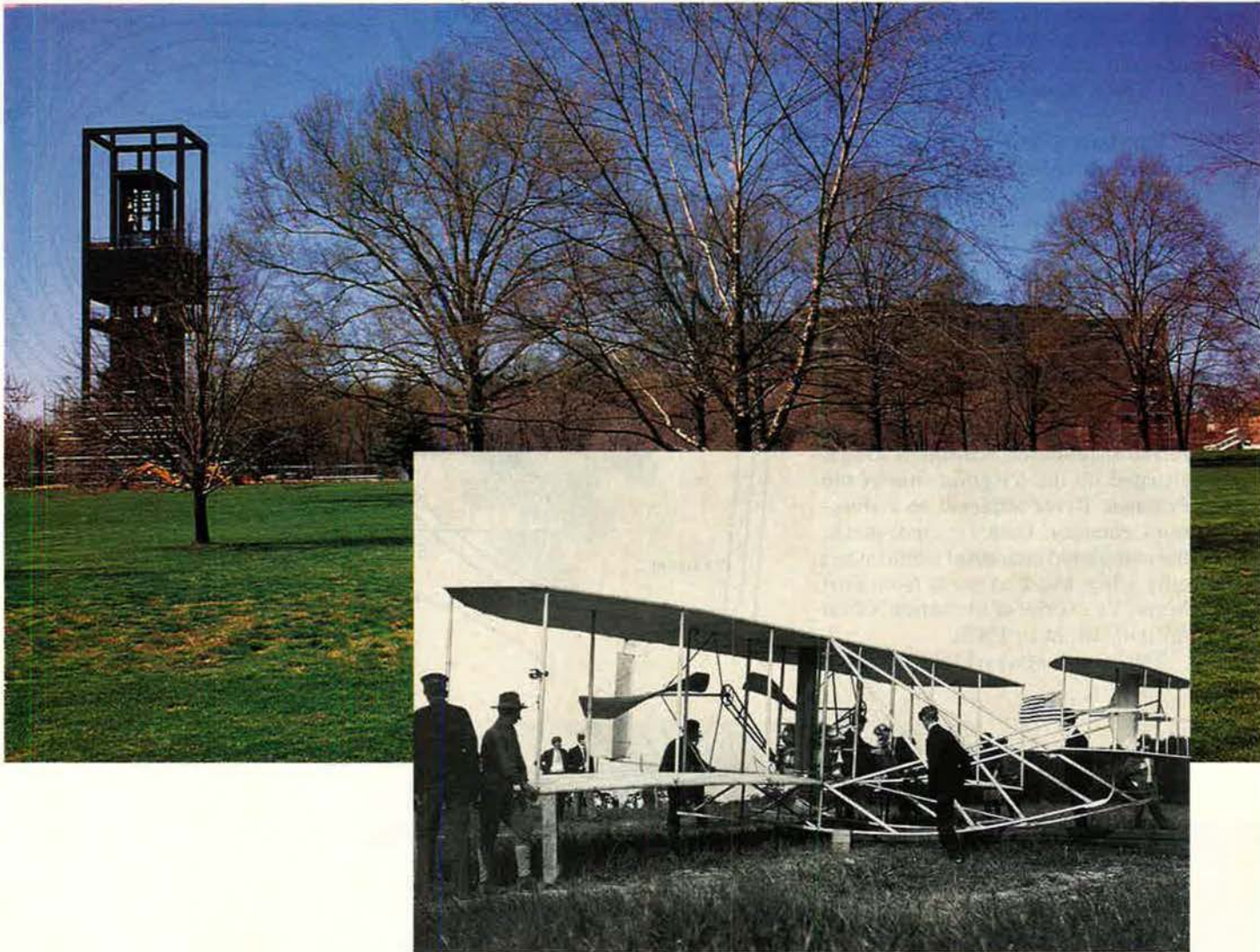
Memorial and the Netherlands Carillon also are located near the site.

Approval by the Planning Commission was critical to the success of plans for the memorial. It followed approval by the D. C. Commission of Fine Arts and the passage of federal authorizing legislation signed by President Clinton.

The Air Force Memorial Foundation, a nonprofit, tax-exempt organization, selected and proposed the site. The foundation's goal is to es-

tablish a permanent memorial to recognize the sacrifice, courage, and heroism of America's airmen and the many significant contributions to peace and freedom made by the Air Force and its predecessors, such as the Army Air Corps.

Foundation officials say they envision a sculptured monument in a dignified landscaped setting possibly accompanied by a visitors' center or an educational facility to depict the history and potential future



The site (above) has been approved by the National Capital Planning Commission. The memorial will be built without taxpayer funds and is meant to be a tribute to all who served in USAF and its predecessors—from the early students of the Wright brothers (inset, at Fort Myer) to the members of the Air Force of the future.

course of the United States Air Force. The facility might, for example, include a small theater and seminar rooms, as well as interactive videos.

The chairman of the foundation's Board of Trustees, Joseph Coors, Jr., of Golden, Colo., said current plans call for building the entire memorial without taxpayer funds. The foundation has a small staff of two. Lt. Gen. Robert D. Springer, USAF (Ret.), serves as executive director. Rent-free office space has been provided to the foundation by the Air Force Association.

The board developed a capital campaign plan to raise an estimated \$25 million for the project. However, the cost of the memorial cannot be projected with certainty until a site and design study have been approved.

Because tax dollars will not be used to build the memorial, the financing of the project will depend on the success of a major nationwide fund-raising campaign.

Mr. Coors said that, even before the start of an active fund-raising phase, the foundation received donations or pledges exceeding \$1 million. Major financial supporters during the start-up phase included AFA and the Air Force Sergeants Association, with a combined membership of 350,000.

Last summer, the foundation selected the New York City-based architecture firm of Pei Cobb Freed and Partners to design the proposed memorial. James Ingo Freed, creator of the acclaimed Holocaust Museum in Washington, D. C., is

serving as the principal architect for the project.

The firm has also designed and managed construction of some of the most prestigious projects in the world, including the John F. Kennedy Library in Boston, Mass., the restoration of the Louvre in Paris, the Morton H. Myerson Symphony Center in Dallas, Tex., and the Federal Triangle Project in Washington, D. C.

Mr. Coors said he expects a design concept to be completed this summer or early this fall. He added that plans are already under way to hold a commemorative ceremony on the Arlington Ridge site in September 1997 as part of celebrations honoring the fiftieth anniversary of the United States Air Force as an independent service. ■

Industrial Associates



Listed below are the Industrial Associates of the Air Force Association. Through this affiliation, these companies support the objectives of AFA as they relate to the responsible use of aerospace technology for the betterment of society and the maintenance of adequate aerospace power as a requisite of national security and international amity.

AAI Corp.
AEL Industries, Inc.
Aermacchi S.p.A.
Aerojet
Aerojet Electronic Systems Div.
Aerospace Corp.
Aerospatiale, Inc.
AIL Systems Inc., a subsidiary of
Eaton Corp.
Alliant Techsystems Inc.
AlliedSignal Aerospace Co.
American-Amicable Life
Insurance Co. of Texas
Analytic Services Inc. (ANSER)
Anheuser-Busch, Inc.
ARINC
Army Times Publishing Co.
Astronautics Corp. of America/
Kearfott Guidance &
Navigation
AT&T Federal Systems
Atlantic Research Corp.
Aviation Week Group Newsletters
Autometric, Inc.
Battelle Memorial Institute
BDM International, Inc.
Bell Helicopter Textron
Betac Corp.
Blue Chip Computers Co.
Boeing Defense & Space Group
Bombardier Inc., Canadair
Booz•Allen & Hamilton Inc.
Bose Corp.
British Aerospace, Inc.
Burdshaw Associates, Ltd.
CAE-Link Corp.
Calspan Advanced Technology
Center
Canadian Marconi Co.
Carter Chevrolet Agency, Inc.
Cessna Aircraft Co.
Charles Stark Draper Laboratory,
Inc., The
Chrysler Technologies Airborne
Systems
Coltec Industries, Inc.
Computer Sciences Corp.
Computing Devices International
COMSAT Aeronautical Services
Contrares Inc.
Cubic Corp.
Cypress International, Inc.
Datatape Inc.
Deutsche Aerospace Washington,
Inc.
Dowty Aerospace
DynCorp
Eastman Kodak Co., FSD
ECC International Corp.
EDO Corp., Government
Systems Div.

EDS
EG&G Defense Systems Group
E. I. du Pont de Nemours & Co.
ESCO Electronics Corp.
E-Systems, Inc.
Evans & Sutherland
Fairchild Space & Defense Corp.
Firearms Training Systems, Inc.
Garber International Associates,
Inc.
GDE Systems, Inc.
GE Aircraft Engines
GEC Avionics, Inc.
GEC-Marconi Electronic Systems
Corp.
General Atomics
Gentry & Associates, Inc.
Geodynamics Corp.
Government Employees
Insurance Co. (GEICO)
Grumman Melbourne Systems
Div.
GTE Government Systems Corp.
GTE Government Systems
Corp., Electronic Defense
Systems Div.
Gulfstream Aerospace Corp.
Harley-Davidson Inc.
Harris Electronic Systems Sector
Harris Government Communica-
tions Systems Div.
Harris Government Support
Systems Div.
Hercules Missiles, Ordnance and
Space Group
Honeywell Inc., Space and
Aviation Control
Howell Instruments, Inc.
Hughes Aircraft Co.
Hughes Danbury Optical
Systems, Inc.
IMO Industries Inc.
Information Technology
Solutions, Inc.
Ingersoll-Rand Co.
Innovative Technologies Corp.
Israel Aircraft Industries Int'l, Inc.
Itek Optical Systems, a Division
of Litton Industries
ITT Defense
Jane's Information Group
JFS International
Johnson Controls World Services
Inc.
Judd's, Inc.
Kollsman
Lear Astronics Corp.
Learjet Inc.
Litton-Amecom
Litton Applied Technology
Litton Data Systems

Litton Guidance & Control
Systems
Litton Industries
Lockheed Martin
Lockheed Martin Aeronautical
Systems
Lockheed Martin Aircraft
Services
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Sector
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Sciences
Lockheed Martin Information &
Technology Services Sector
Lockheed Martin Missiles &
Space
Lockheed Martin Space &
Strategic Missiles Sector
Lockheed Martin Skunk Works
Lockheed Martin Space
Operations
Lockheed Martin Tactical Aircraft
Systems
Logicon, Inc.
Logistics Management Institute
Loral Corp.
Loral Federal Systems
Loral Vought Systems
Lucas Aerospace Inc.
Magnavox Electronic Systems
Co.
Management Consulting &
Research, Inc.
Martin-Baker Aircraft Co. Ltd.
Matra Aerospace Inc.
McDonnell Douglas Aerospace-
East
McDonnell Douglas Aerospace-
West
McDonnell Douglas Corp.
MITRE Corp., The
Motorola Inc., GSTG
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Rafael USA, Inc.
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Raytheon Aircraft Co.
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Offices, Inc. (SatoTravel)
Science Applications Int'l Corp.
Smiths Industries, Aerospace &
Defence Systems Co.
Snap-On Tools Corp.
Software Productivity Consortium
Southwest Mobile Systems Corp.
Space Applications Corp.
SPARTA, Inc.
Sun Microsystems Federal, Inc.
Sundstrand Aerospace
Sverdrup Aerospace
Systems Research Laboratories/
Defense Electronic Systems
Syston Donner, Safety Systems
Div.
TASC
Teledyne Brown Engineering
Teledyne, Inc.
Teledyne Ryan Aeronautical
Telephonics Corp.
TELOS Corp.
Texas Instruments, Defense
Systems & Electronics Group
Textron
Textron Defense Systems
Thiokol Corp.
TPG, Inc.
Tracor, Inc.
Trident Data Systems
Trilelectron Industries, Inc.
TRW Inc., Avionics and
Surveillance Group
TRW Space & Electronics Group
TRW Systems Integration Group
UNC Aviation Services
Unisys Corp.
United Technologies Corp.
Universal Propulsion Co., Inc.
UTC, Hamilton Standard
UTC, Pratt & Whitney
UTC, Research Center
UTC, Sikorsky Aircraft
Vought Aircraft Co.
Watkins-Johnson Co.
Westinghouse Electric Corp.
Westinghouse Norden Systems
Williams International

- ▶ **Opening ceremonies;** address by Hon. William J. Perry, Secretary of Defense
- ▶ **Aerospace Education Foundation Luncheon** featuring the 1995 AEF contest-winning AFJROTC unit; Doolittle, Eaker, and Goldwater Fellowships; awards for education excellence
- ▶ **Business sessions;** address by Hon. Jesse Brown, Secretary of Veterans Affairs
- ▶ **Membership awards;** national awards to Air Force, government, and AFA leaders
- ▶ **Annual Reception** in exhibit halls
- ▶ **Salute** to the twelve Outstanding Airmen of the Air Force; address by USAF Vice Chief of Staff Gen. Thomas S. Moorman, Jr.; Toastmaster: CMSAF David J. Campanale

A F A 1 9 9 5 N A T I O N A L

CONVENTION

Sheraton Washington Hotel • September 18-20, 1995

- ▶ **Secretary's Luncheon;** address by Hon. Sheila E. Widnall, Secretary of the Air Force
- ▶ **Air Force Anniversary Dinner**
- ▶ **Chief's Luncheon;** address by Gen. Ronald R. Fogleman, Chief of Staff, USAF
- ▶ **Aerospace Technology Exposition** with more than 52,000 square feet of technology displayed by companies from all over the world. Exhibit halls open Monday, Tuesday, and Wednesday
- ▶ **Dedication** of AFA building in honor of the late Gen. James H. Doolittle, first AFA President

- ▶ **Attention Industrial Associates:** Exhibit space at AFA's Aerospace Technology Exposition is still available. Please call Pat Teevan at 703/247-5836 for information

Headquarters Hotel: Sheraton Washington Hotel 202/328-2000

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For further information call our recorded Convention Information Line 24 hours: 703/247-5800 ext. 2025

- ▶ **Individual Ticket Prices**

Any luncheon	\$63 each
Annual Reception	\$75 each
Outstanding Airmen Dinner and reception	\$110 each
Anniversary Dinner	\$150 each

Note: Add \$10 to each ticket request postmarked after September 1



AFA Nominees for 1995-96

By Toni Kuzma

AT A meeting May 27, 1995, in Colorado Springs, Colo., the Air Force Association Nominating Committee selected a slate of candidates for the four national officer positions and the six elective positions on the Board of Directors. This slate will be presented to the delegates at the National Convention in Washington, D. C., on September 18.

The Nominating Committee consists of the five previous past National Presidents (not serving as Chairman of the Board) and one representative from each of the twelve US regions.

Nominated for his second term as National President was **R. E. Smith** of West Point, Miss. Mr. Smith is a retired lieutenant colonel (1956-78). Active in many business and civic organizations, he has served as president of the Starkville, Miss., Chamber of Commerce, Mississippi Airport Managers Association, Southeastern Airport, and the Greater Golden Triangle Economic Development Council Managers Association. He is a Rotarian.

Mr. Smith was born in Marks, Miss. He graduated from Tunica County High School in 1952. He earned a

degree in chemical engineering in 1956 at Mississippi State University. He joined the Air Force in September 1956, serving in Air Defense Command and Tactical Air Command, flying a variety of fighter aircraft. On October 25, 1967, while flying his thirty-third combat mission over North Vietnam, he was shot down in Hanoi and captured. He was repatriated on March 14, 1973. He completed his Air Force career as director of Operations for Air Training Command's 14th Flying Training Wing. Mr. Smith received two Silver Stars, two Distinguished Flying Crosses, a Legion of Merit, two Air Medals, two Purple Hearts, the Vietnam Cross of Gallantry, a Meritorious Service Medal, and other military decorations.

Mr. Smith joined AFA in 1974 and is past chairman of the Long-Range Planning Committee and the Veterans/Retirees Council. He is also past president of Mississippi AFA and the Golden Triangle Chapter. His national AFA awards include two Medals of Merit, an Exceptional Service Award, a Special Citation, two State Storz Awards, and a Chapter Storz Award. Mr. Smith is a Life Member of AFA.

James M. McCoy of Omaha, Neb., was nominated for his second term as Chairman of the Board. Mr. McCoy, a retired Chief Master Sergeant of the Air Force (1979-81), was with Mutual of Omaha as vice president and director of military sales until 1991. Active in many business and civic organizations, he has served as a member of the Subcommittee on Military Matters, American Council of Life Insurance; Corporate Contributions

Coordinating Council, Omaha Chamber of Commerce; Board of Directors, Omaha Zoological Society; Airman Memorial Foundation; Met Life Military Advisory Board; and many national, regional, and local boards of the Boy Scouts of America, including the National Eagle Scouts Scholarship Selection Committee. He recently chaired the steering committee to commission USS *Nebraska*.

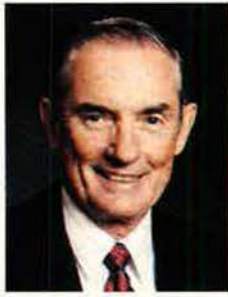
Mr. McCoy was born in Creston, Iowa. He graduated from Maur Hill High School, Atchison, Kan., in 1948. He attended St. Ambrose College in Davenport, Iowa, then enlisted in the Air Force in January 1951, serving as



R. E. Smith

a basic training instructor, noncommissioned officer professional military education instructor, and sergeant major at Strategic Air Command's 2d Air Force NCO Academy. He graduated from that academy and the first class of the USAF Senior NCO Academy. In addition to serving in personnel, training, and operations posts, Mr. McCoy was Strategic Air Command's first Senior Enlisted Advisor and the sixth Chief Master Sergeant of the Air Force. He earned a bachelor of science degree in business administration from Centenary College of Louisiana in 1966.

Mr. McCoy joined AFA in 1974 and has served on the Resolutions, Executive, and Membership Committees; as president, executive vice president, and membership chairman of the Ak-Sar-Ben Chapter; as chairman of AFA's Long-Range Planning, Ad Hoc, and Active-Duty Voting Privileges Committees; and as a member of the Aerospace Education Foundation (AEF) Board of Trustees. Mr. McCoy has served as National President, National Vice President (Midwest Region), and chairman of AFA's Membership Committee and is a permanent member of AFA's



James M. McCoy

National Board of Directors. He has received AFA's Presidential and Special Citations, the Hoyt S. Vandenberg Award, and the Storz membership award. He was recognized as one of USAF's twelve Outstanding Airmen of the Year in 1974. He is a Life Member of AFA and a Charter Life Member of AEF.

Mary Anne Thompson of Oakton, Va., was nominated for her second elected term as National Secretary.

Born in Montclair, N. J., Ms. Thompson graduated from Montclair High School. She holds a bachelor of science degree in commercial consumer services from Pennsylvania State University, an M.Ed. in elementary education from the University of Nebraska, and an education specialist post-master's degree in educational administration and supervision from Troy State University, Ala.

For the last twelve years, she has been a master facilitator for total quality management programs at TRW. She is the manager for the National Airspace Systems configuration management, FAA SETA; and previously was manager for Maintenance, Logistics, and Training Implementation for the FAA Voice Switching and Control System program. In other corporate duties, she represents TRW on the Industry Steering Group of the Computer-Aided Acquisition and Logistics System (CALs) program. She chaired the International CALs Expo in 1992 and currently chairs the Software Products Technical Committee and is a member of the CALs Expo Planning Committee. She was named the 1993 TRW Woman of Achievement.

Ms. Thompson joined AFA in 1981. However, her activity with AFA began in 1957 when she was the first national administrative services officer of Angel Flight and wrote the original national standard

operating procedure for Angel Flight and designed the Angel Flight pin still used today. Following graduation from Penn State, she served on the Angel Flight National Advisory Board and was founder of and advisor to the University of Nebraska Angel Flight in 1963.

Active in aerospace education since 1960, Ms. Thompson developed and managed the nation's first university-level Aerospace Education Instructional Materials Center at the University of Nebraska. She has written aerospace education publications for Civil Air Patrol and the National Air and Space Museum and serves on the



Mary Anne Thompson

Staff Committee for the National Congress on Aviation and Space Education. She has served as the AFA National Vice President (Central East Region); Virginia state president; Virginia state vice president for Programs and North Area; Virginia state secretary; and Donald W. Steele, Sr., Memorial Chapter president, vice president, and secretary. Her national committee assignments have included AFA National Board of Directors and Executive, Resolutions, and Membership Committees. She has received numerous AFA chapter, state, region, and national awards, including the AFA Presidential Award.

Charles H. Church, Jr., of Lenexa, Kan., was nominated for his first term as National Treasurer. Mr. Church was born in Kansas City, Mo., and he graduated from Southwest High School and from the University of Kansas with a bachelor's degree in political science. He has also completed several specialized courses sponsored by the American Institute of Banking.

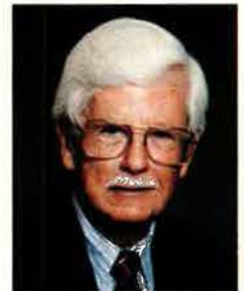
A World War II Navy veteran, Mr. Church was in training to be an aerial gunner when the war ended. He went on to a successful career in banking

and retired as chairman of the United Missouri Bank of Hickman Mills. He still serves as an advisory director of the United Missouri Bank of Kansas City.

Mr. Church is past president of the Richards-Gebaur AFB Community Council and was president of the South Jackson County Kiwanis, South Kansas City Chamber of Commerce, and the Bankers Consumer Credit Association of Kansas City. He has been an American Cancer Society volunteer.

A thirty-five-year AFA member, Mr. Church has been a Life Member since 1983 and also is a Life Member of AEF. He has held all chapter and state offices and currently serves on the Harry S. Truman Chapter's Executive Committee.

Nationally, he has been active for sixteen years as a member of the Finance Committee and has been the National Treasurer's personal choice to be vice chairman of that committee for the past eight years. He has been a regional vice president for three years and has chaired AFA's Long-Range Planning Committee. He has received AFA's Medal of Merit, Exceptional Service Award, Presi-



Charles H. Church, Jr.

dential Citation, and Special Citation and has been designated an AEF Doolittle Fellow, in recognition of his superior service to both his region and national AFA.

The following individuals are permanent members of the AFA Board of Directors under the provisions of Article IX of AFA's National Constitution: John R. Alison, Joseph E. Assaf, Richard H. Becker, David L. Blankenship, John G. Brosky, Dan F. Callahan, Robert L. Carr, Charles H. Church, Jr., Earl D. Clark, Jr., O. R. Crawford, R. L. Devoucoux, Jon R. Donnelly, Russell E. Dougherty, George M. Douglas, Joseph R.



Lt. Col. James G. Clark

Falcone, E. F. Faust, Joe Foss, Barry Goldwater, Jack B. Gross, Alexander E. Harris, Martin H. Harris, Gerald V. Hasler, H. B. Henderson, John P. Henebry, Robert S. Johnson, David C. Jones, Arthur F. Kelly, Victor R. Kregel, Jan M. Laitos, Frank M. Lugo, Nathan H. Mazer, William V. McBride, Edward J. Monaghan, J. B. Montgomery, Bryan L. Murphy, Jr., J. Gilbert Nettleton, Jr., Ellis Nottingham, Jack C. Price, William C. Rapp, Julian B. Rosenthal, Peter J. Schenk, Walter E. Scott, Mary Ann Seibel, Joe L. Shosid, William W.



William D. Croom, Jr.

Spruance, Thos. F. Stack, James M. Stewart, Harold C. Stuart, James M. Trail, A. A. West, and Sherman W. Wilkins.

The six people whose photographs appear on this page are nominees for the six elected Directorships for the coming year.

Lt. Col. James G. Clark, Virginia. Pilot/Controller/Staff Officer. Executive assistant for Modeling and Simulation to the Assistant Vice Chief of Staff. Former membership chairman, Alamo Chapter and the Gen. Charles A. Gabriel Chapter; president, Lufbery-Campbell (Germany) Chapter; and regional vice president (Europe). Currently a member of the National Membership Committee and the Executive Board,

Donald W. Steele, Sr., Memorial Chapter. Life Member of AFA.

William D. Croom, Jr., Colorado. Special agent, Prudential Preferred Financial Services. Former Colorado Springs/Lance Sijan Chapter president and vice president; state president. Currently a member of the Executive, Finance, and Resolutions Committees and National Vice President (Rocky Mountain Region). Life Member of AFA.

Tommy G. Harrison, Florida. Former chapter and state secretary; executive vice president of Central



Tommy G. Harrison

Florida Chapter; Florida state president. Currently president of Central Florida Chapter and a member of the National Finance Committee. Life Member of AFA.

Harold F. Henneke, Indiana. President, The Logistician, Inc. Former president of Central Indiana Chapter and Indiana AFA; Great Lakes Region director of membership; member of the National Membership Committee and the Ad Hoc Committee on Leadership Development; chairman of the National Credentials Committee. Currently National Vice President (Great Lakes Region) and member of the Long-Range Planning Committee. Charter Life Member of AFA and AEF.

Capt. John B. Steele, Ohio. Chief



Harold F. Henneke



Capt. John B. Steele

Integration and Technology Engineer, Advanced Cruise Missile Program Office, ASC, Wright-Patterson AFB, Ohio. Former National Director (*ex officio*) and National Commander, Arnold Air Society; vice president for awards, Albuquerque Chapter; vice president for aerospace education and president, Major John S. Southrey Chapter; Massachusetts vice president and vice president for aerospace education; Ohio vice president for aerospace education; and member of Credentials Committee and AEF's Futures Committee. Currently on AEF's Board of Trustees; vice president for membership, Wright Memorial Chapter; and Under-40 National Director. Life Member of AFA and AEF.



Cheryl L. Waller

Cheryl L. Waller, California. Business Development Manager for Spaceport Systems International. Former member of Communications, Constitution, Long-Range Planning Committees and Ad Hoc Committee on Leadership Development; Under-40 National Director; former state secretary, vice president, and president; former vice president for communications, secretary, and executive vice president for the San Bernardino Chapter. Currently California Chairman of the Board and member of the Long-Range Planning Committee. Life Member of AFA. ■



National Report

House Approves Defense Bill Supported by AFA

AFA President R. E. Smith issued a call to action to AFA field leaders in early June, urging them to contact members of the House of Representatives and let them know their views on the 1996 Defense Authorization Bill. The House bill is the most favorable toward the military in years and helps arrest the decade-long military budget reductions.

AFA efforts did pay off. The House of Representatives added nearly \$10 billion to the defense budget request submitted by the Clinton Adminis-

tration. The House bill provides for the full pay raise of 2.4 percent requested by the administration and boosts the basic allowance for quarters (BAQ) by 5.2 percent, a 1.8 percent increase over the request. It also adds funds for military housing. In terms of Air Force programs, the House bill adds money for additional B-2 bombers and for the procurement of F-15 and F-16 fighters. The House overwhelmingly supported the measure by a vote of 300-126.

The Senate Armed Services Com-

mittee was not as generous, adding only \$7 billion to the administration's defense budget request. But the Committee measure did match the House bill's pay raise and BAQ increase and also increased the military housing account. However, the Committee did not add funds for additional B-2s or F-15s and F-16s. Differences between the House bill and the final Senate bill were scheduled to be worked out in conference committee when this article went to press.

AFA Renews Fight over Source Tax

AFA has actively supported the repeal of the source tax since 1988. The source tax is a tax imposed on the pension or retirement income of people who no longer live in the state imposing the tax. In the states that are collecting this tax, retired military, civil service, and aerospace industry employees are obligated to pay taxes to source-tax states in which they lived during the course of their careers. The calculation of who is owed what at what rate is the first of many problems related to the source tax.

AFA's main objection to the source tax is that it is taxation without representation. Retirees who no longer live in the states imposing the tax receive no services and have no say in the establishment of tax rates or in the distribution of tax receipts. Moreover, for some retirees who moved many times during their careers, filing multiple state income tax forms is complicated and unfair.

Leading the source tax challenge from the beginning has been RESIST, a volunteer, nonprofit organization of retirees headquartered in Carson City, Nev. The group is led by Bill and Joanne Hoffman, whose efforts have been instrumental in gaining momentum for source tax repeal.

AFA, along with 34 other organizations and thousands of individuals, has worked hard during the last three congresses to secure source tax repeal. The measure cleared the Senate on three occasions and cleared the House once (unfortunately not at the same time!).

The effort to repeal the source tax is again moving in the 104th Congress. The lead bill in this Congress was introduced by Rep. Barbara Vucanovich (R-NV), who, with the entire Nevada congressional delegation, has led the fight for source tax repeal for many years. As of this writing, the Vucanovich bill (H. R. 394) has 111 cosponsors. The House Judiciary Subcommittee on Commercial and Administrative Law, chaired by Rep. George Gekas (R-PA), has initiated a series of source tax hearings with the hope of passing legislation during this session of Congress.

The Military Coalition submitted testimony for the record, representing AFA and other military-oriented organizations. The prospects are favorable for passage. Please encourage your elected representatives to cosponsor H. R. 394. The more cosponsors, the more likely the bill will pass early in this session.

Enola Gay Debate

From March 1994 through June 1995, AFA spokesmen participated in:

- 45 television interviews, including CBS, NBC, Fox, CNN, and a number of international TV organizations

- 43 radio interviews, including talk radio in most regions of the United States and some overseas radio stations

AFA spokesmen were also quoted in or provided background information for:

- 557 newspaper articles, including the *Washington Post*, *Wall Street Journal*, the *New York Times*, *USA Today*, and numerous regional and local newspapers



By Frances McKenney, Assistant Managing Editor

New Scholarship Established

The **Central Florida Chapter** recently established the Gen. Bruce K. Holloway scholarship for an AFROTC cadet at the University of Central Florida. The first recipient is Cadet Shawn Brady.

General Holloway, who was a Flying Tiger fighter pilot and ace, USAF vice chief of staff, and commander in chief of Strategic Air Command, said, "It is the highest honor to be recognized by a scholarship in your name for perpetuity."

The Central Florida Chapter donates \$12,000 each year to the university to fund seven or eight scholarships each semester. The General Holloway scholarship is a full-tuition award.

Cadet Brady received the scholarship at a second lieutenant pin-on ceremony, where Brig. Gen. Donald G. Cook, commander of 45th Space Wing at Patrick AFB, Fla., was guest speaker. Chapter President Tommy G. Harrison and Lt. Col. Dean H. Haylett, professor of aerospace studies at the university and chapter vice president for Aerospace Education, also helped present the award.

Veterans Memorial Dedicated

AFA Florida and its chapters dedicated an AFA memorial to veterans at the Department of Veterans Affairs Florida National Cemetery in Bushnell, Fla., in May.

Among the AFA members at the ceremony were AFA Florida State President William L. Sparks, State Chaplain James S. Speese, and four past state presidents: Bill Bingham (currently **Morgan S. Tyler Chapter** president), Tommy G. Harrison (**Central Florida Chapter** president), Jack Rose (state awards chairman), and Bernie Hanlon (**Peace River Chapter** treasurer).

AFA Florida also purchased two wooden benches to enhance the memorial site, located along the cemetery's Memorial Trail.

Commemorating Victory

In Mansfield, Ohio, British police officers Alison Herring and Dawn



AFROTC Cadet Shawn Brady has a lot to smile about, having received the first Gen. Bruce K. Holloway scholarship. General Holloway (second from the right) made the presentation at a University of Central Florida ceremony, along with (left to right) Lt. Col. Dean H. Haylett, Tommy G. Harrison, and Brig. Gen. Donald G. Cook (far right).

McKenna helped the **Frank P. Lahm (Ohio) Chapter** commemorate the fiftieth anniversary of the Allied victory in Europe in World War II. Ms. Herring, a member of the Royal Air Force Association's Mansfield, UK, chapter, presented a pewter tankard to Lahm Chapter President Ralph Shadel at a ceremony held with the Ohio ANG's 179th Airlift Group.

The police officers also presented a plaque from the Mansfield police department to Col. Fred Larson, departing commander of the 179th, and Col. Warren J. Drouhard, incoming commander.

The policewomen were in their hometown's US sister city to learn about the Drug Abuse Resistance Education program.

Lt. Col. Richard B. Vogenitz, AFRES (Ret.), also marked the fiftieth anniversary of the end of World War II, donating a framed lithograph to the US Air Force Academy. The lithograph depicts a B-32 Dominator that was involved in what is thought to be the last aerial combat of World War II.

Before forwarding the lithograph to the Academy, Colonel Vogenitz shared it with members of the **Orange County/Gen. Curtis E. LeMay (Calif.) Chapter** at a meeting attended by Jane LeMay Lodge, General LeMay's daughter. Colonel Vogenitz was an aerial gunner in Twentieth Air Force, commanded by General LeMay, during World War II.

C-17 Team Honored

AFA National Secretary Mary Anne Thompson represented the Association at the USAF Chief of Staff's reception for the C-17 team, winners of the 1994 Robert J. Collier Trophy. The reception was held in Hangar 3 at Andrews AFB, Md., in May.

AFA nominated the Globemaster III for the award, citing the transport as "the linchpin of airlift modernization."

The Air Force, McDonnell Douglas Corp., the US Army, and the C-17 industrial team of subcontractors and suppliers share the 525-pound bronze



The dedication of an AFA memorial at the Department of Veterans Affairs National Cemetery in Bushnell, Fla., included (left to right) Cemetery Administrator Fred Haselbarth and AFA members Bill Bingham, Jack Rose, William L. Sparks, Tommy G. Harrison, Bernie Hanlon, and Jim Speese.

trophy. It is on permanent display at the National Air and Space Museum in Washington, D. C.

Tops at Vandenberg

The **Robert H. Goddard (Calif.) Chapter** recently saluted top personnel at Vandenberg AFB, Calif., at an awards dinner hosted by Maj. Gen. William E. Jones, then 14th Air Force commander, and Brig. Gen. Lance W. Lord, 30th Space Wing commander.

SMSGt. Pete DeFelice received a Space and Missile Operations Award for his leadership on 14th Air Force's Forward Space Support Team.

A Space and Missile Support Award went to MSgt. Billy Taylor for his flight data and systems instrumentation expertise in Peacekeeper and Minuteman follow-on test and evaluation launches.

Capt. Steven N. Dorfman was honored with a Military Community Service Award for his Red Cross volunteer work in developing a plan to integrate emergency response capabilities in Santa Barbara County.

1st Lt. Paul Lockwood was selected as Outstanding Military Engineer, and Fred Neiger received the Outstanding Civilian Engineer Award.

The 30th Security Police Squadron earned the Outstanding Unit of the Year award for its part in overseas deployments and for providing security for Vandenberg's more than 98,000 acres.

Field Trip

The Air Force Reserve's 482d Fighter Wing, Homestead ARB, Fla., recently sent civic leaders to Keesler AFB, Miss., to exchange knowledge on coping with hurricanes. Hurricane Camille hit Mississippi and Louisiana in 1969, and Homestead is still recovering from devastation by Hurricane Andrew in 1992.

Members of the **John W. DeMilly, Jr. (Fla.), Chapter** and the **Miami Chapter** traveled to the Biloxi, Miss., base on an AFRES KC-135 Strato-tanker. On the aircraft (from the 507th Air Refueling Wing, AFRES, Tinker AFB, Okla.), the group watched F-16s from the 93d Fighter Squadron, Homestead ARB, Fla., conduct an in-flight refueling with the tanker.

Brig. Gen. Ernest "Randy" Webster, 403d Wing commander, hosted the group at Keesler, where they toured the Keesler Regional Medical Center's lab, the USAF Military Technical Training Center, and the 53d Weather Reconnaissance Squadron, nicknamed the "Hurricane Hunters."

Chapter News

Charles J. Giallanza represented AFA and the **Atlanta (Ga.) Chapter** at the eighth annual military ball for AFJROTC cadets at Shiloh High School in Lithonia, Ga. Mr. Giallanza, a World War II glider pilot, presented an AFA Award to Cadet 1st Lt. Eric Adams of Lilburn, Ga., in recognition of the student's leadership, exemplary character, and scholastic achievement.

At the annual Air Force-Army ROTC award ceremony at the University of Connecticut, National Director Joseph A. Zaranka presented Cadet 3d Class Justin Abold with an AFA Medal and a Citation for Outstanding Officer Potential. The **Charles A. Lindbergh (Conn.) Chapter** recognized Cadet



North to Alaska: USAF Chief of Staff Gen. Ronald R. Fogleman received certificates of welcome from Alaska's governor, Tony Knowles, and Anchorage Mayor Rick Mystrom. Anchorage Chapter President Doug Stark (right) made the presentations at a chapter meeting this spring.

Photo by 1st Lt. D. Howard Yager, CAP

Coming Events

August 4-5, **New Mexico State Convention**, Alamogordo, N. M.; August 10-12, **California State Convention**, Santa Clara, Calif.; August 12, **North Carolina State Convention**, Greenville, N. C.; August 18-19, **Colorado State Convention**, Colorado Springs, Colo.; August 19, **Indiana State Convention**, Indianapolis, Ind.; August 19, **Montana State Convention**, Malmstrom AFB, Mont.; August 25-26, **Tennessee State Convention**, Tullahoma, Tenn.; August 25-27, **Michigan State Convention**, Petoskey, Mich.; September 8-10, **Utah State Convention**, Wendover, Utah; September 18-20, **AFA National Convention and Aerospace Technology Exhibition**, Washington, D. C.

3d Class Benjamin Hudson's excellence in summer field training with a saber presented by National Director Joseph R. Falcone. For his leadership and officer potential, Cadet 3d Class David Robinson received the John Henry Griffin Memorial Scholarship (named for a charter member and past president of the chapter) from Donald R. Graves, then Connecticut State President. National Vice President (New England Region) Dr. Phillip J. Sleeman also attended the ceremony.

Austin (Tex.) Chapter President Bob Larson took part in a JROTC awards banquet at Bergstrom ARS, Tex., presenting an AFA Citation to Mary Compton, a seventeen-year-old cadet from Westwood High School, Austin, Tex.

The **Total Force (Pa.) Chapter** held its eighth annual Community Partner Appreciation dinner in April, honoring Andy Kochifos of South Hills Lincoln Mercury, Elaine Williams from Essex West Flowers and Gifts, Tony

Monica from Industrial Scientific, and attorney Larry Paper. In appreciation for their support, Chapter President Lee Niehaus presented each Community Partner with a statuette of an eagle.

M. Lee Cordell (1919-1995)

AFA reports with sadness the death in June of M. Lee Cordell, a permanent National Director. He was seventy-six years old.

Born in Sulphur Springs, Ala., he served as a radar operator in World War II, earning five battle stars and attaining the rank of master sergeant. Mr. Cordell earned a bachelor's degree in television engineering from the American Television Institute of Chicago and was a systems equipment engineer for AT&T until his retirement.

Mr. Cordell served in AFA elected offices at the chapter, state, and national levels. Under his leadership, the West Suburban (Ill.) Chapter received two membership awards, and he organized several new AFA chapters in Illinois. He became a member of the AFA National Board of Directors in 1959.

Mr. Cordell is survived by his wife Gwen and son, Bill. Contributions in his name may be made to the Air Force Memorial Foundation, 1501 Lee Highway, Arlington, VA 22209-1198.

Have AFA/AEF News?

Contributions to "AFA/AEF Report" should be sent to the Director of Volunteer and Regional Activities, 1501 Lee Highway, Arlington, VA 22209-1198. ■



At the Massachusetts State Convention held at the John F. Kennedy Library in Boston in April, State President Winston S. Gaskins (far right) welcomed (from left) AFA President R. E. Smith; 439th Airlift Wing Commander Col. James P. Czekanski; and guest speaker Lt. Gen. Charles E. Franklin, commander of Electronic Systems Center, Hanscom AFB, Mass.

Unit Reunions

Supreme Headquarters, Allied Expeditionary Force (SHAEF), and European Theater of Operations, US Army (ETOUSA), October 6-9, 1995, at the Holiday Inn-O'Hare International in Chicago, Ill. **Contacts:** Alan F. Reeves, 2301 Broadway St., San Francisco, CA 94115. Phone or fax: (415) 921-8322. William C. Lahman, 2230 S. Overlook Rd., Cleveland Heights, OH 44106. Phone: (216) 721-0921.

Tuskegee Airmen, August 8-13, 1995, at the

Marriott Marquis Hotel in Atlanta, Ga. **Contacts:** Marion Lee Connell, 25 Virginia Ave., Montclair, NJ 07042-2464. Phone (Charles Dryden): (404) 696-6847. Fax: (404) 753-6157.

7th Photoreconnaissance Group Ass'n, Mount Farm, England, 8th Air Force (World War II). September 5-10, 1995, with the 8th Air Force Historical Society in St. Louis, Mo. **Contact:** Claude Murray, 16810 Boswell Blvd., Sun City, AZ 85351-1270. Phone: (602) 972-3991.

17th/38th Tactical Reconnaissance Squadron, Zweibrücken AB, Germany. October 20-21, 1995, in Yorktown, Va. **Contacts:** Maj. Tom Kelly, 1019 Brookley Ave., Robins AFB, GA 31098-1150. Phone: (912) 922-9737. B. Lucas, 102 Naurene Ct., Yorktown, VA 23693. Phone: (804) 867-8707.

20th Airlift Squadron Alumni Ass'n, October 5-8, 1995, in Myrtle Beach, S. C. **Contact:** T. C. or Helen Ward, 113 Henrietta Dr., Ladson, SC 29456. Phone: (803) 873-6567.

Unit Reunions

20th Fighter Group Ass'n and support units. September 21–23, 1995, at the Marriott Hotel in Salt Lake City, Utah. **Contact:** Ken Ashbaugh, 6201 Ormada Dr., Kalamazoo, MI 49004. Phone: (616) 342-8522.

30th and 478th Service Squadrons, 5th Air Force (World War II). October 9–11, 1995, in Auburn, Ind. **Contacts:** Alfred Troop, 3838 Thomas Rd., Baton Rouge, LA 70811. Phone: (504) 778-0538. Bruce Dudley, P. O. Box 355, Woodstock, VT 05091-0355. Phone: (802) 457-1921.

43d Service Squadron, 5th Air Force (World War II). September 12–14, 1995, in Laughlin, Nev. **Contact:** Richard Vigil, 2960 Silver Creek Rd., Apt. #158, Bullhead City, AZ 86442. Phone: (520) 758-4684.

Aviation Cadet Class 44-C, Spartan School of Aeronautics, Tulsa, Okla. (1943). September 21–23, 1995, in Tulsa, Okla. **Contacts:** Milo Balhorn, 223 Letsch Rd., Waterloo, IA 50701. Phone: (319) 233-8645. Oscar Bushwar, 1122 W. Northgate Dr., Irving, TX 75062. Phone: (214) 255-1742.

Class 54-10, Navigators/Observers (Harlingen and Ellington AFBs, Tex.). October 20–22, 1995, in San Antonio, Tex. **Contacts:** Frank McNiff, 430 Crestwind Dr., San Antonio, TX 78239.

Phone: (210) 654-6638. Ben Kirkland, 607 7th Ave. N. E., Jacksonville, AL 36265. Phone: (205) 435-5230.

55th Reconnaissance Squadron (Long-Range Weather), World War II. October 9–13, 1995, in West Point, N. Y. **Contacts:** H. E. Nimke, 209 Deerpath Rd., Tuxedo, NY 10987. Phone: (914) 351-4502. Lt. Col. Carlo Arrobio, USAF (Ret.), 2612 Hollister Terr., Glendale, CA 91206. Phone: (818) 243-9516.

68th Fighter-Interceptor Squadron, Itazuke AB, Japan. September 29–October 1, 1995, at the Crockett Hotel in San Antonio, Tex. **Contact:** Robert Kronebusch, 675 Mark & Randy Dr., Satellite Beach, FL 32937. Phone: (407) 777-2492.

307th Bomb Group/Wing (1946–54). September 28–October 1, 1995, in Orlando, Fla. **Contact:** Ed Lasch, 4311 Kasper Dr., Orlando, FL 32806. Phone: (407) 896-9742.

405th Fighter Squadron, 371st Fighter Group. September 26–30, 1995, at the Marriott Hotel in Colorado Springs, Colo. **Contact:** L. P. Cellitti, 4017 W. 138th Terr., Leawood, KS 66224. Phone: (913) 681-8024.

449th Bomb Squadron Ass'n, 322d Bomb Group. September 13–16, 1995, in Washington,

D. C. **Contact:** Robert F. Wittling, 240 N. Edison Ave., South Bend, IN 46619. Phone: (219) 287-0264.

Mail unit reunion notices well in advance of the event to "Unit Reunions," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Please designate the unit holding the reunion, time, location, and a contact for more information.

525th Fighter-Interceptor Squadron. August 19, 1995, in Hagerstown, Ind. **Contacts:** Stephen Starling, 16325 Massey Rd., Hagerstown, IN 47346. Phone: (317) 489-5097. Albert Mikuski, 89 Pond Rd., Vernon, VT 05354. Phone: (802) 254-6297.

596th Signal Aircraft Warning Battalion Ass'n (Company C). October 11–15, 1995, at the Cape Hotel in Hyannis, Mass. **Contact:** Elizabeth Bartley, 255 Crescent Dr., Decatur, IL 62526. Phone: (217) 877-1417. ■

Bulletin Board

Seeking photos of and information on the **Jaguar GR Mk. 1, Mirage IV bomber, Harrier GR Mk. 5, Eurofighter 2000, Rafale, and F-14.** **Contact:** David E. Heggie, 33 Apple Blossom Lane, Westfield, MA 01085.

Seeking photos from and contact with anyone who flew or maintained the **North American T-28** as a trainer or fighter-bomber. Also seeking contact with instructor pilots who flew the T-28 in Air Training Command. **Contact:** Robert F. Dorr, 3411 Valewood Dr., Oakton, VA 22124.

Seeking contact with crew members of the B-25 **Silver Belle** who knew its bombardier, **Sgt. Joseph J. White.** **Contact:** Joseph R. White, 3101 Washington St., Trailer #59, Bellevue, NE 68005.

Seeking the whereabouts of Edward or Edders

who knew **Hilda Barber** of Market Weston, UK, in 1943–44. **Contact:** Deanna Baker, 2 Church Rd., Market Weston, Diss, Norfolk IP22 2NX, UK.

Seeking contact with anyone who knew **2d Lt. Richard L. Krill**, a P-47 pilot with the 389th Fighter Squadron, 366th Fighter Group, 71st Fighter Wing, killed in action June 6, 1944. **Contact:** Richard L. Krill, 238 Frederick St., Hanover, PA 17331.

For a possible lawsuit against the Japanese government, seeking contact with former **POWs and internees** held by Japan during World War II. **Contact:** Capt. Jay W. Hill, USNR (Ret.), 1050 Lagrima de Oro N. E., Apt. #158, Albuquerque, NM 87111.

For a memorial, seeking contact with anyone who knew **Capt. Joseph A. Glover, Jr., 1st Lts.**

Howard B. Hibbard, Richard E. Higley, and Joseph C. Robinson, MSgt. John Q. Montgomery, TSgt. Silvio A. Rossi, or other crew members of the B-17G #44-6005 (509th Bomb Squadron) that crashed in Wales June 8, 1945. **Contact:** Matthew Rimmer, Cae Mur Hywel, Barmouth, Gwynedd LL42 1DZ, UK.

For World War II commemorations, seeking **unit histories** and American, German, and Japanese flags, insignias, patches, and uniforms. **Contact:** Dwain Christian, 226 Primrose Dr., Prattville, AL 36067.

Seeking the whereabouts of **Capt. L. T. Parker** of the 43d Combat Support Group (Disaster Preparedness) at Andersen AB, Guam, 1984–86. **Contact:** SMSgt. Dave Pote, USAF (Ret.), 1686 Autumn Lane, Chino Valley, AZ 86323.

Seeking information on **Manhattan AFS** aerial ports used by personnel heading to the UK in 1956. **Contact:** Joseph P. O'Rourke, 276-83 N. El Camino Real, Oceanside, CA 92054.

Seeking contact with survivors and rescue personnel of a C-47 crash in **Shangri-la Valley, New Guinea**, May 13, 1945. **Contact:** John S. McCollom, 3750 Arelia Dr. N., Delray Beach, FL 33445.

Seeking contact with a **Captain Clark** and flight engineer "**Buckwheat**" who flew hurricane evacuation from Boca Raton, Fla., to Tinker Field, Okla., in September 1945. **Contact:** John Chopelas, 508 S. Gray St., Killeen, TX 76541.

Seeking contact with **9th Infantry soldiers** Petton and Clayton who were befriended by René and Jeanne Lepaumier of Fauville's castle, Normandy, France. **Contact:** Jeanine Sanson, 10 Place de la Boissière, 27180 St. Sebastien de Morsent, France.

THE AIR FORCE VILLAGE FOUNDATION seeks candidates to be the successor to the current President/Chief Executive Officer upon his retirement. The Foundation is a non-profit organization controlling two premier retirement communities with attendant nursing homes. Bachelor's Degree required, retirement community experience desired, strong management experience and interpersonal/communications skills needed. Send resume with salary requirements, in confidence, to AIR FORCE VILLAGE FOUNDATION, 5100 JOHN D. RYAN BLVD., SAN ANTONIO, TX 78245-3502, ATTENTION SEARCH COMMITTEE.

Seeking information on, photos of, or memorabilia from **Civil Air Patrol** tow target and tracking units, aircrews, and base personnel, 1943-44. **Contact:** Charles Wiest, California Wing, Civil Air Patrol, P. O. Box 9117, Ontario, CA 91762.

Seeking contact with personnel from the **K-9 security section**, 57th Fighter Group, Paine Field, Wash., in the early 1960s. **Contact:** Ron Shaw, 28926 Shadow Creek Lane, Highland, CA 92346.

Seeking contact with 58th Bomb Wing and 462d Bomb Group veterans who knew **Maj. Harold Joseph Mann**. **Contact:** John J. Chapman, 116 Penny Pack Cir., Hatboro, PA 19040-3559.

Seeking the whereabouts of **MSgt. Pete Sauer** and wife Darleen, who were assigned to Homestead AFB, Fla., 1973-75. **Contact:** Larry Seabrook, 2538 E. Nance St., Mesa, AZ 85213.

If you need information on an individual, unit, or aircraft, or if you want to collect, donate, or trade USAF-related items, write to "Bulletin Board," Air Force Magazine, 1501 Lee Highway, Arlington, VA 22209-1198. Letters should be brief and type-written; we reserve the right to condense them as necessary. We cannot acknowledge receipt of letters. Unsigned letters, items or services for sale or otherwise intended to bring in money, and photographs will not be used or returned.—THE EDITORS

For the RCAF Station Centralia Memorial Museum, seeking photographs, uniforms, and memorabilia from those who trained at **Centralia, Ontario, Canada**, in World War II and as exchange pilots in the 1950s. **Contact:** Wally Fydenchuk, R. R. 1, Crediton, Ontario N0M 1M0, Canada.

Seeking the whereabouts of **Robert Stephen Rubin**, born March 29, 1957, at the USAF Hospital Burderop Park, Wiltshire, UK. **Contact:** Howard M. Rubin, 2309 Guest Dr., Alhambra, CA 91803.

Seeking **maintenance manuals** for 1940 to 1950-era aircraft or engines. Also willing to trade SAC pins and RF-4C manuals. **Contact:** Randall Tait, P. O. Box 14, Breckenridge, TX 76424-0014.

Seeking contact with those who served in the Forbes AFB, Kan., **Atlas missile silo**. Also seeking contact with American, British, French, and German **World War I pilots** and pilots who flew the Sopwith Pup or Camel. **Contact:** Al Clovis, 2021 S.W. Mission #2, Topeka, KS 66604-3366.

Seeking the whereabouts of **John Joseph Walsh**, originally from Alabama, based at RAF Mildenhall, UK, 1950-52. **Contact:** M. Fitzjohn, 2A Ward Rd., Cambridge, UK.

For historical displays, seeking information from veterans of the **961st Airborne Air Control Squadron**, **61st Bomb Squadron**, **961st Airborne Early Warning and Control Squadron**, and the **552d Airborne Warning and Control Wing**, Det. 3. **Contact:** Capt. Robert J. Long, USAF, 961 AACs, Unit 5148, APO AP 96368-5148.

Seeking contact with **506th Fighter Squadron** (P-38) veterans who were at Burns AAF, Ore., in May 1943. Also seeking contact with 404th Fighter-Bomber Group veterans who served with **Lieutenant Colonel Wilson** at Burns in August 1943. **Contact:** Eugene E. Luckey, 144 East E St., Burns, OR 97720.

Seeking a 12th Tactical Reconnaissance Squadron Operation Desert Shield or Desert Storm cloth **patch**, any AWACS patch, and a USAF Academy professor badge. **Contact:** Andreas Hunold, Westpromenade 71, 52525 Heinsberg, Germany.

For a newsletter, seeking information from former members of the **USAF Presidential Honor Guard**. **Contact:** MSgt. Eric Fjetland, 2605 Jackpine St., Bellevue, NE 68123.

Seeking contact with anyone who knew **SSgt. Hugh D. Watt**, 703d Bomb Squadron, 445th Bomb Group, shot down in a B-24 over Germany April 1, 1944. **Contact:** William J. Watt, 9422 S. Grandview Ct., Davison, MI 48423.

Seeking a class book for **Gosport Class 44-C**. Also seeking former Texas A&M student **MacAdams** (or MacDuff), who flew PT-13 and -17 Stearmans in the primary course. **Contact:** Capt. W. Mack Palmer, USAF (Ret.), 2400 Stone Hollow Dr., Apt. #713, Brenham, TX 77833.

Seeking to trade **35-mm slides** of US and foreign military subjects and color **patches** of USAF, Navy, and Marine flying units. **Contact:** Phillip Huston, 8439 Melrose Lane, El Cajon, CA 92021.

Seeking **identification models** of World War II and postwar aircraft, all scales and countries. Also seeking identification models of postwar ships (Teacher scale 1/500 and 1/250), Kix 1/432-scale aircraft models from the 1940s, Armored Force Vehicles, Wings or Players cigarettes aircraft cards, and AHM Cox Showcase miniature aircraft models. **Contact:** James A. Dorst, 113 Beach Rd., Hampton, VA 23664-2054.

Seeking a 1980s era "Mach 7" poster of **John Elway** and the Colorado ANG's 140th Fighter Wing. **Contact:** Joseph C. Caffarella, 14 Mountain Ave., West Orange, NJ 07052.

Seeking information from those involved in a **B-36 gear-up landing at Kirtland AFB**, N. M., in 1951 or 1952. **Contact:** Richard N. Beardslee, 1118 Creekdale Dr., Clarkston, GA 30021.

Seeking information on or contact with those involved in post-World War II activities at **Pacific Missile Range Facility**, Hawaii, or **Bonham AFB**, Hawaii. This includes Regulus missile testing, NASA space tracking, or SDI experiments. **Contact:** Michael S. Binder, 6107 Palo Pinto Ave., Dallas, TX 75214-3615.

For an Eighth Air Force display, seeking **flight jackets** and squadron **patches**, including photos and documents from their owners. **Contact:** Lt. Col. Terry Carlson, USAF (Ret.), P. O. Box 250, Round Lake, IL 60073.

For association membership, seeking former **air weather personnel**, including reconnaissance personnel, meteorology cadets, and Chanute AFB, Ill., and Keesler AFB, Miss., instructors. **Contact:** Cliff D. Kern, 1879 Cole Rd., Aromas, CA 95004-9617.

Seeking the whereabouts of B-26 pilot **Lt. William Clements**, stationed at Yuma AAF, Ariz., 1944-45. **Contact:** William C. Collins, 1514 Benjamin Pkwy., Apt. D, Greensboro, NC 27408.

Seeking leather **flight jackets** and bomb squadron or group insignia for the 823d, 824th, 825th, 826th, and 509th jump groups. **Contact:** TSgt.

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Bulletin Board

Dick Pankowski, USAF (Ret.), Box 22, Greendale, WI 53129.

Seeking information on the B-29 *The City of Grundy Center* and contact with crew members **2d Lt. Lloyd C. Jordan**, **1st Lt. Bernard Roth**, **Master Sergeant Owen**, and **Sergeants Olds**, **Esquivel**, and **Moot**. **Contact:** Ken Mutch, 1402 9th St., Grundy Center, IA 50638.

Seeking information on or photos of **Griffiss AFB, N. Y.**, 1942-65, particularly the Rome Air Service Command, Rome Air Technical Service Command, 4104th AAF Base Unit, 27th Fighter-Interceptor Squadron, the Sabre Dancers, and the 1st Fighter-Interceptor Group. **Contact:** Michael Huchko, 65 East St., Apt. #22, Plainville, CT 06062.

Seeking information on **1st Lt. Theodore W. Sedvert**, a P-51 pilot from the 353d Fighter Squadron, 354th Fighter Group, and **Capt. Emmer N. Wallace**, shot down August 9, 1944. **Contact:** Karl Haeuser, 93 Bakersfield Ave., Cayucos, CA 93430.

Seeking contact with anyone who participated in experiments with **float-equipped C-47s** during World War II. **Contact:** Col. C. V. Glines, USAF (Ret.), 1531 San Rafael Dr., Dallas, TX 75218.

Seeking contact with bomber crew members who parachuted into **Croce della Rocca Franca, Italy**, in 1944 and escaped by fishing boat from Porto Recanati before being captured. **Contact:** Arthur Page, Ivy Cottage, Sexton Yard, High St., Docking, Norfolk PE31 8NH, UK.

Seeking the whereabouts of **Janet Richardson Harvey** (married to Eric Harvey), who was sta-

tioned at Andersen AFB, Guam, and Wurtsmith AFB, Mich., in the 1960s. **Contact:** Patt Knotts Bergerson, 1160 Bismarck Dr., Campbell, CA 95008.

Seeking information on and photos from the **JB program**, 1944-46, and contact with those who worked on the development or testing of JB-1 through JB-10. **Contact:** Peter J. Esterle, 3427 Wright Rd., Uniontown, OH 44685.

Seeking the whereabouts of **Major Wetstien** and **Capt. John J. Murray**, who were with the 2d Aviation Field Depot Section, RAF Fairford, UK, 1952-54. **Contact:** Fred Jenkins, Rte. 3, Box 85, Mexia, TX 76667-9412.

Seeking contact with **Carroll E. Clark**, **Joseph A. Frazier**, **Lawrence I. Maloney**, **Darrell W. Messer**, and **Robert Pankratz**, who were gunners with the 85th Bomb Squadron, Sculthorpe, UK. **Contact:** Richard McCormick, 307 S. Meridian St., Greenwood, IN 46143.

Seeking anyone who knew **Maj. Samuel N. Busch** and his crew, who were downed in the Sea of Japan, off Vladivostok, Russia, June 13, 1952. Also seeking contact with anyone stationed at Yokota AB, Japan, in June and July 1952. **Contact:** Charlotte Busch Mitnik, 731 Killdeer Lane, Huntingdon Valley, PA 19006.

Seeking contact with **physical training instructors** at the base gym, Davis-Monthan Field, Ariz., 1942-45. **Contact:** Charles H. Jacob, 3408 Tibbett Ave., Bronx, NY 10463.

For an association, seeking former members of the **Billy Mitchell Drill Team**, University of Florida AFROTC. **Contact:** Lt. Debbie Ostrov, USAF,

89th OSS/OSNS, 1535 Command Dr., Suite A-300, Andrews AFB, MD 20331-7002.

Seeking contact with **SSgt. George Scilico**, members of the **524th Bomb Squadron**, 379th Bomb Group, or anyone who knew **SSgt. Eugene Foster Hively**, ball turret gunner on a B-17 that crashed at Venlo, Holland, February 22, 1944. **Contact:** Dona Rizzo, 6317 Slippery Creek Lane, Citrus Heights, CA 95621.

Seeking information on **Lt. Col. Donald E. Ridings**, who was a B-17 pilot at Hickam Field, Hawaii, December 7, 1941. He was born in Oregon, graduated from the University of Idaho, married in 1940, and died about 1980. **Contact:** Col. Ancil D. Baker, USAF (Ret.), 18 Don Timoteo Ct., San Rafael, CA 94903-3519.

Seeking contact with former members of **Pilot Training Class 57-M**, Laughlin AFB, Tex. **Contact:** Col. Dan Barry, USAF (Ret.), 7077 Jupiter Trail N. W., Silverdale, WA 98383-9711.

Seeking identification and modification **plates and models** for aircraft from World War II to present. **Contact:** Robb Hill, 4563 Coachman Cir., Las Vegas, NV 89119.

Seeking contact with former members of the **1st Combat Cargo Squadron** or the **344th Airdrome Squadron** who served in India or China, August-November 1945. Also seeking contact with **Lt. Roy B. Sutherland**, **Lt. R. S. Wilson**, **Flight Officer Robert Alt**, **TSgt. Harry F. Welsh**, and **Sgt. Frank Chiara**. **Contact:** TSgt. Gerald A. White, Jr., AFRES, 1818 Barbee St., McLean, VA 22101.

Seeking contact with anyone who knew **Lt. Gail Wagar**, a B-24 pilot with the 449th Bomb Group,

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47th Wing, in Italy in 1944. **Contact:** Floyd M. Black, 1356-A Skyridge Dr., Crystal Lake, IL 60014-8933.

Seeking contact with World War II veterans of the **347th Bomb Squadron**, 99th Bomb Group, Italy, who knew **John D. Badgley**. **Contact:** Marian B. Badgley, 1731 Margarita Lane, Sanford, NC 27330.

Seeking contact with anyone who knew **TSgt. John J. Golden**, 390th Service Squadron, 74th Service Group, who served in World War II in Greenland and England. **Contact:** C. Hale, P. O. Box 1271, Paramus, NJ 07653-1271.

Seeking information on a USAF aircraft accident on the Appalachian Trail in **Great Smokey Mountain National Park**. **Contact:** TSgt. Tim Shaffer, USAF (Ret.), 1410 Girard Blvd. N. E., #70, Albuquerque, NM 87106.

Seeking contact with anyone who knew **Sgt. James John Zipperer**, an aerial photographer with Eighth Air Force, April 1944 to November 1945. **Contact:** Lorri Zipperer, 1002 Washington St., #3E, Evanston, IL 60202.

Seeking the whereabouts of **Brig. Gen. Victor N. Cabas**, USAF (Ret.), originally from New Castle, Pa., last known to be in Rancho Palos Verdes, Calif. **Contact:** Joan Foster Porter, 3225 Happy Hollow Rd., Hopkinsville, KY 42240.

Seeking contact with **Lt. Wayne H. Tindall**, a bombardier with the 403d Bomb Squadron, 43d Bomb Group. **Contact:** Wade T. Kehr, 715 Sherry Dawn Dr., Dallastown, PA 17313.

Seeking photos, laser copies, or drawings of unofficial USAAF or USAF **insignia**. **Contact:** Johnny Signor, 714 Atlantis Rd. S. E., Palm Bay, FL 32909-4811.



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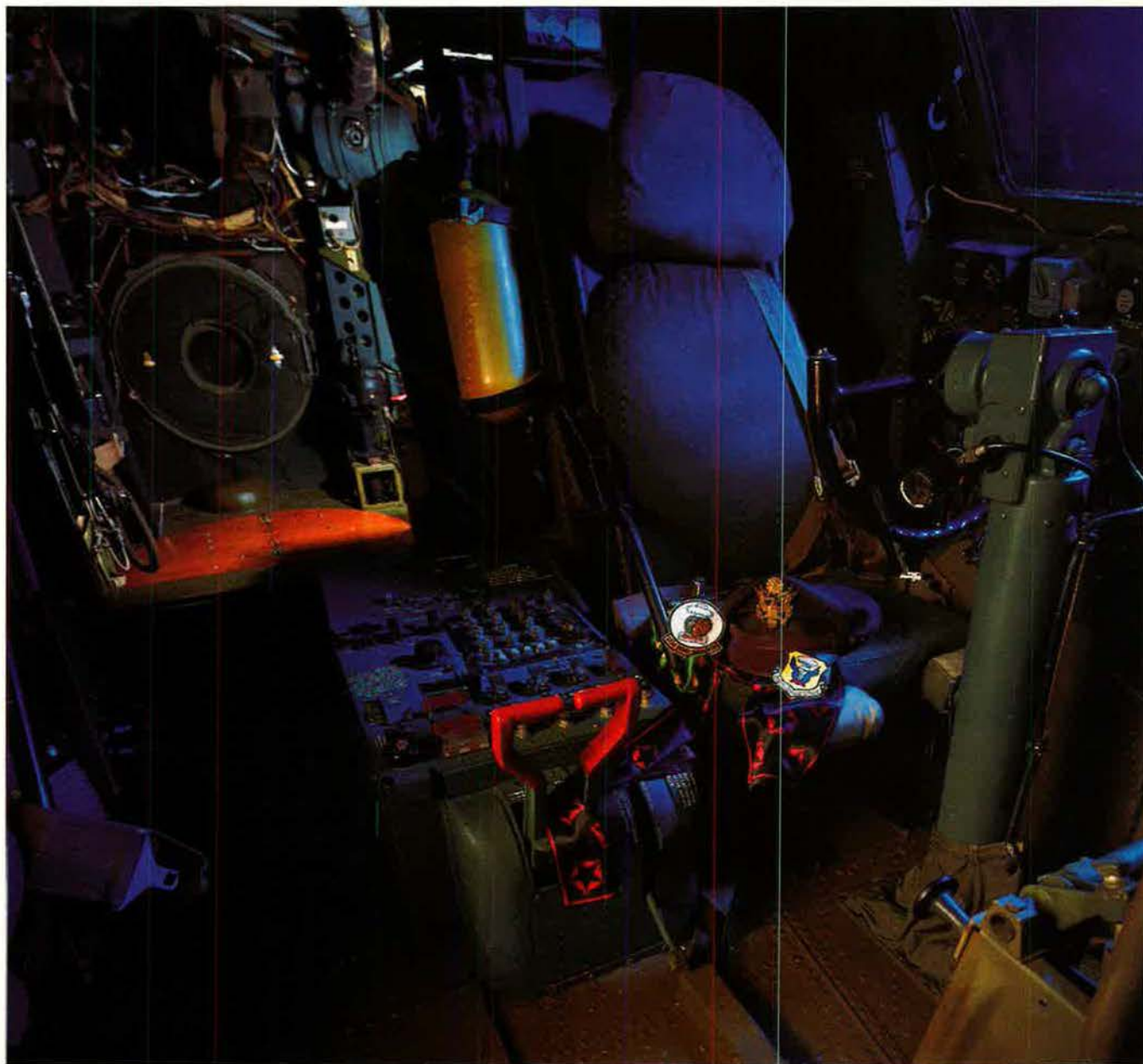
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Photography by Paul Kennedy

The Last Word



The atomic bomb had fallen on Hiroshima, dropped by the B-29 Enola Gay on August 6, 1945, but Imperial Japan was not quite ready to surrender. That did not happen until after another B-29—Bockscar, piloted by Maj. Charles W. Sweeney—dropped an atomic bomb on Nagasaki on August 9. Today, Bockscar is on display at the USAF Museum at Wright-Patterson

AFB, Ohio. Both the Enola Gay and Bockscar were assigned to the 393d Bomb Squadron, 509th Composite Group, on Tinian. The lineage of these units continues with the 393d Bomb Squadron, 509th Bomb Wing, at Whiteman AFB, Mo. The USAAF cap in Bockscar's cockpit above is of World War II vintage, but the scarf and patches are from the modern day.

Memorabilia courtesy the United States Air Force Museum, Wright-Patterson AFB, Ohio

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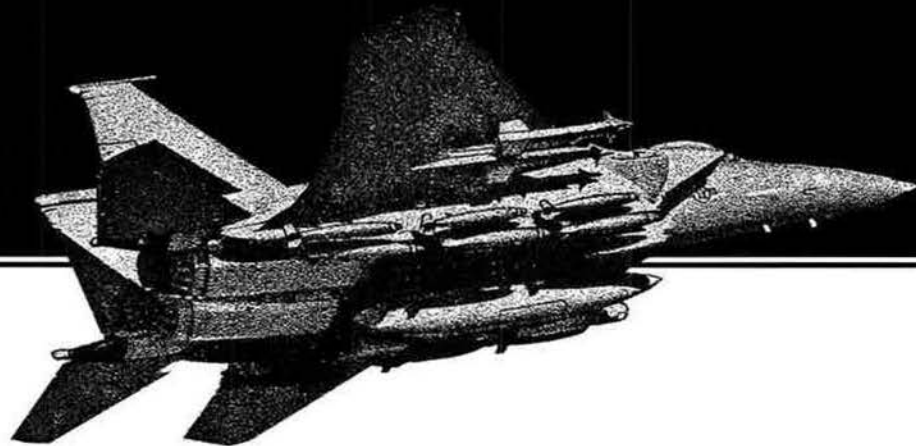
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