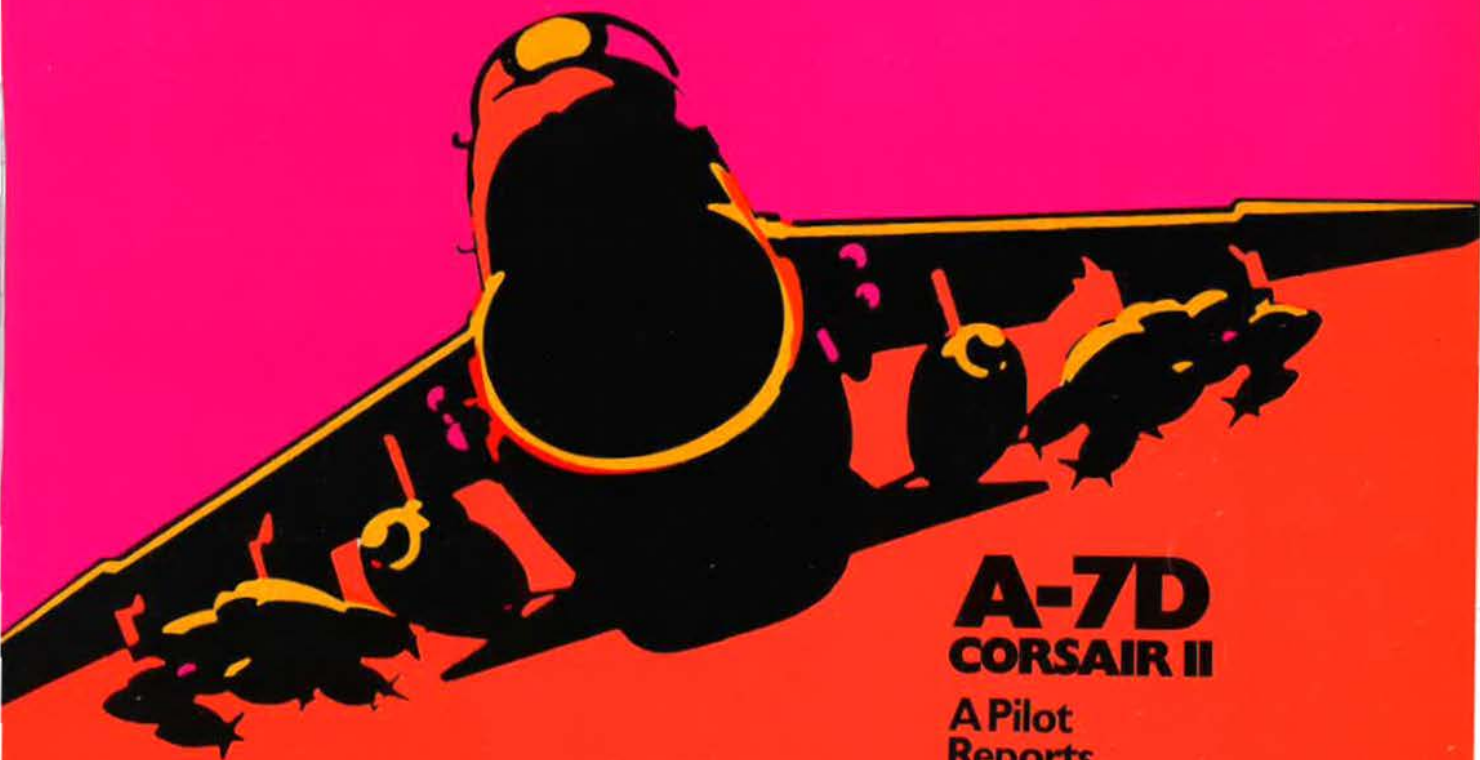


MARCH 1972 / \$1

AIR FORCE

Published by the Air Force Association

MAGAZINE



A-7D CORSAIR II

A Pilot
Reports
On the
Super-Accurate
'Short Little
Ugly Feller'

New airborne electronic systems require power and cooling.

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example is the technology required to produce highly effective cold plates

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early in the game and let us put our experience to work for you.



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one of The Signal Companies 

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Blue-Water Booby Trap

FOR THOSE who like their defense budgets heavily salted with ocean spray, the Fiscal Year '73 proposal now before Congress is *it*. Senior Editor Claude Witze reports the details of that budget on page 6. For the second successive year, Navy funding is to be greater than that of the Army or the Air Force—and the budgetary gap is widening.

In FY '72, Navy had it over the Air Force by a narrow (on the Defense budget scale) \$110 million. The new budget shows Navy leading Air Force in new obligational authority by a whopping \$1.6 billion. There are long-term implications in the FY '73 budget that have been little explored by the press. Let's look at some of them.

Federal budgets for FY '71 through FY '73 will produce a combined deficit greater than that of the preceding ten years put together. Whoever is in the White House next year is going to need political courage just to maintain the present level of defense spending. Providing military muscle for the principal national objective of deterrence—both strategic and tactical—certainly will be done with unusual selectivity. Any investment on a scale of a billion dollars per copy in one deterrent weapon system is likely to be made at the expense of complementary systems that make up the strategic Triad of land- and sea-launched missiles and manned bombers, or the correct mix of tactical forces.

Now, the essence of either strategic or tactical deterrence is readiness—a recognized ability to respond instantaneously to a threat or an actual attack. But among the largest increases in the FY '73 budget are developmental and advanced procurement funds for weapon systems with a low readiness index. Foremost among them is an \$800 million increase to accelerate development of the Navy's Undersea Long-range Missile System (ULMS), an "invulnerable" replacement for the Polaris submarine, whose own vaunted "invulnerability" appears to be questionable even to the Navy.

We do not imply that any single ULMS boat—or Polaris submarine, for that matter—has a low readiness index *when at sea and on station*. But up to half of the Polaris subs are in port at any given time, in contrast to the ninety-eight percent readiness of the Air Force land-launched missile force. Supposedly ULMS can fire its longer range missiles while in port, but, tied to the dock, it becomes an unhardened launching platform, infinitely more vulnerable than a siloed missile. And the ports, unlike Minuteman sites, are in heavily populated areas.

A large part of the rationale for ULMS has been based on the alleged vulnerability of land-launched missiles. Curiously, Minuteman became "vulnerable" at a time when building the Safeguard ABM system to pro-

tect cities proved politically unacceptable. In order to save ABM, it was discovered that the Minuteman force—hitherto (and still) considered by experts to be highly survivable—needed to be protected by Safeguard. It may eventually emerge that Minuteman "vulnerability" has been a political, rather than a technical, malady.

In time, if nothing is done to counter it, all weapon systems become vulnerable as enemy technology improves. Any future vulnerability of Minuteman can be countered in several ways—additional silo hardening, hard-site defense, proliferation at a cost of \$5.5 million per Minuteman III, including its silo and command/control system. All of these ways are far cheaper than putting US missiles at sea, particularly in ULMS, to the tune of a billion dollars for each sixteen missiles, which works out to more than \$60 million per missile.

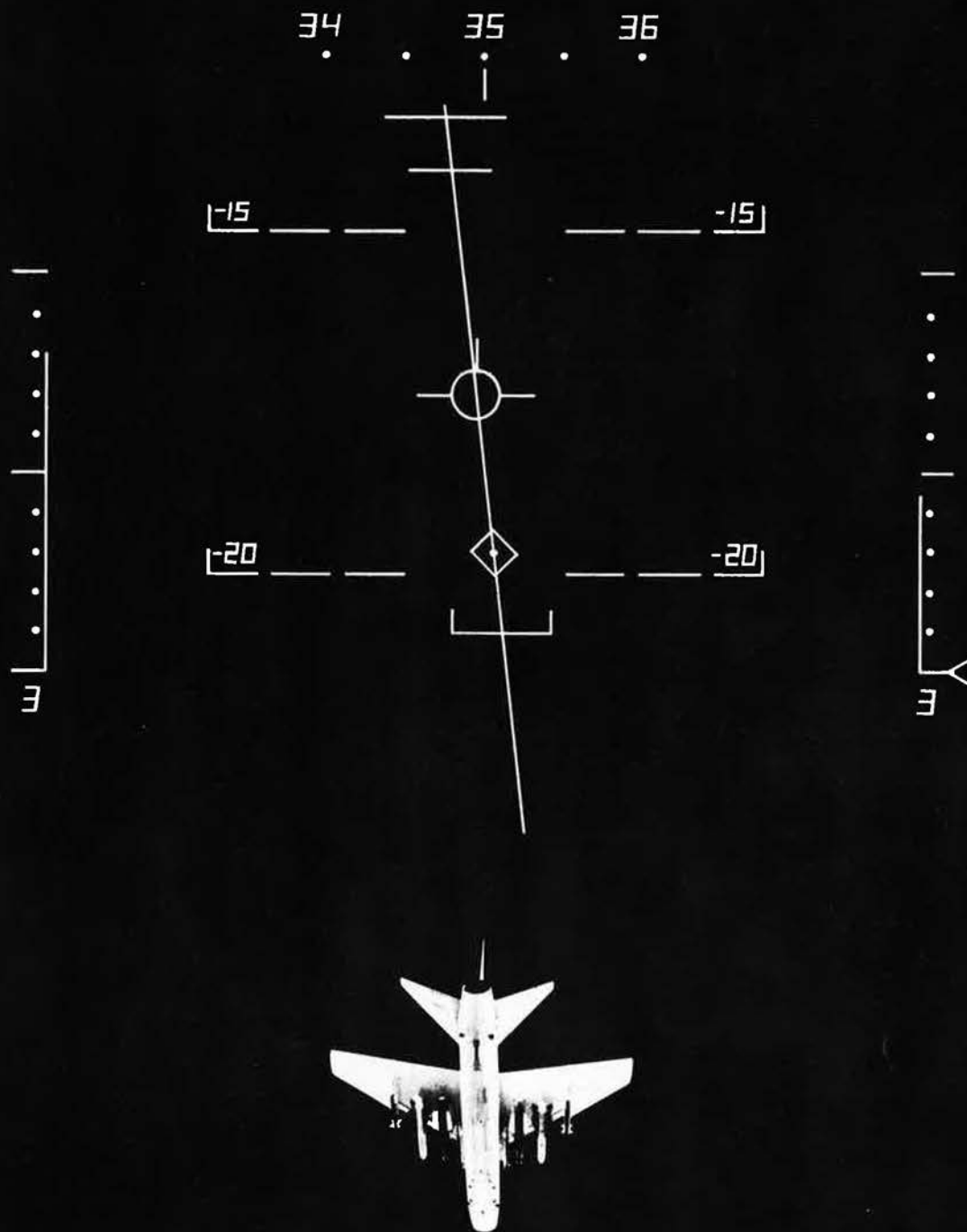
Another example of increased investment in slow reacting systems is the apparent go-ahead—subject to congressional approval—on the Navy's billion-dollar nuclear-powered carrier. Without strategic warning, it takes as much as thirty days to ready and deploy carrier to a distant trouble spot. Air Force tactical fighter units, with their bare-base capability or operating from established bases, can be there, flying combat sorties, in seventy-two hours.

We do not argue against either sea-launched missile or carriers as part of balanced strategic and general purpose forces. We do oppose overinvestment in *any* single element, either of the Triad or of general-purpose deterrent forces. The theories advanced by proponents of a blue-water strategy have long been a potential threat to the balanced US military posture that has proved its worth for a decade. Their advocacy of putting the US nuclear deterrent at sea and of substituting proximity forces for land-launched tactical airpower is based on notions that are untested in the strategic area and that have met with indifferent success as a tactical deterrent. (See also p. 40 of this issue.)

Now the threat of a serious imbalance in US force has been given real substance by the FY '73 budget that, to use a currently fashionable word, "tilts" toward a blue-water strategy. That strategy needs a lot more public examination than it has had so far. It needs to be examined *now*, before the nation is committed to an unbalanced strategy from which there could be no quick return to sanity.

Perhaps most of all, two sacred cows that have become articles of faith for many legislators and media people need to be publicly milked. One is the "invulnerability" of nuclear-armed submarines; the other is the "vulnerability" of Minuteman.

A lot of people who now support a blue-water strategy will find the milk to be pretty sour, for there is little truth in either cow.



The A-7 makes ground movement after dark a nightmare.

In combat, the devastating accuracy of this aircraft is being applied to an increasing number of night attack missions.

The A-7 is equipped with the most advanced navigation weapon delivery systems in service. The Head-Up Display, shown above, gives the pilot eye-level information required for weapons delivery.

An improved Doppler, inertial platform, for

ward looking radar, projected map display and computer supply integrated data for pinpoint navigation and attack.

With its superior navigation and weapons capability, today's A-7 continues to deliver a wide variety of mixed ordnance on target with better than 10-mil accuracy.

So when the A-7 prowls at night, enemy ground movement plans go up in smoke.



**VOUGHT
AERONAUTICS**

Airmail

No Holds Barred

Gentlemen: AIR FORCE Magazine needs more articles of the caliber of John W. R. Taylor's "Jane's Aerospace Review, 1971-72" [January '72 issue]. Your typical military or DoD contributor cannot be as candid or analytical for fear of censure for compromising privileged information.

LT. COL. O. D. TAYLOR,
USAF (RET.)
Valparaiso, Fla.

For Music Lovers

Gentlemen: In the December 1971 issue you carried a letter from Brig. Gen. Alfred L. Wolf suggesting the old Air Force songs be recorded before they were lost. Well, they were—about ten or twelve years ago, by Oscar Brand on an LP by the Elektra Corp., of New York City. . . . The record has *Throw a Nickel on the Grass*, *The Poor Copilot*, *Itazuke Tower*, *Fighter Pilot's Lament*, *Wreck of the Old '97*, and many more. . . .

CAPT. C. R. LASATER
East Point, Ga.

Gentlemen: The "Airmail" section of the December issue carried a letter musing about recording some of the old ballads. In 1960 I purchased a record of these ballads by that old troubadour Oscar Brand which included *Throw a Nickel on the Grass* in its original version. Also included was a song sheet with the words to all of the ballads.

Unfortunately, my copy is in storage and I cannot recall the recording company. I do recall the cover though—it showed Oscar Brand descending in a parachute pouring himself a glass of champagne, with ribbons from his chest to his kneecap. . . .

I certainly agree with the General that it would recall with nostalgia the era "with which these lyrics deal."

TSGT. EDWARD H. STRUS,
USAF (RET.)
APO New York

• *All you music lovers are in luck. Elektra tells us that the record is still in existence. It's called The Wild Blue Yonder, Number EKS 7168. Your local disc dealer can order it through the Elektra Record Corp., 15 Columbus Circle, New York, N. Y. 10023, if he doesn't stock it.*—THE EDITORS

C-47s and A-1s in Vietnam

Gentlemen: I'm preparing two articles

for the American Aviation Historical Society—"The C-47 in Vietnam," and "The A-1 in Vietnam." I would appreciate hearing from anyone who served with or had any association with either of these aircraft. The information I'm seeking is dates they arrived in Vietnam, markings, colors, squadrons they were assigned to—both USAF and VNAF—and photographs.

Any material loaned will be treated with great care and returned as soon as possible.

TSGT. NORMAN E. TAYLOR
6942 Westlawn
San Antonio, Tex. 78227

Observer Wings

Gentlemen: As a charter member of AFA, I am proud to be associated with such a fine organization—also look forward each month to your fine magazine.

I was a bombardier-observer during World War II, eligible to wear bombardier wings, observer wings, or gunner's wings. I am putting together a plaque to display wings, ribbons, insignia, etc. To my dismay, I've lost the observer wings and have been unable to locate any.

Would appreciate any suggestions as to how or where I might locate a set of World War II observer wings, either regular or miniature size.

MAJ. ROYAL D. CRIDER,
USAFR (RET.)
5335 Quince Rd.
Memphis, Tenn. 38117

Flying Again

Gentlemen: I assure you and TSgt. Raymond W. McCleery ["Airmail," December '71 issue] that the 355th Tactical Fighter Wing is in fact back in business, now flying the A-7D at Davis-Monthan AFB, Ariz. We would welcome his "pride and morale" back into the wing anytime.

Reference your editorial . . . , the "choir" needs and appreciates the facts—keep up the good work.

MAJ. GLENN A. JONES
Tucson, Ariz.

Indispensable EM

Gentlemen: . . . Most items you print always show the officer as a man who does it all. I really hate to inform you, but the lowly enlisted man is the backbone of the armed forces and we deserve a bit more credit.

A good example is the two articles you printed on the SR-71. The officers

of our famous "bat plane" couldn't even make it to the bat cave where the bird is waiting if it were not for the enlisted man, and as far as strapping on the SR-71, he would really have trouble if it were not for the guys in specialized supply, the Organizational Maintenance Squadron Support Branch, the Armaments Maintenance Squadron, the Aerospace Ground Equipment Branch who deliver the start carts and the special JP-7 fuel.

Now, if the SR-71 has trouble and must land at another base, my office works many hours of overtime getting tankers ready to go out with the maintenance troops to repair the SR for the trip home.

Incidentally, we do have the best officers in the Air Force.

TSGT. THOMAS O'NEILL
9th Strategic Reconnaissance Wing
Beale AFB, Calif.

• *We couldn't agree more about the EM's importance.*—THE EDITORS

UNIT REUNIONS

Pony Express

Spring Roundup is currently being planned for April 7-9, 1972. Any "riders" or "vets" are welcome. For further information contact me as soon as possible.

Capt. L. S. Bodony
7001 Cliffwood Pl.
Dayton, Ohio 45424

Phone: Autovon 785-5002 or -2043

89th and 94th Troop Carrier Wings

Former members of the 89th and 94th Troop Carrier Wings will gather at the Hanscom Field Officers' Open Mess on Saturday, May 20, for their annual reunion. Former members interested in attending the reunion should contact

Steve Lannan
40 Winn St.
Woburn, Mass. 01801

509th Bomb Wing

The 2d annual reunion of the 509th Bomb Wing will be held July 14-16, 1972, at the Hilton Hotel, Omaha, Neb. All interested 509ers are asked to forward their names and addresses, as soon as possible, to

Lt. Col. James Cook
1110 Offutt Blvd.
Bellevue, Neb. 68005

Phone: Autovon 271-2326 or -2665



One and a half million

continuous operational hours.

Without failure.

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Overall we have accumulated over one hundred million operational hours on Minuteman I, II, and III.

Minuteman III has the free world's most dependable gyro. In large measure, its success stems from its simplicity—a gas bearing, auto lubricated, two-axis instrument. Over 5000 of them have been produced

to date and they're logical choices for many military and aerospace applications.

Throughout 3 generations of the Minuteman Program, we've supplied 99% of the electronics. Inertial navigators. Onboard computers. Checkout equipment. The gyro is just one element—but a key element in the guidance platform. Due to the high reliability performance of all elements, this guidance and control system is currently running over twice the contractual



reliability requirement.

North American Rockwell is pleased to belong to a First Team, the many people under Air Force management who've provided our nation with the most advanced unmanned aerospace system ever built.

And with its continuing cost underruns—\$10½ million this last time—Minuteman III is a success in more ways than one.



North American Rockwell
Electronics Group

Airpower in the News

By Claude Witze

SENIOR EDITOR, AIR FORCE MAGAZINE

Is Anybody Listening?

WASHINGTON, D. C., FEBRUARY 4

It is almost two weeks since President Nixon sent his annual budget message to Congress, and lines are beginning to form for the debate over the realities of national defense. In his message, the Chief Executive said something about the budget as a "superb deflator of rhetoric," but, as usual, a lot of people weren't listening.

"We could never fulfill our hopes for a full generation of peace from a position of weakness," Mr. Nixon said. "We can only negotiate and maintain peace if our military power continues to be second to none.

"A demagogue may find it easy enough to advocate that we simply allocate necessary defense dollars to social programs, but a responsible Congress and a responsible President cannot afford such easy answers."

With that, he proposed a \$6.3 billion increase in budget authority for the Pentagon, for a total in Fiscal 1973 of \$83.4 billion. Sixty-five percent of the increase, or \$4.1 billion, represents pay increases. With Russia now even with the United States in strategic power, there are men in government who still believe there is no threat, and they will press for unilateral disarmament this year.

The basic content of the new defense budget should provide some stumbling blocks in that effort. There is an emphasis on research and development, which we will discuss later, meaning that significant spending increases will come in the future, when R&D begins to pay off in procurement. Actual outlays in FY 1973 are estimated at \$76.5 billion, an increase of \$0.7 billion over FY 1972.

At the Pentagon briefing for the press, which was on the record for the first time in this reporter's seventeen years of experience on the defense budget beat, the emphasis was on improved weaponry. The program calls for the development of extensive new systems that will take years to emerge from the laboratory. This means the outlay of

funds will be spread over several years, while the budget authority to develop them is concentrated in a single year.

Robert L. Moot, the DoD Comptroller, displayed a chart (*see below*) demonstrating that outlays lagged behind budget authority in the years from FY 1964 to FY 1968. They were the years of a defense buildup. The trend reversed itself during the FY 1968 to FY 1971 cutback. With increased budget authority in FY 1972 and FY 1973, outlays are again lagging. This is caused by the lead times required. For the aerospace industry, it means better times are not here, but are ahead.

"What this means is that we are again in a defense buildup situation to modernize our peacetime baseline forces," Mr. Moot told the press. He continued:

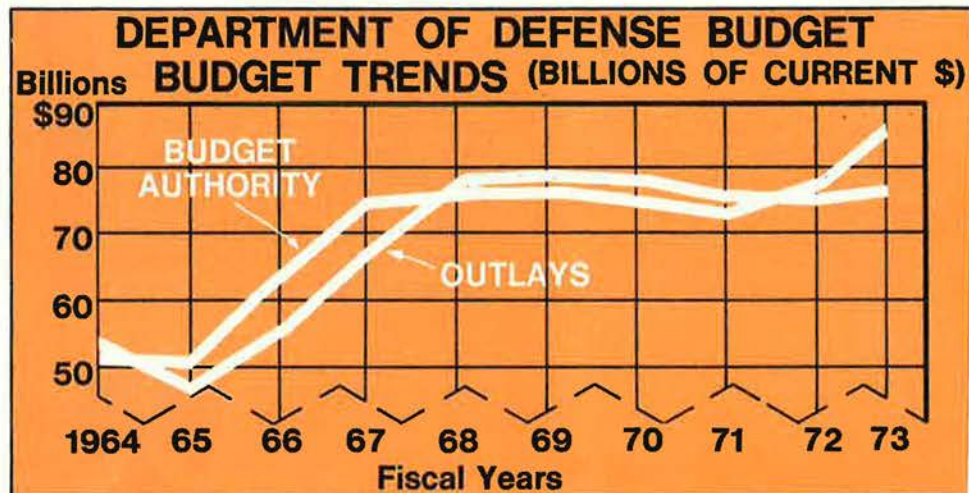
"There are three key factors in the 1973 fiscal situation that explain the magnitude of the spread [between budget authority and outlay]. First of all, there is a large increase in our development and acquisition funding, and this is slow-spending money in the first year. We go out and make contracts. Contractors—the defense industry—start a buildup in terms of new systems or in accelerating current systems, and it takes time to get organized.

"Secondly, there are some fast spending increases in 1973, particularly in the pay-raise areas, but these have been largely or significantly offset by decreases in Southeast Asia or wartime activities which likewise are fast spending, so that one has a tendency to significantly offset the other.

"Third, [there is] the issue of a new defense policy as of January 1 of this year. It is a new policy on contract financing, which requires that the defense industry, rather than the Defense Department, finance initially a greater share of work in progress or weapons during production than they have in the past."

He said the department has been making payments of from \$300 to \$400 million a week to contractors with a \$16 to \$20 billion annual rate. Payments have been made

Defense Department chart demonstrates how outlays lagged behind budget authority between Fiscal Years 1964-1968. Trend was reversed during the cutback that took place in 1968-1971.



almost on demand. Now they will be made not more frequently than biweekly. This "time wedge" will require contractors to finance an additional \$700 or \$800 million of work in progress.

Some other major budget points made by Mr. Moot:

- FY 1973 budget authority for defense represents 29.8 percent of the total US budget of \$270.9 billion, and no significant change from the substantially reduced funds enacted by Congress for FY 1972. This is still 9.3 points less than FY 1968's 39.1 percent. It is a twenty-three-year low.

- Defense outlays (as opposed to budget authority) are thirty percent of the total federal outlays of \$246.3 billion. This is down 12.5 points from the FY 1968 peak of 42.5 percent. This is the lowest level since FY 1950.

- The percentage of Gross National Product devoted to defense continues to decline. It will be 6.4 percent, a twenty-two-year low.

- The cost of the war continues to decline. It is down \$2.8 billion between FY 1971 and FY 1972 and will go substantially lower in the new year.

- Major program increases—\$3.5 billion—will occur in investment areas. This is for procurement, RDT&E, military construction, family housing, and military assistance.

- Operating funds, to meet the cost of military personnel, retired pay, and operations and maintenance, will go up \$3.1 billion.

The most important single program change in the new budget is the emphasis on strategic forces, up from \$7.6 billion in FY 1972 to \$8.8 billion in FY 1973. Mr. Moot did not disagree that the move carries a message to Soviet delegates at the SALT talks. Development of new systems will be accelerated. Budget authority for USAF's B-1 bomber is increased \$74 million, to a total of \$444 million. The Safeguard ABM system is increased \$366 million to a total of \$1,483 million. For USAF's Airborne Warning and Control System (AWACS) there is a request for \$331 million, bringing the total to \$470 million. The biggest increase in \$802 million requested for the Navy's Undersea Long-range Missile System (ULMS). The ULMS total then will be \$942 million, with the major push definitely in FY 1973.

There is no question that the lion's share of new procurement money goes to the Navy. The Pentagon is seeking an increase of \$1.4 billion in procurement funds, for a total of \$19.3 billion. Of that increase, \$941 million is slated to go to the Navy. The largest category within procurement was for Navy aircraft and missiles—\$3.9 billion in FY 1973.

So far as the Air Force is concerned, aircraft procurement funds will drop again sharply from \$3.8 billion in FY 1972 to \$2.3 billion in FY 1973. Budget authority also is down, from \$3 billion to \$2.6 billion.

The cuts reflect the windup of procurement of the A-7 and F-4 aircraft. Included in the FY 1973 program are funds for the F-111, F-5E, T-43A, T-41D, the C-5A, and initial procurement of the F-15. Also requested are funds for AWACS, the airborne command post, and some modernization.

Air Force missile procurement will increase slightly. Funds requested will go from \$1.4 billion in FY 1972 to \$1.5 billion in FY 1973. Budget authority in this category will increase from \$1.6 billion to \$1.8 billion. Covered are procurement of Minuteman ICBM systems, the SRAM (Short Range Attack Missile), Shrike, Sparrow, Sidewinder, and Maverick.

An unusual item in the USAF request is for \$35.9 million to purchase 120 Bell UH-1H light jet helicopters. Some will be used for air base rescue, the rest transferred to the Army to replace helicopters already given to the Vietnamese Air Force.

Air Force funding for research, development, test, and evaluation (RDT&E) will be increased from \$3 billion to \$3.2 billion. Aside from what this means to USAF, it must be viewed as part of the Nixon Administration's new and more stimulating approach to the whole subject of technology.

In his budget message, the President said he seeks more ways to "turn science and technology to the service of man."

"We have been reordering our research and development investments in defense and space," Mr. Nixon said. "We have reassessed the space program and placed it on a firm future footing with increased attention to practical and economical applications of space and reductions in the cost of manned spaceflight."

This was a reference to the space shuttle program (see page 20). Requested funding in the NASA budget is for \$200 million, twice the FY 1972 figure. NASA expects to actually spend \$228 million on the shuttle system next year.

The Presidential message also said that defense R&D will be strengthened "to ensure that the country will not face the possibility of technological surprise or lack the deterrent power necessary to protect our national security."

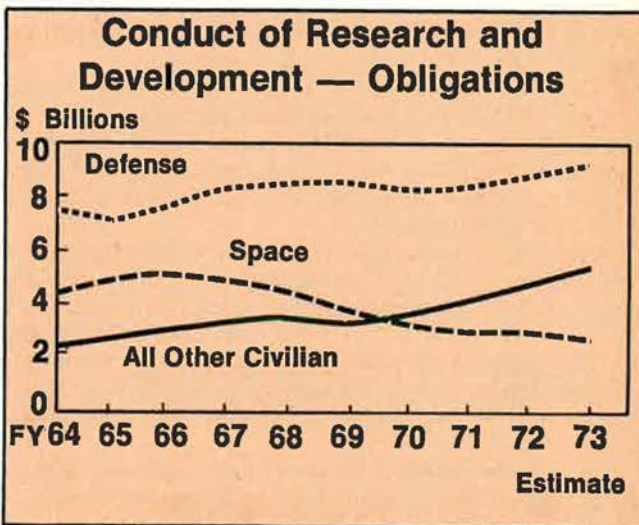
For the entire Pentagon, budget authority for RDT&E is being increased \$838 million to an all-time high of \$8.5 billion in 1973.

For the entire aerospace industry, the Administration's declaration is pregnant with opportunity. It is a declaration of war on the school of reactionaries that has been so busy discounting the promises of the future.

By White House estimate, 1973 will see a total government effort to strengthen science and technology to the tune of \$17.8 billion, nearly half of it in the hands of the Department of Defense. The President said he believes this program is essential "to the security, welfare, and economic well-being of our country."

In his message, Mr. Nixon offered some challenges to the aerospace world, with these proposed steps in 1973:

- Secure the contributions that science and technology can make to our national life.
- Initiate a series of experiments to find better ways to encourage private investment in R&D, including investment by small R&D firms, which have made significant contributions.



Funding for research and development goes up under the Nixon Administration policy of bending these capabilities to the solution of current social and environmental problems. In Defense and other categories new opportunities lie ahead.

Airpower in the News

- Draw more directly on the agencies we have which have harnessed the atom and conquered space. The AEC and NASA will be called upon to look for better energy sources and better modes of transportation. The President said the talents that sent men to the moon will seek better ways to send men downtown and back.

- Review our policies in the area of economic regulation, which may be restricting the development and utilization of new technologies.

Aside from the Defense Department, NASA, and AEC—they will get \$13.6 billion of the \$17.8 earmarked for the total R&D effort—there are other agencies involved. The Department of Transportation has requested \$380 million and plans to spend \$282 million for better highway safety, highway design, railroad research vehicles, Metroliner improvements, aircraft noise reduction, improved air traffic control, and navigation systems. The National Science Foundation requests budget authority of \$525 million and plans outlays of \$455 million. NSF is interested in environmental sciences—how science can help solve social problems and improve the availability of energy from solar power.

It probably is true that we have not had a budget since the late 1950s—in the trail of Sputnik—that has reflected so much apprehension over Russian capabilities. Their development and testing of new weaponry and their demonstrated ability to find and destroy objects in space have combined with their deployment of modernized forces to create new apprehensions.

The rhetoric that ignores these facts is the rhetoric that needs deflating.

Who is listening?

The Wayward Press

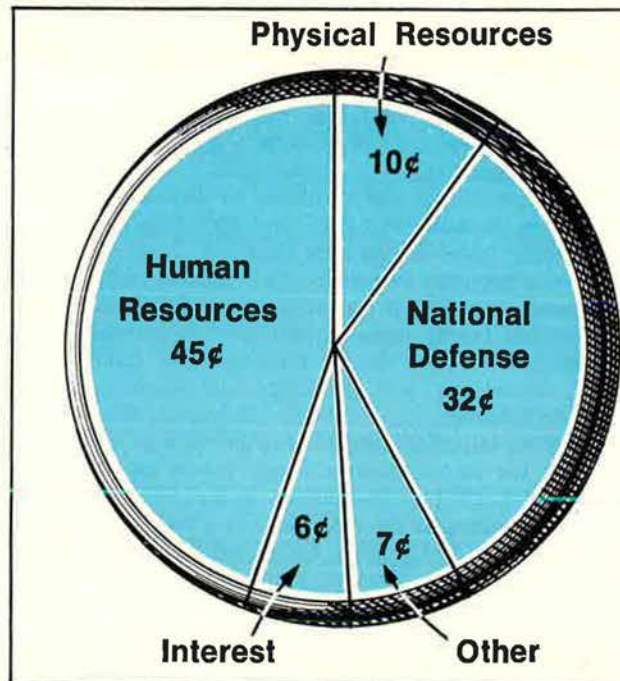
To us nitpickers, there is a phony ring of authenticity coming out of the television tube during routine news broadcasts, but in almost all cases documentation is lacking. A statement is made by a young man with a lot of charisma; we sense it is wrong, but TV is show business, not the news business, and people on camera have a special license. We have an obliging exception here in the nation's capital, at WRC, the local NBC outlet.

WRC has an announcer who is introduced as Neil Boggs. While he recites a script and pontificates, a few of the basic facts are projected on a sort of blackboard, which the audience can view over the left shoulder of Neil Boggs. Presumably, Neil Boggs can see the blackboard, too, if only on a monitor screen.

A couple of weeks ago, on a late evening news show, Mr. Boggs told us, with a ring of real authority, that the stock market had declined today. Over his shoulder, the viewer could see the afternoon's Dow Jones figures and the fluctuation in the price of an average share. Both were up, not down. In fact, they were up by the exact index figures used by Mr. Boggs to measure what he called a decline.

We telephoned WRC. A young lady responded and we asked: "Did the stock market go up or down today?" "Oh," she said, "it went up." Reminded that her Mr. Boggs said it went down, her simple reply was, "Oh, yes, of course. Mr. Boggs just made a mistake." We said thank you, and went to bed grateful that Neil Boggs is not our surgeon.

On the evening of January 24, the day President Nixon delivered his annual budget message, we were interested in how TV handled the news. Again, our Mr. Boggs. Over his left shoulder, on the blackboard, there was the image of the budget dollar, divided into pieces like mom's apple pie. The biggest piece of the dollar, of course, was the forty-five-cent chunk labeled to the credit of "Human Resources." The next largest piece clearly said it was worth thirty-two cents and was earmarked for National Defense.



Here is "Boggs's Buck." It shows Defense will get less than a third of each budget dollar. Defense outlays will consume a smaller percentage of US spending than any year since 1950

Neil Boggs declared in stentorian tones, with a hint of alarm, that the new budget offered to Congress today proposed to spend "more than a third" of each dollar on military requirements. It is a statement that is not true and the chart displayed at the moment over the shoulder of Neil Boggs proved it is not true. As the girl said, Mr. Boggs just made a mistake.

* * *

As you know, Howard R. Hughes is a prominent and near-historic figure in the military-industrial complex. Mr. Hughes has been a pilot, airplane designer, airplane builder, government contractor, airline magnate, and investor extraordinary. Like men of equal importance in the military-industrial complex, he has for years put up with criticism from many of his inferiors, armed only with a typewriter or microphone.

It is for this reason alone that his recent travail, which involves a couple of monster publishing houses in New York and an obscure writer who lives on an island in the Mediterranean, is worth being mentioned in "The Wayward Press."

At this writing, the adventure has not run its course, but we should follow it without forgetting that critics of the media, these days, are accused of conspiring to discredit the press. Even the Vice President has been accused of championing the effort. In a short time, some intelligent man should ponder the question: Who has discredited the press? Is it Howard R. Hughes, or is it the press? ■

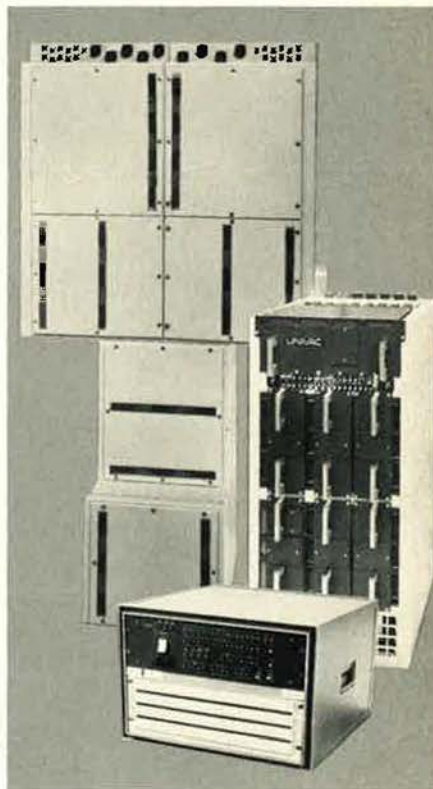
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DIVISION OF UNITED AIRCRAFT CORPORATION

SUNNYVALE, CALIFORNIA 94088



By William P. Schlitz

ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

WASHINGTON, D. C., FEB. 7

In January, Air Force issued requests for proposals to industry for the design of two aircraft—a light-weight fighter and an advanced medium short takeoff and landing aircraft (AMST).

The fighter and AMST are the first and second projects to be funded under the Advanced Prototype Development Program, which essentially designates the creation of prototype military hardware well in advance of actual operational requirements.

(For articles on how the new program operates and the philosophy behind it, see "How Our New R&D Policy Relies on the Extensive Use of Prototypes," August 1971 issue, p. 32, and "The Advanced Prototype Approach," by Senior Editor Edgar Ulsamer, November 1971, p. 25.)

The Air Force said that development of the two aircraft "is an attempt to demonstrate in hardware the technology leading to low-cost . . . aircraft combining an optimum combination of new aerodynamics concepts and design ideas. . . ."

Two contractors will probably be picked to build prototypes for each of the aircraft types, with flight-test programs following. At this time there is no program for carrying either of the planes through to the operational-production stage.

Congress has allotted a total of \$12 million for initiation of prototype development of the two aircraft.

Under the AMST project, USAF will determine the technical and operational feasibility of a low-cost, medium STOL of the C-130 class, but with improved takeoff and landing characteristics and an austere field capability.

The prototype program emphasizes simplified and streamlined procurement. For example, each RFP numbered only twenty-one pages, compared to about 250 for other weapon systems in the past.



It was 1945 and the war in Europe would soon be over. Most G.I.s fighting there could look forward to coming through unscathed.

That hope was erased for Bob Bottenberg, however, when, while

taking part with the 63d Infantry Division in an assault, artillery shrapnel in the face took his sight, senses of smell and taste, and made him partially deaf.

In January 1972, Dr. Robert A. Bottenberg, Chief of the Computer & Management Sciences Branch of the Personnel Research Division, USAF Human Resources Laboratory, San Antonio, Tex., was notified that he had won the President's Trophy—the highest tribute bestowed by the nation on its handicapped citizens.

Dr. Bottenberg will receive the trophy in May at the annual meeting of the President's Committee on Employment of the Handicapped.

Following his wounds in 1945, Dr. Bottenberg was hospitalized in Minelo, Calif., and then went on to earn B.A. and M.A. degrees in psychology at the University of Missouri; in 1957 he took his Ph.D. in psychology from Stanford University.

In his job, Dr. Bottenberg manages more than 100 professional and technical personnel, and his knowledge of mathematics and computers helps USAF make the best use of its manpower. He is also a consultant to other government agencies, educational institutions, research foundations, and private groups.

"In a highly technical and fast-changing field," the committee on the handicapped said, "Dr. Bottenberg has used great ingenuity in keeping abreast of developments. His initial approach was to develop his mental reasoning and memory skills by working calculus problems in his head.

"He then had to make modifications in braille to cope with statistical, mathematical, computer programming, and other scientific terminology and notations. In addition, he trains readers and secretaries to convey information to him orally, on transcription devices, and in braille."

Married and the father of three, Dr. Bottenberg takes an interest in other blinded adults and children. He is the former president of the Blinded Veterans Association and is on the advisory committee to the Sensory Aids Evaluation Research Center at MIT.

He tutors blind young people in mathematical sciences and frequently

visits recently blinded veterans to advise them on the opportunities available for leading a productive and rewarding life.

His award, a plaque, is prepared and donated by students at the Institute for the Crippled and Disabled in New York City. This year's presentation will mark the twenty-fifth anniversary of the President's Committee.



USAFE is trimming the headquarters staffs of its numbered Air Forces in Europe in order to beef up combat units.

The staffs of the Third Air Force



Kenneth Rush, former attorney, businessman, and Ambassador, has been named as Deputy Secretary of Defense, to replace David Packard. He is sixty-two years old and a native of Walla Walla, Wash.

in the United Kingdom, the Sixteenth Air Force in Spain, and the Seventeenth Air Force in the Federal Republic of Germany "will be significantly reduced," USAFE said.

"The manpower savings realized will be reallocated to Air Force combat units in Europe, thus substantially strengthening their capabilities. Most of the day-to-day supervisory functions formerly handled by these headquarters will be absorbed by USAFE Headquarters, located in Wiesbaden,

Aerospace World

Germany. The only relocation associated with this reorganization will be the move of the Third Air Force from London to RAF Mildenhall, UK," USAFE said.

Gen. David C. Jones, Commander in Chief, USAFE, commented: "We are constantly striving to improve USAFE combat capability, and this action advances that goal in two ways. The first is qualitative in that we will achieve much more streamlined communication, control, and supervision of our combat forces, both NATO-committed and national.

"The other improvement is both qualitative and quantitative. This reorganization will allow us to shift the personnel center of gravity further toward combat units. More than ninety-five percent of USAFE's manpower will be employed at wing level and below."

In this connection, General Jones pointed out that savings from the Third Air Force in the UK will provide manpower spaces for the conversion of the 48th TFW at RAF Lakenheath from the older F-100 to the F-4 Phantom. He also said this action is aligned with President Nixon's policy to improve US forces in Europe within present manpower levels, in concert with similar efforts on the part of our allies. (For an article on the overall Air Force situation in Europe, see Executive Editor John L. Frisbee's Report on USAFE, "Responsibilities: Up; Defense Budgets: Down," February '72.)



The perfect crime: with ransom in hand, parachute from a hijacked airliner into an unpopulated area from which escape is possible in any direction.

Only it didn't work when tried in late January. Two F-111 fighter-bombers on a practice mission from Nellis AFB, Nev., were diverted to tail the airliner and then pinpointed the skyjacker when he parachuted to earth. FBI agents brought in by Air Force helicopter quickly bagged him.

Thus, a permanent solution may have been found to the new type of skyjacking threat. USAF promises full cooperation in any future incidents.



Citing "anomalies that have arisen during checkout," NASA officials re-

scheduled from March 17 to April 16 the Apollo-16 manned mission to the Descartes highlands of the moon.

The "anomalies" involve:

- Strengthening the astronauts' lunar suits to enable them to stoop and bend and generally permit more freedom of movement;

- The correction of a minor problem that cropped up in tests of the Command Module's docking ring jettison device; and

- Revamping Lunar Module descent batteries to eliminate variations in capacity revealed in tests.

Presumably, the additional month will allow ample time for retests of the moderated equipment before launch of Apollo-16.

The Apollo-16 crew: Capt. John W. Young, USN, Mission Commander; Maj. Charles M. Duke, USAF, Lunar

NASA, were submitted to the Ames, Langley, and Manned Spacecraft Centers. They will be reviewed by experts, and the most promising will be the basis for the award of development contracts not to exceed \$75,000, NASA said.



In late January, following President Nixon's decision to go ahead with the multibillion-dollar space shuttle (see February issue, p. 13), NASA named the flight crews for Skylab—planned as the US's first earth-orbiting space station.

Skylab, scheduled to be launched unmanned in the spring of 1973, is to receive three visits during a subsequent eight-month period. The crews for each visit will consist of a commander, a scientist pilot, and a pilot.



—Wide World Photos

Flanked by high-ranking Air Force Academy cadets and officers, the Academy's Superintendent, Lt. Gen. Albert P. Clark, discusses violations of the honor code with the news media. Academic cheating and other infractions recently brought resignations from thirty-nine cadets attending the thirteen-year-old Academy.

Module Pilot; and Lt. Cmdr. Thomas K. Mattingly, II, USN, Command Module Pilot.

In a related matter, NASA said that it has received more than 250 proposals from various sources for the application of space-related technology to solve problems on earth.

Four categories are concerned: air and water pollution, solid waste management, and clinical medicine.

The proposals, encouraged by

In that order for the first mission will be Charles Conrad, Jr., Dr. Joseph P. Kerwin, and Paul J. Weitz. For the second mission: Alan L. Bean, Dr. Owen K. Garriott, and Jack R. Lousma. For the third flight: Gerald P. Carr, Dr. Edward G. Gibson, and William R. Pogue.

Backup crewmen for the first mission are Russell L. Schweickart, Dr. Story Musgrave, and Bruce McCandless II. Backup for the second and

third missions are Vance D. Brand, Dr. William E. Lenoir, and Dr. Don L. Lind.

Astronauts Kerwin, Garriott, Gibson, Musgrave, and Lenoir are scientist astronauts; the remaining Skylab crew members are pilot astronauts.

The first manned visit will last twenty-eight days, while the second and third will each last fifty-six days.

The Skylab program is designed to test earth resources remote sensing equipment and techniques to gather data on earth's ecology, oceanography, water management, agriculture, forestry, geology, and geography. Astronomy experiments will substantially extend knowledge of the sun and its effects on man's existence on earth.



—Wide World Photos

AEC Chairman James R. Schlesinger shows model core of an atomic "breeder reactor" to be built at Sevierville, Tenn., at a cost of \$500 million, to supply power to the Chicago, Ill., area.

Habitability, biomedical, behavioral, and work effectiveness experiments will further evaluate man's capabilities in spaceflight, NASA said.

Conrad, 41, has flown on Gemini-5 and -11 and Apollo-12—the second manned lunar landing—for a total 506 hours of spaceflight. Holding the rank of captain in the Navy, Conrad is from Philadelphia, Pa.

Kerwin, 39, is a native of Oak Park, Ill., and holds a doctor of medicine degree from Northwestern University Medical School. He is a commander in the Navy Medical Corps. This will be his first spaceflight.

Weitz, 39, is also a commander in the Navy and holds a master's degree in aeronautical engineering from the Naval Postgraduate School. Born in Erie, Pa., he has not flown in space.

Bean, 39, was born in Wheeler, Tex., and was lunar module pilot on Apollo-12. He holds a bachelor's de-

gree in aeronautical engineering from the University of Texas and is a Navy captain.

Garriott, 41, was born in Enid, Okla., and holds a doctorate in electrical engineering from Stanford University. Garriott has not flown in space. He is a civilian scientist-astronaut.

Lousma, 35, is a major in the Marine Corps and is a native of Grand Rapids, Mich. He holds aeronautical engineering degrees from the University of Michigan and from the Naval Postgraduate School. He has not flown in space.

Carr, 39, a Marine Corps lieutenant colonel, was born in Denver, Colo. He has a master's degree in aeronautical engineering from Princeton University. Carr has not flown in space.

Gibson, 35, holds a doctorate in engineering with a minor in Physics from the California Institute of Technology. A civilian scientist-astronaut,

mitted Program Director Col. James A. Abrahamson to scratch other flights originally scheduled with Maverick's prime contractor, Hughes Aircraft Co.

The test missiles remaining will be available for advanced testing, such as Maverick's effectiveness in a tactical environment, *i.e.*, against actual targets and under operational conditions.

Some eighteen months after development got under way in mid-1968, the success of Maverick was presaged when, during its first guided test flight, it scored a direct hit on a stationary tank hull.

"Captive" missiles currently are being tested aboard F-4 Phantom aircraft to determine how well they can "see" under adverse weather conditions. This spring, Maverick is to undergo trial combat exercises against "live" tanks at Fort Riley, Kan.

Maverick is designed to lock onto a

North Vietnam Hard Line

Early in February, North Vietnam's chief negotiator at the Paris peace talks, Xuan Thuy, said that simply setting the date for the removal of US forces in Vietnam would not serve to secure American POWs' freedom. He also called for the immediate resignation of South Vietnam President Nguyen Van Thieu as a first step toward peace.

In so doing he rejected, in effect, President Nixon's eight-point plan to gain peace and repatriate US MIA/POWs. (See also p. 63.)

In the major clarification of North Vietnam's position, he also indicated that the political and military issues would no longer be considered separately. In other words, only when the US withdraws all support for Thieu and the war ends will the POWs be freed.

Secretary of State William P. Rogers declared untrue Thuy's further allegation that, if the US had set a date for withdrawal before President Thieu's election last October, North Vietnam would have freed the prisoners.

In contrast to President Nixon's growing number of concessions to bring peace, North Vietnam has taken its hardest public stand yet.

Gibson was born in Buffalo, N. Y. He has not flown in space.

Pogue, 42, was born in Okemah, Okla. He is an Air Force lieutenant colonel and holds a master's degree in mathematics from Oklahoma State University. Pogue has not flown in space.



Early test flights of the Air Force's new air-to-ground Maverick missile have proved so successful that the final thirteen in the series have been canceled, thus putting the missile's development well ahead of schedule.

"The first twenty-seven test flights clearly demonstrated the system's capability," Air Force said, and per-

target and, as it is self-guided, will permit a pilot to "launch and leave" a hostile area.

The first production missile is expected this fall. Maverick will be carried by F-4D/E and A-7D aircraft.

The Maverick program is the responsibility of AFSC's Aeronautical Systems Division, Wright-Patterson AFB, Ohio.



The test phase of a digital data system that ties in six air defense systems in the area of Japan and its environs has been completed.

Known as WESTPACNORTH (Western Pacific North), the project is a joint USAF, US Navy, and Japa-

Aerospace World

- US Navy's Tactical Data System (NTDS)—a shipboard air defense system;
- US Navy's Airborne Tactical Data System—an airborne NTDS;
- US Marine Corps' Tactical Data

System (MTDS)—a mobile land-based NTDS;

- Okinawan Air Defense System (OADS);
- And the Korean Air Defense System.



For your stranger-than-fiction file:

The Japanese garrison on Guam in early summer of 1944 knew the war was lost. The Americans had been too successful, and now even Guam itself was threatened with invasion. But the order was clear: No surrender.



Capt. Don Whaylen of the 1st Special Operations Squadron, Nakhon Phanom RTAFB in Thailand, lines up as "Sandy Lead" in A-1 number 609, with 1st Lt. Lamar Smith flying "Sandy Wing" in 021. The two escorted HH-53 helicopters of the 40th Aerospace Rescue and Recovery Squadron on recent search and rescue operations.



—Wide World Photos

One of two AWACS evaluation test platforms—a Boeing 707-320—was rolled out at Renton, Wash., plant in February.

nese Air Self Defense Force project. The automated system shares information among six defense nets encompassing Japan, South Korea, and Okinawa. USAF's Fifth Air Force in Japan conducted the test program.

The six air defense systems are:

- Japan's Base Air Defense Ground Environment System (BADGE)—a computerized aircraft control and air surveillance net;



John L. Frisbee, who retired from USAF as a colonel in February 1970 to join this magazine as a Senior Editor, has been named Executive Editor. He will be responsible for editorial content. John F. Loosbrock, Editor of AIR FORCE Magazine since 1951, will continue to head the magazine staff, while Richard M. Skinner—now also in his twenty-first year with the magazine—continues as Managing Editor.

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For young Shoichi Yokoi serving on the island, the order was to be taken quite literally; he was reported dead in September, about six weeks after US forces stormed ashore.

But in late January 1972, Yokoi, now fifty-seven, was once again on his way to his homeland after hiding twenty-eight years in the jungles of Guam.

Discovered by fishermen, the modern Robinson Crusoe had existed over the years on a diet of nuts, fruit, shrimp, snails, frogs, and rats. Until the mid-1960s he had had two com-

over and was aware of other progress in the world, Yokoi was stunned by the technical changes that have come about in the past thirty years. Given a hero's welcome in Japan, he said that he intends to spend his remaining years as an ascetic, mourning his dead comrades.



NEWS NOTES—In late January, the **National Aviation Club** presented its Award for Achievement to **William M. Magruder** for his efforts on behalf of the **Supersonic Transport pro-**

to screen for **drug abuse**. The program should be in full operation by July 1.

In mid-January, a **US Navy Phantom** shot down a North Vietnamese **MIG-21** 170 miles north of the DMZ. It was the first MIG kill in twenty-two months.

Col. Robert B. Shaw, whose experience spans two decades, has been assigned to the **B-1 Systems Program Office** as director of procurement and production.

In official recognition of its top performance, USAF's **Gunship Pro-**



The last of 1,187 Talon supersonic trainers built by Northrop Corp. was delivered to the Air Force early this year. Throughout the program, Talon deliveries were on or ahead of schedule and all production cost commitments were met. The first Talon is still in use at the test pilot school at Edwards AFB, Calif.

Martin Marietta Recruiting

In the face of generally deepening unemployment throughout the aerospace industry, Martin Marietta's Orlando, Fla., Division has initiated an extensive recruiting program.

The drive is intended to sign up from 350 to 400 engineers and several hundred other workers during 1972, the company says.

Cited for the recruitment campaign are the expansion of several current major programs along with new projects, all of which have created a need for engineers and other technical personnel, plus manufacturing and support people.

Primary targets are electronic engineers with experience in lasers, seekers, sensors, and other electro-optical systems, and in communications. Jobs are open also for engineers in systems analysis, nuclear effects, guidance and control, structural analysis, aerodynamics, thermodynamics, mechanical design, and digital computer analysis.

The company will concentrate on high areas of aerospace unemployment and will emphasize finding qualified blacks and other minorities.

panions, but they had died, apparently of malnutrition.

Doctors found Yokoi in good health, except for an anemic condition brought on by his salt-free diet.

Although he knew the war was

gram; he served as special consultant to the President before Congress killed the US's SST development.

DoD has instructed the services to initiate a program of **random testing** of personnel on extended active duty



A Navy pilot at the Naval Air Test Center, Patuxent River, Md., looks through the "monocle" that will automatically sight his aircraft weapons on a target. Honeywell Inc. built the helmet-mounted device.

gram Office, Aeronautical Systems Division, Wright-Patterson AFB, Ohio, was presented with the **US Air Force Organizational Excellence Award**. Program Director **Lt. Col. Ronald W. Terry** accepted for GPO.

Died—**Reed M. Chambers**, a World War I ace and charter **AFA** member who retired in 1968 as chairman of the US Aviation Underwriters. He was seventy-seven. During World War I, he succeeded Eddie Rickenbacker as commander of the 94th (Hat-in-the-Ring) Squadron.

Died—Retired USAF **Col. H. J. Odenthal**, eighty-four (see p. 78). ■

Technology Transplants

Project Paperclip: German Scientists and the Cold War, by Clarence G. Lasby. Atheneum Press, New York, N. Y., 1971. 297 pages plus notes and index. \$8.95.

There is nothing new in the transfer of science and technology from one locale to another. It is an age-old process, documented over a period of at least 2,000 years. But at the close of World War II, something new was added. Clarence Lasby (a social and political historian) painstakingly documents it in his book: the cutthroat competition between the major powers to "persuade" and acquire German scientists and technologists.

What makes this novelty interesting is not so much that it happened, as that the process of garnering the scientists was so bizarre. It was beset by endless delays, unbelievable bungling, maddening frustration, and vacillating bureaucracy at its worst—particularly so far as the American Project Overcast and later Project Paperclip were concerned.

Anyone who seeks to understand the value of the science and technology transfer process will be disappointed if he looks for it in this book. There are occasional references to some of the new ideas and innovations involved—such as the sweptwing for aircraft, and rockets for space and missile applications. And there are some unsubstantiated claims as to the value of the program, e.g., one reported Air Force estimate that German scientists and technologists had saved it \$2 billion.

But if you are interested in how the wheels of government turned, or failed to turn, you will have trouble putting down *Project Paperclip*. Starting with 1944, the author has spelled out who did what to whom with no holds barred. Reading much like a dissertation, the book chronicles international pressures as well as bureaucratic forces. Perhaps most interesting are the unreasoned postwar anti-German outbursts of various ethnic groups whose emotions were understandably colored by Nazi atrocities.

And, through it all, there is the sad—at times pathetic—story of the German scientists and technologists themselves. Those who chose to come to

the United States were continuously buffeted between hope and despair. However well-meaning the best of the American organizers might have been, none of them ever seemed to appreciate the human and cross-cultural problems inherent in rooting out and transplanting Germans to the United States. The scientists had to gain the acceptance of their American counterparts, and oftentimes that was not possible. Then, as pawns in the cold war, they frequently found themselves "on ice" with neither productive nor challenging work.

While there are examples of individual expatriate successes—indeed, flashes of brilliance as in the von Braun group—overall, the project was disjointed and not too successful. It raises the question whether things would go differently if the United States were to face the same situation again. That is the message of Clarence Lasby's book.

—Reviewed by Sally Quenneville. Mrs. Quenneville has worked as a research assistant for the Air Force in a variety of technical fields.

Cloak-and-Dagger

The Game of the Foxes, by Ladislav Farago. David McKay, New York, N. Y., 1971. 696 pages. \$11.95.

The Abwehr, Germany's spy organization before and during World War II, kept meticulous records, and the Allies captured them in 1945. But, incredibly, these records lay unnoticed in a metal footlocker full of microfilm in a dark loft of our National Archives until 1967, when author Ladislav Farago found them. The yield included lists of all German agents, all the intelligence reports they made, and the paperwork of the Abwehr headquarters—the *Fuchsbau*, or "Fox Lair."

From this, Farago (whose previous successes include the books *Patton* and *The Broken Seal*) weaves a fascinating tale that never lags despite its 696 pages.

The Abwehr could boast some remarkable achievements. By 1937 it had already stolen one of America's most jealously guarded secrets, the Norden bombsight. An assembly inspector at the Norden plant took blue-

prints home at night, copied them on tracing paper, and sold them to the Germans, who smuggled them, rolled up in an umbrella, aboard a ship in New York harbor. The plans were complete enough to enable German scientists to fill in the missing parts and build a working model.

Methods were often unbelievably bold. When agent Simon Koedel had trouble learning details of an Army transport ship voyage, he wrote to a US Senator, who queried the War Department and then passed the desired information on to the spy. Koedel was also on the mailing list of the Army Ordnance Association. He circumvented censors by steaming open envelopes he received from the War Department, adding his own reports to the privileged information in them, crossing off his name and address, and forwarding the whole package unmolested to an Abwehr mail drop overseas.

But the Abwehr often failed to produce when it really counted. In 1942, it completely overlooked an armada of 104 US ships sailing from Norfolk, Va., and British troop convoys from Scotland, thus allowing the Allied invasion of North Africa to reach its destination undetected. More important, the Abwehr missed what may have been the most important information of all: the timing and location of the D-Day invasion in Normandy.

Britain was a special problem. Wherever the Abwehr turned, it seemed, there were the British, who jailed, executed, or made double agents of every spy the Germans sent to England. (See also the review of *The Double-Cross System in the War of 1939 to 1945*, below.) Sometimes, though, the counterspying reads like an episode of *Get Smart*. Unable to place their own agents in Britain, the Germans succeeded in persuading fellow Fascist Franco to put the staff of the Spanish Embassy in London at their disposal. But the Spaniard, Don Jose Brugada Wood, whom the Germans believed to be their man, had been subverted, and was, in truth, working for the British—and the British spymaster who was directing triple agent Don Jose's activity was Kim Philby, who had secretly gone over to the Russians in 1933.

The German spy effort was hindered by quarreling and competing in-

telligence bureaucracies. When the Germans solved the mystery of the scrambler used in radio-telephone chats between Churchill and Roosevelt, the transcript went only to Gestapo Chief Heinrich Himmler, with no copies provided to the Abwehr or the military.

Some items seem especially pertinent thirty years later. Tyler Gatewood Kent, a US State Department functionary in London, stole and released to an acquaintance copies of messages between Roosevelt and Churchill, the correspondence winding up in German hands. He didn't do it for money, but rather because (a) he believed that Roosevelt's policy was contrary to the interests of the US, and (b) he was convinced that the Administration was not being forthright with the American people.

There's more—including accounts of how Abwehr machinations deviously involved such prominent Americans as Labor Leader John L. Lewis and Vice President Henry Wallace. If you're at all interested in espionage, this is a book you won't want to miss.

—Reviewed by Capt. John Correll, USAF. Captain Correll is presently assigned to AIR FORCE Magazine under the Education With Industry (EWI) program.

Reversible Cloak-and-Dagger

The Double-Cross System in the War of 1939 to 1945, by J. C. Masterman. Yale University Press, New Haven, Conn., 1972. 203 pages with appendices and index. \$6.95.

A retired Air Force officer friend of ours relates this story: While on duty with Supreme Headquarters, Allied Forces Europe, during World War II, he approached a senior RAF staff officer with the idea of sharing some secret data with another RAF officer on the staff.

"Oh, I wouldn't do that, old chap," replied the senior RAF man.

"Why not?"

"Because he's a German agent."

This exchange illustrates the unflappable approach utilized by the British during World War II in dealing with the problem of German espionage. In fact, it is the author's contention that the "problem" was solved to Allied satisfaction, since as the war rolled on, every German agent at liberty in the British Isles had been "turned around" and was actually working under British control. (The implications concerning deception and general intelligence gathering are obvious.)

If presumed to be the case—and

Masterman cites German documentation uncovered following the surrender as corroborative evidence—this achievement ranks as one of the most stunning intelligence triumphs in the annals of spycraft.

Masterman's book is actually the republication of a report written by him in 1945 as an addendum to his service as a top British intelligence official. Only recently did the British government agree to lift its security classification to permit publication.

The book's style is crisp, terse, and understated in the characteristic manner of the better British historians. And a requirement to read between the lines adds to, rather than detracts from, its dramatic effect.

The book is a must for anyone building a library on intelligence methods and that murky underworld of espionage that fascinates us all.

—Reviewed by William P. Schlitz, Assistant Managing Editor of this magazine.

Shallow Dive—Deep Pool

Cold War and Counterrevolution: The Foreign Policy of John F. Kennedy, by Richard J. Walton. The Viking Press, New York, N. Y., 1972. 250 pages. \$7.95.

Americans have always indulged in scapegoating, infusing it with their special kind of brawling. It is part of the American political scene—and where else is politics so open and mercurial as in the American democracy? To the relentless, often confusing, sometimes chaotic way we conduct our politics, add the frequency with which we analyze affairs with selective memories, often failing to recapture our expectations, neglecting the mood and passions of the past.

Richard J. Walton's book on President John F. Kennedy's foreign policy reeks with these pronounced flaws of the American commentator. History it is not. Nor does it successfully recreate the issues and dilemmas that confronted President Kennedy. This is an unsatisfactory book, nowhere approaching the promise of its title.

Walton purports to have reached his conclusions after comprehensive study of the public record. He finds that the American interventionist adventure began full blown with the anticommunism of Harry Truman, continued under President Eisenhower, and reached its ultimate and tragic final chapter with Presidents Kennedy and Johnson getting the US sucked into Vietnam. Although LBJ escalated in Vietnam, Walton lays this disaster right on Kennedy, for it was

JFK who started the US on the road in 1961–63.

Walton generally portrays Kennedy as an anti-Communist Cold Warrior *extraordinaire*, a man who needlessly got the US trapped into the Berlin crisis, the Bay of Pigs, the Cuban missile crisis, and, worst of all, Southeast Asia. But what of the nuclear test ban treaty? JFK, charges the author, muffed a chance to secure a more comprehensive agreement.

He flays Kennedy for initiating "a mighty offensive against communism," for promoting a massive military buildup. He speculates that "... Kennedy intended to end the cold war by scoring a victory, that by a combination of unchallengeable military and economic strength . . . he would force the Soviet Union, short of war, short of humiliation, to accept a Pax Americana" (p. 66).

The author does not pretend to understand the checkered character of JFK's foreign policy—now the stick, then the carrot. That a consistent philosophy, a *Realpolitik*, could lurk beneath such twists and turns completely eludes Walton. His selection of material and unyielding bias paralyze his narrative. Certainly President Kennedy must bear a heavy responsibility for Vietnam; but Johnson directed the crucial phase, the massive American buildup.

There is, I suppose, a place for a polemic like Walton's, profoundly influenced by what has happened in the last ten years. But we shall have to wait for a balanced, understanding explanation of Kennedy's foreign policy from someone who can structure an insightful narrative, grounded in the ironies that infest history.

Schlesinger and Sorensen have not measured up to the task, as valuable as their books are in other ways. And clearly we don't have it from Walton—an admirer of Adlai Stevenson, a well-intentioned observer who can never quite forgive JFK for the shabby way he treated the gifted, compassionate Democrat from the plains of Illinois.

—Reviewed by Herman S. Wolk, Office of Air Force History.

The Unthinkable Revisited

When War Comes: The Domsday Book of the Nuclear Age, by Martin Caidin. William Morrow, New York, N. Y., 1972. 159 pages. \$4.95.

This is a strange book—almost an anachronism. It begins with a chilling account of a young English couple starting out on a date in the outskirts

America's NATO Commitment: Alterations Might Be Fatal

U.S. Troops in Europe, by John Newhouse, Melvin Cronon, Edward R. Fried, and Timothy W. Stanley. The Brookings Institution, Washington, D. C., 1971. 177 pages. \$2.95.

Messrs. Newhouse, Cronon, Fried, and Stanley have, in their title, given a short but concise review of their book. It is all here, in varying degrees of depth—the issues, the costs, and the various choices that face the Alliance. By and large I cannot fault the book in any serious way. It is simply a well-researched, scholarly exploration of the problems facing NATO's continuing existence. The authors conclude, it seems to me clearly enough, that any substantial altering of the US commitment to NATO, except through negotiations, might prove fatal to the Alliance.

The main theme of their book is, of course, the current US commitment and its relationship to the strategy of flexible response. There is a very common-sense exposition on this elusive subject on pages 152–153. Here the point is made that there must be a certain plausibility to this complicated concept of a flexible response.

Now the whole concept of flexible response is premised on a capability to put up a determined conventional fight. This conventional phase might be short, or it might be extended, but the capability to resist in a conventional, or nonnuclear, battle must exist for the strategy to have credibility.

The notion that America would use nuclear weapons in response to any attack in Europe is not plausible, but this nuclear capability does become plausible if NATO has a conventional defense capable of handling conflicts at the lower end of the spectrum. It is a simple point, but it is not widely understood, and the fact that it is not is, in itself, a very dangerous thing, both to the future of NATO and to European stability. US troops in NATO are linked inescapably to the credibility of the US nuclear capability.

However, nothing goes on forever without change. The trick is to manage these changes in such a way as to retain the structure. It is a good structure as it now stands, but it is curiously put together and may not withstand internal pressures for which it was not designed. That is the great danger to NATO—the internal pressures.

In this book the authors take a fairly cheerful view of the prospects for mutual and balanced force reductions. This is clearly the only acceptable way to make substantial cuts in the US commitment at this time. Meanwhile, at this moment, Manlio Brosio, the designated NATO explorer of the subject, is still waiting for an invitation from the Soviet bloc to come explore.

There is, as Messrs. Newhouse *et al.* tell us, a growing skepticism within our democratic alliance about the continuing need for the NATO outlay. This skepticism is certainly abroad in the US but it exists, more or less, elsewhere. One frequently hears of the sense of futility felt by our soldiers in Germany. Why are they there? What purpose, after all these years, do they serve? This is one reason.

Just before Christmas, a young German couple and their infant were trying to escape from East Germany. The young woman had her legs blown off, but the family did escape through the brave efforts of some West German villagers. In the same week, a Czech family, risking everything in a lightplane, managed a hairbreadth escape to West Germany, dodging in and out of clouds as MIGs attempted to shoot them down. Again, the Czech family was given asylum just across the border in the Federal Republic of Germany. And in today's newspaper there is an item from Vienna which tells us that fifty Hungarians have defected to the West in the past three days.

As we all know, these incidents go on at a steady pace.

Once in a while someone gets through in a spectacular way and that becomes news. Never does this savage system from which they seek escape seem to cause much emotion in the Western world. We accept it and while any small show of military or police force in the West is sure to bring on some kind of demonstration, we can be quite sure that the woman who lost her legs will create no public-relations problem for the East Germans or the Soviets.

It seems absurd to think that in 1972 a nation that is as scientifically advanced as the Soviet Union, and with such civilized peoples as the Hungarians and Germans as allies, should have to resort to such barbaric extremes to keep the population within its borders. A West German doesn't need a lightplane or even any courage to leave the Federal Republic—he simply needs a passport. But if it is absurd that the Warsaw Pact countries have to go to these lengths to protect their borders against their own citizens, it seems equally absurd to have reached a state of considering any substantial dismantling of the NATO force structure. There is every reason to believe this NATO commitment of the United States is the principal stabilizing factor on the continent today.

The people who gave asylum to the Czech and his family did so in the sure knowledge that there would be no reprisal visit by the Soviet Air Force. It is not straining things to claim all of this is germane to the question of troops for NATO and how much is enough. The troops are there to keep the lid on—to keep the democratic side of Europe free of this sort of police-state oppression. And from the United States viewpoint, the troops also serve the more basic purpose of self interest, for the United States has become in a very real sense a European power.

If a visitor to Brussels were blindfolded until he had left the air terminal, he might conclude on the drive into town that he was approaching some American city. The road is lined on either side with modern American buildings: Esso Research Center, IBM, a new Holiday Inn, Minnesota Mining, Minneapolis Honeywell, and many others. In Brussels alone there are 500 US companies. The newest skyscraper in downtown Brussels is the ITT building. All of this has something to do with justification for a substantial United States commitment to European security.

As we have said, the authors lay out the alternatives to the present United States commitment, but they do not give an answer. The fact is there is no satisfactory answer that is practical except one—the present commitment must remain until we have developed a rationale for its reduction. Moreover, this rationale cannot be based on a contention that the United States is contributing too much, nor can it be based on economic considerations. It has to be a rationale clearly derived from a premise of undiminished security. The NATO structure is a fragile affair, and sudden substantial cuts in the United States commitment are likely to have unsettling if not disastrous effects on the whole Alliance. Once dismantled, NATO or anything like it would be difficult to construct again. It would be gone.

However vexing it may be to realize that the United States is spending so much of its income to provide security for some nations who do not seem all that interested, there are alternatives that are even more vexing, if not downright frightening.

U.S. Troops in Europe is a much-needed and timely book. It should serve as required reading for anyone really interested in this problem, and it will provide a good point of departure for further excursions in this subject.

—Reviewed by Gen. T. R. Milton, USAF. General Milton is US Representative, NATO Military Committee.

Airman's Bookshelf

of Manchester. Two brilliant shooting stars flash across the sky. As the first star trail dips below the horizon, the couple is totally, permanently blinded by an unearthly flash. It doesn't really matter all that much. Moments later they are vaporized as the second star, a Russian 100-megaton warhead, reduces Manchester to gas and dust—a warning to the British to stay neutral as hundreds of other bombs detonate on the US.

The book ends with a second scenario in which three gigaton devices, sunk off our Pacific coast, turn the western United States into a moon-escape.

Between these horror stories, the author conducts a dialogue with his readers, answering rhetorical questions about the bomb, what it can do, what we have tried to do about it and failed, how nuclear strategies evolved—the logic of illogic in the nuclear age. It is all very much like the books that flourished in the 1950s, when most of us were being introduced for the first time to the unthinkable. That was before the US gained its wide margin of nuclear superiority, before the US deterrent made it unnecessary to think any more about such things.

The book is almost an anachronism—but not quite. As the nuclear balance tips in favor of the USSR, the unthinkable becomes thinkable again, and urgently so. Too many of us have forgotten, or never knew, what we are dealing with, and that it *can* happen.

Caidin sums it up: "If we let our guard down—that's it. The end. We say it. They say it. In today's world we're right and so are they . . . that's the hell of it. It's all true."

He despairs of this generation's ability to find a way out of the nuclear maze. What is needed is a revolution in thinking, he says. So Caidin is really addressing young people, all over the world, who will inherit the intractable and illogical circle of logic from which there now seems no escape.

—Reviewed by John L. Frisbee,
Executive Editor, AIR FORCE
Magazine.

New Books in Brief

The Almanac of American Politics, by Michael Barone, Grant Ujifusa, and Douglas Matthews. This thick volume provides political background on each state and every district within

the states. There is a short biography of every member of Congress, his electoral record, and his voting record as analyzed by nine groups ranging from Americans for Democratic Action to the American Security Council. Invaluable to anyone with a personal or professional interest in politics. Gambit, Inc., Boston, Mass., 1972. 1,030 pages. \$4.95 paperback; \$12.95 hardback.

Augsburg Eagle: The Story of the Messerschmitt 109, by William Green. The ME-109 was designed in 1933, produced (through innumerable modifications) in larger numbers than any other fighter plane, used in the Spanish Civil War, flown by most of the leading German aces of World War II, and last retired from service by the Spanish Air Force in 1967. The whole story is in this large-format book, with hundreds of photos and drawings, and twenty-four pages of color plates. Doubleday, New York, N. Y., 1971. 128 pages with index. \$9.95.

Brassey's Annual: The Armed Forces Yearbook 1971, edited by Maj. Gen. J. L. Moulton. In this eighty-second volume of the Annual are nineteen articles on military affairs worldwide by authorities from several countries. Their subjects include defense policies, strategies, economics, training, R&D, and several geographical areas such as Vietnam, the Middle East, the Persian Gulf, Ulster, and East Pakistan. Praeger, New York, N. Y., 1971. 317 pages with bibliography of military books published in 1971. \$18.50.

Your Body Clock: Its Significance for Jet Travelers, by Hubertus Strughold. Dr. Strughold, the father of space medicine, discusses the timing device that regulates wakefulness and sleep cycles of the human body and tells what happens when this "clock" is thrown out of tune by intercontinental jet travel. The author also describes the effects of space travel on the body mechanism. Charles Scribner's Sons, New York, N. Y., 1971. 95 pages. \$5.95.

A Guide to the Sources of British Military History, edited by Robin Higham. Here is a unified introduction to bibliographical sources of British military history, and a list of suggested topics for research that are as yet untouched. The book includes information on how to obtain access to special collections and private archives, and points out the strengths and weaknesses of the materials discussed. Univ. of California Press, Berkeley and Los Angeles, Calif., 1971. 630 pages. \$22.50. ■

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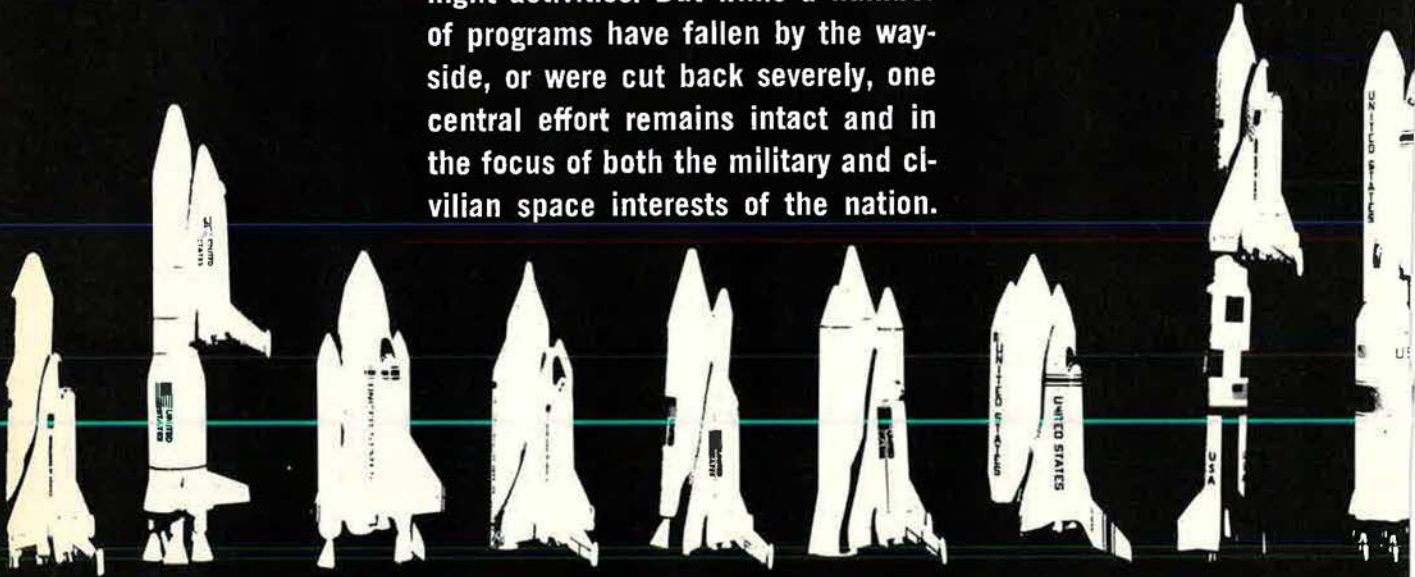
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New Space Workhorse?

The current federal budget squeeze has caused an upheaval of the National Aeronautics and Space Administration's plans for the nation's long-term manned and unmanned space-flight activities. But while a number of programs have fallen by the wayside, or were cut back severely, one central effort remains intact and in the focus of both the military and civilian space interests of the nation.



Almost All Conditions Are 'Go' For the Space Shuttle



NASA Associate Deputy Administrator Dr. Wernher von Braun predicts the shuttle will greatly improve national security.

Recent efforts, launched with considerable public impact, to "sell" a shift to a single system and single-basing mode for the nation's strategic as well as tactical deterrence jeopardizes vital defense requirements and narrows the

The Categorical Need for a Mix of

THE Air Force Association 1971-72 Statement of Policy defines the linchpin of US security as a strategic Triad, reinforced by US ground troops and land-based tactical air-power garrisoned in the sovereign territory of those allied countries to whom "we have firm and unequivocal commitments." Ensuring this dual capability of strategic and tactical deterrence, in AFA's view, must be a mix of aerospace, land, and sea forces whose makeup and proportions "must not be confused with service objectives," but should be arrived at solely on the basis of the national strategy of realistic deterrence.

A similar view was expressed by USAF's Chief of Staff, Gen. John D. Ryan, who pointed out that "when in the face of serious external aggression to our allies we have made firm commitments and have underwritten these commitments by garrisoning ground and air units in the sovereignty of our allies, there has been no aggression. NATO and post-1953 Korea are cases in point."

Obviously inspired by arguments that favor moving the nation's entire strategic deterrence to sea are proposed schemes to depend for tactical deterrence on using proximity forces (sea-based tactical air) in place of in-country forces. Recent analyses of this rationale by defense planners concluded that the single-system approach makes no more sense in the tactical arena than it does in the strategic field. The most pervasive deficiency is ambiguity as to US interest. *How* an adversary reads US intentions and resolve is more important than *what* they actually may be. The presence of in-country forces provides a clear and unequivocal commitment.

On the other hand, a force standing off in the extra-territoriality of the high seas may or may not be committed. Further, an attack on an ally in whose territory US forces are garrisoned must be perceived by a would-be aggressor as an attack on the United States. To oversimplify, these analyses found that in-country forces connote certainty and thereby reinforce deterrence, whereas "proximity" forces connote uncertainty and lower the deterrent threshold.

In a practical sense, in-country forces are only as effective as our ability to reinforce and supply them. Recent advances in air mobility, coupled with the rapid operational deployment capabilities of tactical air units stemming from the Bare-Base concept, achieve these goals, and further improvements can be attained as needed. A recent study found, for instance, that a total of thirty tankers of the Boeing 747 type, operating between the US Eastern seaboard and Europe, could provide the fuel needs of all tactical US fighter aircraft currently stationed in Germany and the Benelux countries. A single 747 can deliver 200,000 pounds of fuel for ground storage, an amount sufficient for about fifteen fighter aircraft sorties.

Modernizing the tanker fleet by adding a supersized jet vehicle is considered the only major new requirement to assure adequate tactical air deterrence in the years ahead, assuming that such ongoing projects as the F-15, A-X, the advanced technology fighter, and AWACS will go into the inventory.

There are other advantages to the selective use of in-country forces *augmented* by proximity forces and air mobility, as opposed to *only* proximity forces. In the sense of the studies, the non-Communist world is separated into three basic levels of US interest. The first category is typified by the NATO countries and the Japan-Korea complex. It involves nations firmly allied with the United States and vital to our own security interests, who face a serious, long-term threat of external aggression. Explicit in such a commitment is the US capability for rapid and massive reaction. It follows that such commitments, to be effective and in consonance with the Administration's concept of realistic deterrence, must be confined to crucial and legitimate areas of US political concern. Such a tactical posture reduces the likelihood of proliferating commitments, an erosion of resolve, and forces spread too thin to be effective.

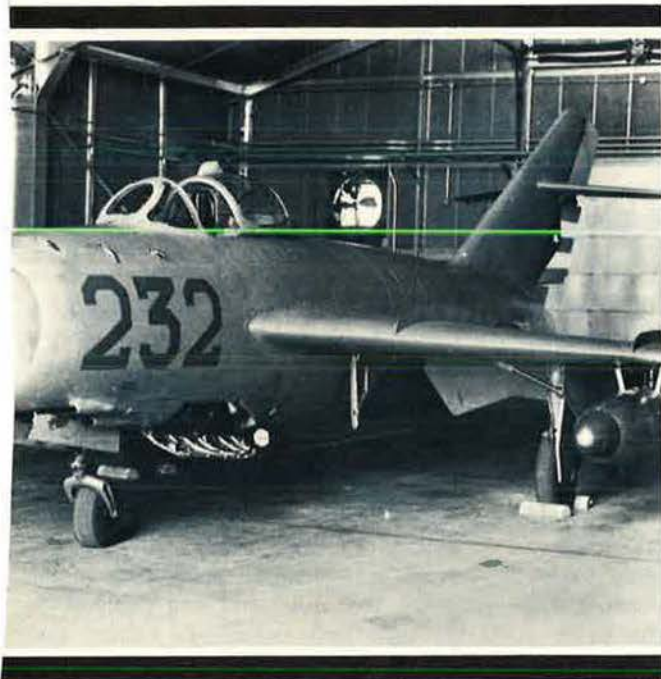
The counter arguments advanced by the advocates of a proximity force policy, is that an ally may deny base rights because the external threat may dwindle or for political reasons. The first condition, in the view of

and obviously is of major concern to the Armed Services Committees of both the House and Senate. No report is complete, however, without reference to the skepticism that prevails in other key areas.

It suffices to call attention to last year's hearings of the Subcommittee on Defense Appropriations of the Senate Appropriations Committee. The Chairman is Allen J. Ellender, who hails from Louisiana and is a political neighbor of F. Edward Hébert.

Mr. Ellender, who has visited Russia and considers himself something of an expert on that country, its intentions and capabilities, says "they are not building bombers to any extent." He says the force they have is old and he fears that "the moment we start building the B-1 . . . they are going to go back and try to imitate us.

"I have contended all along that we have put Russia



This is a MIG-17, built in Russia and flown into Homestead AFB, Fla., by a defecting Cuban pilot, who evaded detection by flying low. The date was October 5, 1969. The aircraft was returned to the Cubans, but the men responsible for US air defenses remained embarrassed.

on the defensive for the last fifteen or twenty years. That is what we have done. That is why you see so many Russian ships in the Mediterranean. We have been in the Mediterranean for twenty-two years, and they just recently have come there."

The hearings were held last April, but the censored transcript was released only about the first of this year. In it, Chairman Ellender engaged in exchanges on Russian military stature with Grant L. Hansen, Assistant USAF Secretary for Research and Development, and Lt. Gen. Otto J. Glasser, Deputy Chief of Staff for R&D.

Mr. Hansen pointed out that the F-106 air defense interceptor is fourteen years old. That situation must

be remedied and other R&D money for the next few years must go to finish development of the B-1, the F-15, the A-X, and AWACS. There are other items essential to our defense, including better surface-to-air missiles, optically aimed weapons, improved reconnaissance devices, unmanned observation platforms, and relays for guidance and control. So far, there is no development program for the IMI.

Mr. Ellender's response was to recall the history of the North American B-70 bomber. He said the project was stopped because the Russians improved their high-altitude defense system, which also forced the US to alter B-52 tactics and put the aircraft on the deck. "How do we know," the chairman asked, "they won't develop a low-altitude defense system that will counter the B-1's low-level capabilities?"

The response was that the B-1 will be versatile; it can go high and fast, and it can go low, using sophisticated penetration aids.

Facing General Glasser, who outlined the case for OTH-B and AWACS, the Appropriations Chairman challenged the spending of "tremendous sums" for a warning system aimed at Russian bombers, arguing that it escalates the arms race. Again, he depreciated the threat from Russian bombers.

General Glasser testified that the OTH-B proposed funding for Fiscal 1972 was \$3.6 million, added to prior funding of \$8.6 million. Then there was this revealing exchange:

CHAIRMAN ELLENDER: In view of the limited threat against the continental United States, just why do you feel it necessary to spend all of these funds to develop new aircraft warning systems?

GENERAL GLASSER: As you know, we have hard evidence of a bomber prototype, which is well advanced in the Soviet Union and which could be in production long before we would be able to put in these reactive defenses.

CHAIRMAN ELLENDER: That has been going on for several years?

GENERAL GLASSER: Yes, Sir.

CHAIRMAN ELLENDER: When we develop a new weapons system, the Russians emulate us or develop a countermeasure to our action. The development of the B-1 may well accelerate the development of more sophisticated Russian bombers. Don't you agree?

GENERAL GLASSER: I am not in a position to agree with you, but I would have to point out that it would be reckless of us to engage in unilateral disarmament.

This discussion, essentially about the chicken and the egg, is going to be continued in 1972. Considering the opinions of Mr. Hébert, Generals McKee, McGehee, and Glasser, Admiral Moorer, and Mr. Ellender, the debate is not likely to wane.

The right answer could be dictated in Moscow.

Until it is, the NORAD command and Congressman Hébert appear to be the only principals truly embarrassed by such events as the flight of Cubana 877. ■

It was suggested by Rep. Samuel S. Stratton of New York that the Cubans might attempt an attack against a US target and Russia would intervene by threatening nuclear war if the US retaliated.

The Admiral said he does not think the Kremlin would be willing to trade Moscow for New York in order to support Castro "on such a junket as these MIGs might indulge in." He puts his faith in continued deterrent power.

Stored Radar

It was while Admiral Moorer was testifying that the inquiry learned there is a backscatter radar (OTH-B) in storage. In early December, at the final session of the Armed Services hearing, witnesses were called from the Office of Naval Research and the International Telephone & Telegraph Corp. (ITT) to discuss the status of this project. A vast amount of the testimony was deleted by Pentagon censors, upon publication of the transcript. What was learned is best summarized in the committee report:

"The brightest spot in this depressing picture was supplied by certain military and civilian witnesses, who testified that Over-the-Horizon Backscatter (OTH-B) radars are in operation overseas today, and have been for some time, and such a unit is now available to provide immediate detection capabilities along our southern perimeter," the report says.

"Experiments with OTH-B detection systems have been conducted since the late 1940s; but at that time results were inconclusive as to their value for military purposes. In the late 1950s, greater attention was directed toward the development of OTH capabilities when the Navy proved it could detect nuclear testing. In the early 1960s, the Navy constructed an OTH-B and began reporting missile launches, as well as nuclear testing.

"Later, techniques were developed to detect aircraft and cruise missiles that can be launched from submarines. The operational capability of OTH was proven in the deployment of such radars overseas. Confirmation of the OTH capabilities has led to plans to develop a sophisticated OTH-B system for US air defenses to be operational in the mid-1970s. However, a used system, which is now available, can provide interim detection capabilities along our southern perimeter."

The report continued:

"Estimates provided by industry witnesses indicated that coverage of the Florida Straits, and practically the entire Gulf of Mexico by the existing OTH-B radar, can be achieved in six months. They also testified that the first-year costs, including refurbishment, installa-

tion, and site preparation, as well as one year of operational manning, are estimated at \$5.7 million.

"The subcommittee urges the Department of Defense to take immediate action to install the presently available OTH-B at a location that would close the gap in our southern defense perimeter. The subcommittee also urges the rapid development, procurement, and deployment of the improved OTH-B to insure the integrity of our entire CONUS defense detection capability. This, of course, is but the first step in the critically needed upgrading of our CONUS defenses which, in addition, must also include the new Airborne Warning and Control System (AWACS) and Improved Manned Interceptor (IMI).

"These two systems can also be operational by the mid-seventies and, when used in connection with the OTH-B, can give this country real defensive security. This must be accomplished with all speed, for each passing day makes more dangerous 'the calculated risk' which has been permitted in the name of economy."

What the report failed to point out in this otherwise revealing summary of OTH-B capabilities is that the new advance in radar contributes to more than our defense against intrusions by airplanes, be they bombers or irritating little flights like that of Cubana 877. The OTH-B, once fully operational, will be part of the continent's strategic warning system.

A New Soviet Bomber

In recent months, the Russian surge to achieve nuclear superiority has been well publicized. *Jane's Weapons Systems*, published last November, reported that the Soviet Union has "overtaken, and in some cases surpassed, the West in developing missiles and other weaponry." More recently, there was the appearance of a new bomber, named "Backfire" by NATO. *Jane's* says it is supersonic with a low-altitude capability at no loss of speed. Also, that "the approximately equivalent US B-1 bomber project is only at the mockup stage, while Russia has two Backfire prototypes flying."

In Colorado Springs, air defense experts argue that the Russian aircraft now in use for offshore missions near North America are a credible threat to the United States. Heaviest is the TU-95 Bear, with an unrefueled range of about 8,000 miles. It can carry a 25,000-pound bomb load.

The commercial version of this airplane, the TU-114, regularly flies nonstop from Havana to Moscow. Bear bombers fly nonstop Moscow to Havana in seventeen hours—that trip has become routine. They are turbo-props.

There is a smaller, medium-range Soviet bomber called the Badger, frequently seen off Alaska, and a supersonic medium-range bomber named Blinder. The Defense Department estimates there are 750 aircraft in these two classes, plus 110 Bears and ninety Bisons, an older all-jet bomber.

The credibility of this threat is accepted at NORAD

"I can say," he told the committee, "that our anti-bomber defense systems are obsolescent and generally nonexistent along our southern border. We still have precisely the same types of weapons that we had in the early 1960s, but they are now ten years older, and we have them in far fewer numbers. In spite of this phase down in weapons and personnel, CINCNORAD's responsibilities have not diminished."

Priority Deployment

Later, the General said he must use what he has on a priority basis. Russia has the capability to threaten our survival and that is why his limited arsenal is deployed the way it is. He said the master plan drawn up in 1967 was based on the premise that the savings achieved by phasing down the system would amortize the procurement of a more modern defense force.

It was repeatedly pointed out that the decisions to phase down air defense are made by the Joint Chiefs of Staff and "at a higher level." NORAD gets its orders from the JCS. The Hébert hearing called Admiral Moorer, JCS Chairman, to testify.

The Admiral, always a blunt witness on Capitol Hill, made no bones of the fact that "fiscal realities" dictate some JCS decisions. He said the big threat from Russia lies in their nuclear missile capability; their bombers could strike targets in the southern states, but better options are in hand at this time.

So far as Cuba is concerned, Admiral Moorer testified that it has Russian MIG-17 and MIG-21 aircraft, the latter with an operating radius that would permit attacks no further away than Florida. American deterrent power, the Admiral believes, is enough to eliminate the risk of such an assault. He indicated the JCS still stands in support of the air defense modernization program drafted in 1967. Under questioning he gave the anticipated operational dates for the OTH-B, IMI, and AWACS projects. The dates were deleted by the censors.

For the improved interceptor, Admiral Moorer suggested, probably for the first time in public, that either the Navy's Grumman F-14 or the USAF McDonnell Douglas F-15 could fill the bill. In Colorado Springs, General McGehee indicated to this reporter that ADC has been working on a proposed modification of the

new USAF aircraft, the F-15, that can fill the requirement later in the 1970s.

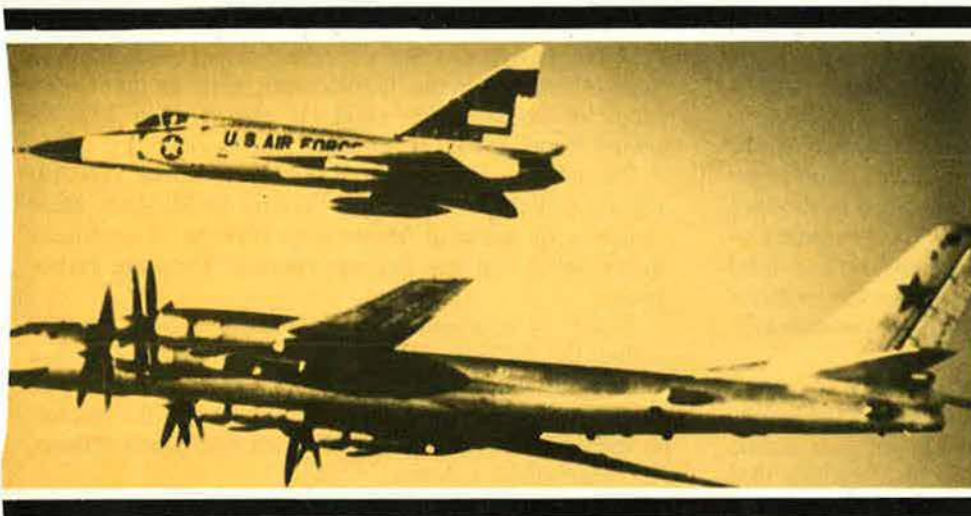
In his testimony, Admiral Moorer somehow did not seem to share the distress of General McKee and Congressman Hébert over their embarrassment at the violation of our airspace and regulations by Cubana 877. He was asked what he would do if he had more money. "Would you fill this gap as a top priority, or put it somewhere else?"

The Admiral replied that he would favor more modernization.

"You might procure the AWACS aircraft, for example, when it becomes available, so that it could be redeployed quickly to establish a barrier along the southern area in order to prevent these single-plane run-ins.

"I think you are always going to have the possibility that a single plane flying on the deck can penetrate almost any system that you could develop. It would be very expensive indeed to build up a system in this area [that would be] 100 percent leakproof. It would be very expensive for the purpose of intercepting one or two aircraft a year, if you consider these priorities that I have discussed.

"On the other hand, I realize fully the psychological impact and the need for the United States to protect this airspace. It is a highly desirable capability, as I have said. But at the rate we have been reducing the defense budget, and viewing at the same time the condition of the current air defense forces, I would have to look at the problem in totality to see just where we should put the money."



Both NORAD and NATO interceptors get plenty of practice intercepting Russian bombers probing our air defense capabilities. In addition to runs along the North American continent and parts of Europe, the Soviets overfly our ships at sea and carry out routine training missions to Cuba.

from State that visa applications for the sugar-cane conference had been denied about a month earlier.

As a matter of fact, the State Department had known for over a year that Cubans were making a determined effort to attend the conference. The Armed Services Committee argues that State "should have brought this information promptly to the attention of all agencies concerned with national security, in order to insure a ready response to a possible illegal entry. However, although the problem was discussed over a period of months, there is no evidence that either NORAD or CONAD was advised of the pending problem or that any contingency plan had been agreed upon."

Further, in discussing NORAD's participation, the report concludes that it was exactly eight minutes after

Tain't Funny

In the early 1950s, when our air defense effort was at a pretty low ebb, ADC personnel were frequently twitted by SAC people about their inability to find and fix SAC bombers on mock penetration missions. The stock answer, wryly offered, was, "Don't worry about it. As soon as the Russians drop their bombs, we'll know where they are and we'll shoot 'em down like flies." It wasn't really funny then and it isn't now, either.

—J. F. L.

the Cubans had deplaned at New Orleans that the command had a call from the State Department representative at the National Military Command Center. The message: Due to Soviet Prime Minister Kosygin's arrival in Cuba that day, the Havana airport was closed and the proposed flight—of Cubana Special One, later Cubana 877—could not take off.

"Under these circumstances," the report says, "it would not be too difficult to understand why NORAD might have been less than certain as to what, if anything, it should do."

General McKee's attitude was stated, loud and clear, on the stand. He was asked whether he was of the opinion that the Cubans really were headed for the conference on sugar, or "did they have something else in mind?"

The answer was that from the way the flight was conducted and the fact that it was not detected "indicates to me that they underflew our radar, which did give coverage in the Cuban area. Also, since they didn't report in at the mandatory reporting points as they should have done, it is my opinion they didn't want us to know they were there until they arrived."

The General was reminded that even though he doesn't have the equipment, he has the responsibility.

"If they had come in, let's say, and dropped bombs or something or other, you would be the fellow that would be on the pan, would you not?"

The General replied this was most likely.

General McKee raised a point of his own about the State Department's requirement for five days' notification of unscheduled flights from Cuba to airports in the US. There had been a long discussion about it, and the USAF captain who got the first word on October 26 testified that he did not know of the requirement.

"That response might have led you to believe that others of us were aware of that requirement," General McKee told the hearing. "The facts are that I was not aware of it, and I have been unable to determine that anyone in NORAD was aware of it."

JCS Chairman

There were two star witnesses heard on the subject of air defense capabilities. In addition to General McKee, the committee had a long session with Adm. Thomas H. Moorer, Chairman of the JCS.

The General reviewed the role of CINCNORAD and his responsibilities to the President, the Prime Minister of Canada, the JCS, the Secretary of Defense, and their military counterparts in Canada. NORAD is binational; it uses the strength of USAF's Aerospace Defense Command (ADC), the Canadian Forces Air Defense Command, and the US Army Air Defense Command.

Back in 1958, when NORAD was established, it had substantial forces. What has happened since then is shown in this tabulation:

NORAD Weapons

	1960	1971
Nike/Hawk batteries	270	63
Fighter squadrons (Reg.)	65	14
Fighter squadrons (ANG)	38	15
Bomarc squadrons	9	7
TOTAL	382	99

By June 30, 1972, the fourteen regular interceptor squadrons will be cut to nine and, by June 30, 1973, reduced again to seven, half of the 1971 strength. The Fiscal 1973 proposed budget, sent to Congress in January, also indicates the Army's surface-to-air batteries will be depleted to only twenty-one. The number of Bomarc squadrons already stands at five instead of seven.

NORAD Radars

	1960	1971
Long-range radars	187	99
Gap fillers	105	0
TOTAL	292	99

In the same time period, personnel assigned for air defense of the continent were reduced by about sixty percent, from 246,720 to 94,575.

In his testimony, General McKee emphasized that he does not have forces to cover our southern approaches. There are from four to six interceptors on alert at Homestead AFB in Florida. He said that in the past year the 20th NORAD region, which is responsible for air defense of the southeastern US, has detected a total of 176 unknown aircraft.

proposed trip from Havana to New Orleans. The message designated the flight as Cubana Special One, not Cubana 877.

This flight plan was filed directly with the Federal Aviation Administration's switching center at Kansas City, Mo., and relayed at once to centers at Houston and Miami as well as the New Orleans International tower. Word also was passed on to NORAD, FAA headquarters, and the State Department. The plan called for Cubana Special One to depart Havana at 9:00 a.m. with estimated arrival in New Orleans at 11:59 a.m. Intended airspeed was 240 miles an hour at an altitude of 14,000 feet.

The Cubans violated a couple of regulations right at the outset. There is a rule, instigated by the State Department and presumably enforced by FAA, that says any flight from Cuba is required to file its flight plan five days in advance. This wasn't the case and when FAA asked Havana if Cubana Special One had taken off, FAA was told it had not departed. In fact, Cubana 877 had already been in the air about forty minutes. On top of this, at no time was FAA told how many passengers were aboard or their identification. Mr. Hébert says one of those aboard was the chief of Castro's central intelligence organization.

"There is no evidence," the Armed Services report says, "that any of the US authorities advised the Cuban authorities that the flight plan filed by Havana failed to conform to US requirements in at least two important respects and, therefore, would not be approved."

Sticky Matter

On the morning of October 26 there was another sticky matter in the news about Cuba that obviously had a bearing on how FAA handled what turned out to be Cubana 877. Washington was concerned about an American Airlines 747 with 235 passengers that had been hijacked to Havana and kept there more than two days. James Murphy, Director of the Office of Air Transportation Security, was the man in charge of the problem on the morning of October 26. Under questioning, he was asked whether he challenged the Cubans when they failed to give five days' notice for the flight.

"We were having a hard time with the Cubans that particular day," Mr. Murphy replied. "The night before—because of the American 747 with 235 people on the ground—the Havana Center told the Miami Center to stop bugging them. They didn't want any more transmissions. We tried to be very selective in communicating with Havana Center until it really counted. . . ."

Mr. Murphy said he waited until fifty-three minutes after the flight plan called for Cubana Special One to have taken off, then ordered Miami to ask whether the aircraft had taken off or not. He suspected, by this time, that Cubana Special One had something to do with the hijacked airplane and the release of the Americans aboard. He said, "We were urging the State Department and other elements to treat the Cubans with courtesy and consideration on their arrival" because he did not want to jeopardize the release of the 747 and the Americans aboard.

As for Cubana Special One, the inquiry found Havana replied to Mr. Murphy's query at 9:54 a.m., saying the aircraft had not departed. Later evidence showed Cubana 877 had taken off at 7:15 a.m. and was in the air for thirty-five minutes before the flight plan was filed. It arrived in New Orleans at 11:17 a.m., nearly an hour earlier than the arrival time estimated in the flight plan for Special One.

The first knowledge US officials had of an impending arrival was a request for landing instructions received at New Orleans International at 10:57 a.m. The aircraft identified itself as Cubana 877 and said it was twenty-five miles away at 4,000 feet. Cubana 877 was cleared for landing at 11:12 a.m. There is no further reference to Cubana Special One.



Unwelcome guests from Cuba prepare for takeoff from airport at New Orleans. Denied visas for US visit, they defied both State Department and FAA regulations.

Who was on board? Twenty-one Cubans who said they came to town to attend an International Sugar Cane Technological Conference. In addition to arriving without an approved flight plan, they had no US visas for admission to this country.

The uninvited and unannounced Cuban guests were put up, for a couple of days, at a Hilton Hotel adjacent to the New Orleans airport. Then they were moved, to quarters that were less expensive to the US government. They spent the next half-dozen days at the Belle Chasse Naval Air Station, where they were bedded down in—of all places—the F. Edward Hébert Bachelor Officers Quarters. From here, they were sent home, without a taste or smell of sugar.

State Not Spared

The committee report does not spare the State Department. Kenneth M. Smith, FAA Deputy Administrator, testified that "we got nowhere" in first efforts to find out whether any visas had been issued.

An hour and twenty minutes after the proposed departure of Cubana Special One, the word came back

The report on that session came up with these conclusions:

1. Existing US air defense is virtually useless. It is more concept than actuality.

2. In a series of economy moves, beginning in 1963, our detection and intercept capabilities have rapidly deteriorated, despite a steadily increasing threat posed by submarine-launched missiles and newly developed Soviet long-range bombers.

3. Because of the failure to maintain a viable US air defense system, sovereign US airspace cannot be effectively protected from intrusions by foreign aircraft, civil or military.

4. A 1,500-mile opening in our air defense exists on the southern US perimeter between Florida and California. The area is virtually devoid of military surveillance and air defense command and control.

5. The Cuban plane incidents of 1969 and 1971 demonstrate that any foreign power can, at will, violate the southern US airspace without detection or interception. More importantly, they suggest that any enemy having the capability to attack from the south would be immune from detection and interception.

Committee Recommendations

The committee made two recommendations to the Secretary of Defense:

1. Accelerate the upgrading of existing outmoded and ineffective continental air defenses by inclusion of the Airborne Warning and Control System (AWACS), the Over-the-Horizon Backscatter Radar (OTH-B), and the Improved Manned Interceptor (IMI).

2. Utilize, as an interim measure for southern air defenses, the OTH-B system presently available for detection and surveillance.

If Mr. Hébert seems unduly alarmed, there are more reasons for it than two airplane sorties from Cuba. The truth is that Soviet bomber flights along the fringes of North America are routine. Alaska, Canada, and Iceland are common territories of interest and the Russian flights are monitored by American and Canadian interceptors. Our Defense Department has a

policy of keeping silent about this, although the Canadian government shows little reticence in this regard. At NORAD Headquarters in Colorado Springs, Colo., there is a file of motion-picture films, taken from accompanying interceptors, of innumerable examples of Russian bombers on probing flights.

General McKee makes it clear to visitors at his command post at Ent AFB, Colo., that the two Cuban flights are different only in that they terminated in the continental US. Soviet bombers fly over our fleets in the Atlantic and Pacific and skirt the continent with regularity. They are checking NORAD's response time. They are recording the frequencies of our command-and-control systems and radars. They are giving Russian bomber crews realistic training. They are observing our naval activity.

And NORAD is not alone in facing these feints. Reports from Europe say Soviet aircraft are probing NATO defenses in the same manner. Almost daily they are testing NATO's ability to react. The British Royal Air Force sees a great deal of Russian Bear and Badger bombers, many of them headed for Cuba. In Castro's country they not only can receive fuel and maintenance, but they profit from the experience of navigating and operating at the edge of the United States.

Like General McKee, Mr. Hébert is interested in broader aspects of the problem than those dramatized by the Cuban act in his own front yard.

In his report on the most recent hearing, the chairman points out there has been little change in our concept of air defense since the late 1950s, when Russian bombers were the only threat. Since then, the missile has assumed stature as a strategic weapon, "although the bomber threat has not significantly diminished."

At the same time, the report says, to save money, air defense forces on the continent have been cut sixty percent. It fixes 1963 as the start of this degeneration. As money became scarcer, the decision was made to deplete the southern defense ring in favor of the northern borders.

Surprised Reaction

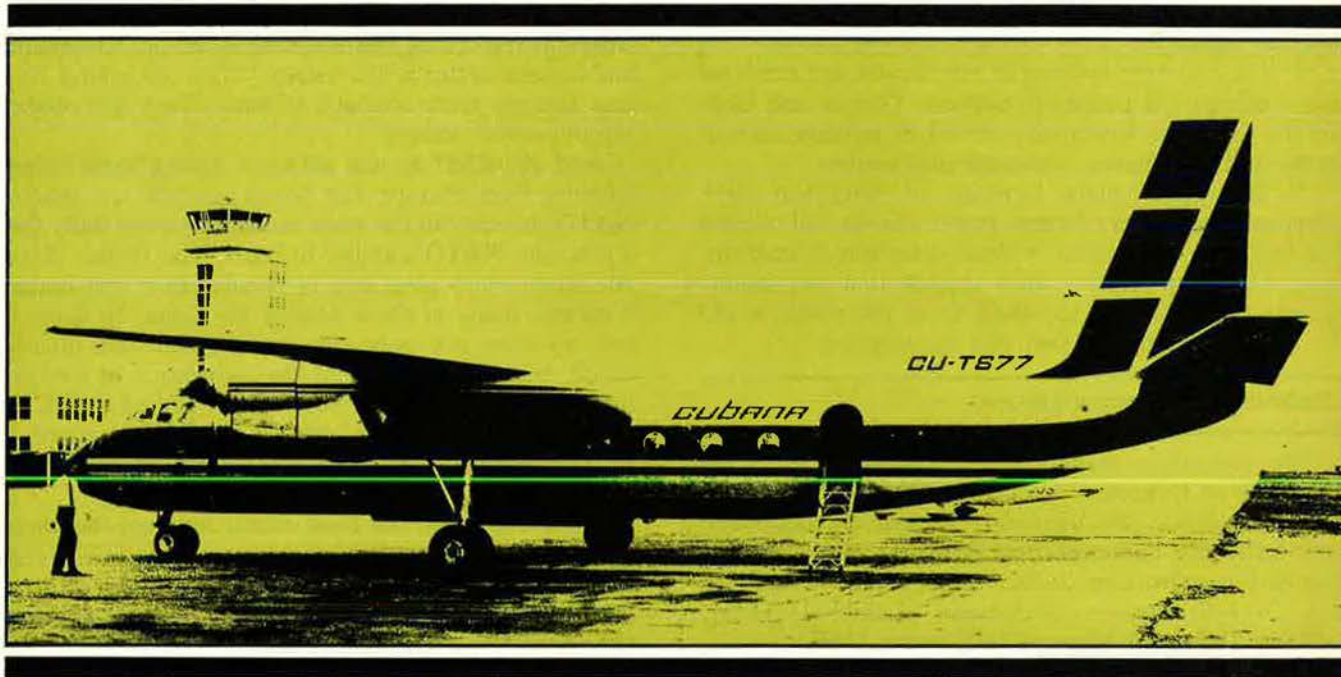
Out in Colorado Springs, a component neighbor of NORAD is USAF's Aerospace Defense Command, headed by Lt. Gen. Thomas K. McGehee. General McGehee sounds a little surprised when he talks about the reaction in Congress to a couple of episodes in which the southern defense ring has been penetrated by airplanes from Cuba. He points out that there was little objection in Congress back in 1963 when the first steps were taken. According to the General's recollection, the first surveillance radar to be dismantled was in Texas. And the only Congressman to complain with vehemence was Edgar F. Foreman, a Texas Republican and Armed Services Committeeman. When the radar was taken out, the hole was called "Foreman's Gap."

Now the gap is about 1,500 miles long, and the Cubans know it can be penetrated with ease. The aircraft that landed in New Orleans last October—Mr. Hébert says it was flown in by Fidel Castro's personal pilot—was designated Cubana 877. Early on the morning of the flight, the Havana Air Traffic Control Center filed an instrument flight rule (IFR) flight plan for a



The flight of Cubana 877 last October 26 approached New Orleans at an altitude of 4,000 feet, undetected. Chart shows where it crossed US Air Defense Identification Zone and should have been challenged.

On October 5, 1969, an armed Cuban MIG-17, flown by a defecting Cuban pilot, arrived undetected at Homestead AFB, Fla. And just last October, a Soviet-built AN-24 transport flew uninvited—and untracked—from Havana to Moisant International Airport in New Orleans. These two incidents—a source of considerable embarrassment to a number of people—have led to a chain of ominous conclusions about . . .



The Gaps in Our Air Defense

By Claude Witze

SENIOR EDITOR, AIR FORCE MAGAZINE

ABOUT two and a half years ago, Gen. Seth J. McKee, Commander in Chief of the North American Air Defense Command (NORAD), was asked by the Joint Chiefs of Staff to evaluate the impact of a proposed shutdown of half a dozen long-range radars, then part of the network guarding the USA from attack by hostile bombers.

The General's reply was that if six radars had to be closed down, for budget reasons, they should be selected from the area along the Gulf of Mexico, because that was the least critical area.

However, he added, "we will be vulnerable to embarrassment by undetected and unchallenged flights entering the US. . . ."

"When was that written?" General McKee was asked last November by Rep. F. Edward Hébert, chairman of the House Armed Services Committee.

The witness gave the date as September 4, 1969.

"You certainly have been embarrassed," the Congressman continued.

"Yes, Sir," was the General's answer.

The General was not alone. Mr. Hébert has been embarrassed, too, most of all last October 26, when a Russian-built AN-24 transport, out of Havana, Cuba, landed at Moisant International Airport in New Orleans. Mr. Hébert represents New Orleans in Congress, and national defense is his personal legislative bailiwick.

The Armed Services chairman had been upset previously, on October 5, 1969, about a month after General McKee wrote to the JCS. That was the day an armed Cuban MIG-17 flew undetected from Havana to Homestead Air Force Base in Florida and landed while the Presidential aircraft, *Air Force One*, was parked nearby.

Both incidents resulted in examinations by Mr. Hébert's committee. It was only two weeks after the New Orleans surprise that his Armed Services Investigating Subcommittee, chaired by the chairman himself, called a hearing.

The Long and the Short of the SLUF

Designer and Manufacturer:

Vought Aeronautics Co., a division of LTV Aerospace Corp.,
Dallas, Tex.

Historical Highlights:

First flight (Navy A-7)	September 1965
USAF A-7 configuration selected	May 1966
First A-7D accepted by USAF	December 1968
First delivery to operational USAF squadron	September 1970

Specifications:

Weight, empty	19,665 pounds
Internal fuel capacity (usable)	1,425 gallons
External fuel capacity	1,200 gallons
Aircraft length	46.13 feet
Aircraft height	16.17 feet
Wingspan	38.73 feet

Powerplant:

Single Rolls-Royce/Allison TF41-A-1 nonafterburning turbofan
jet engine with a static thrust rating of 14,250 pounds.

Performance Summary:

Speed at 5,000 feet, clean	575 knots
—with eight M117 bombs	543 knots
Rate of climb (with 8,200 pounds of ordnance)	6,600 feet per minute
Flight envelope (with 3,500 pounds of ordnance)	Up to seven Gs
Ferry range (with external tanks)	2,643 nautical miles
Takeoff ground roll (with 4,000- pound load)	4,000 feet
Rate of roll (at 5,000 feet)	180 degrees per second at 300–500 knots

Ordnance Flexibility:

Eight external stations (six wing pylons, two fuselage brackets),
accommodating almost all USAF weapons; M-61 20-mm internal
cannon; two Sidewinder missiles. The A-7D can deliver a combat
payload of 15,000 pounds.

This entire scenario presents a picture consistent with the proven capabilities of the A-7D. My fellow pilots have all been pleasantly surprised by the effectiveness of *The System*. They have flown in both high- and low-threat environments in all types of aircraft from Korea to Vietnam. After listening to them and evaluating my own combat experiences, I'm convinced that in an attack on enemy ground forces near US troops or any key target, I want to go in an A-7D.

I'm also convinced that the A-7D will succeed in those missions with fewer sorties and losses, because of its accuracy. That means less cost in both lives and money.

Silver Lining

There is much I have not discussed in telling what it is like to get to know and appreciate the A-7D.

- It has a 2,500-mile unrefueled ferry range, and is air refuelable for longer hops.

- There are many ways to deliver weapons from the A-7D other than the normal attack mode described above. Its radar bombing accuracy is excellent. *The System* has an off-set capability enabling it to hit unseen targets.

- With the addition of LORAN and low-light-level images in the HUD, all-weather and night capabilities of the A-7D may be greatly increased.

- The computer has many functions for storing intelligence data, updating, and self-diagnosis not discussed here.

But what I did want to tell is the story of the difference *The System* makes in flying the A-7D. With today's hyperconsciousness of high cost in military hardware, the A-7D is a silver lining in sometimes very dark clouds. It is complex, but it does work. We are demonstrating daily its ability to get more bombs on target at lower cost to the taxpayer.

For these reasons my affections have been won by that Short Little Ugly Feller. I prefer to think Hemingway's words referred to loveliness of character. If doing its job better than anyone else is a measure of character, then the A-7D is the loveliest of fighters. ■

turn radius, we can keep the target in sight even in dense haze. If we should lose sight of it for a moment in a rain shower, our *System* guides us back to reattack, and the diamond-shaped aiming symbol of the HUD magically remains superimposed on the target.

If the friendly troops were fighting in an area defended by sophisticated weapons with radar-guided fire-control systems, the A-7D Sys-



tem should have an advantage over earlier tactical aircraft because of its comparative standoff bombing accuracy. The manual bomber over North Vietnam was often forced to undergo great risk in order to hit his target. To accurately attack the target he had to achieve certain release parameters of airspeed and dive angle, track the target during the dive delivery, and reduce bombing slant range to the point where he entered the effective range of enemy AAA. Every second he tracked the target he was fired upon.

Wise pilots reduced their straight path tracking time by flying curved approaches and varying dive angles. However, this usually reduced the accuracy of delivery because pre-computed dive angles and airspeeds were much harder to achieve and judge from such an approach.

The mental computation and vulnerable tracking time of manual dive bombing don't exist with the A-7D automatic system. As we attack in the A-7D, we can jink and fly a turning, "curvilinear" approach to the target without being concerned with exact airspeed or dive angle. We constantly change our track through space, presenting a poor target, as we simultaneously designate the target's location to the computer. While other systems, such as F-4 dive-toss, have similar capabilities, their accuracy is less than that of the A-7D.

The System measures slant range by radar, and fixes the location of the target in space while simultaneously computing release conditions twenty-five times per second. Command steering and attack solution anticipation cues are presented in our HUD field of view. We wait until release is imminent before flying the predicted set of bomb impact points over the target.

Now we pull off the target, and *The System* releases our remaining 500-pound bombs with the exact spacing along the ground that we selected in the cockpit. We watch them hit the target with better than ten mile accuracy regardless of wind as we jink away at 600-plus knots indicated airspeed, above the effective range of most AAA weapons. *The System* now shows us the safest planned egress route from the hostile defenses.

Ending Up Inside

Our high-lift subsonic wing is capable of high G loads and shorter turn radii than aircraft with super-

sonic capabilities. Coming off the target run with a full load of 20-mm and two Sidewinder missiles, we can maintain 460-520 knots in a tight, level turn at 2,000 feet. But what happens if we're jumped by enemy fighters?

A supersonic fighter would probably have to fly in a vertical plane to match our turn. At very high G loads his missiles are ineffective. If he tried to turn with us and press for a gun attack, we could take the A-7D down to fifty feet and hold a high G turn.

If he still pressed his attack, the enemy aircraft would be forced into an extremely tight nose-down turn in an attempt to get the required lead and depression angle for effective gunfire. At this attitude and altitude he would run the risk of hitting the ground. As a last resort, however, we could force an overshoot by rapidly slowing down and reducing turn radius.

If our attacker pursued at this altitude, his afterburner would be rapidly using up fuel. Our A-7D, using just internal fuel, has enough playtime at full power to fight for half an hour, then fly home with enough fuel left to divert to an alternate base 100 miles away if necessary and land safely. If the enemy broke off the engagement as he ran low on fuel, he might expose himself to our Sidewinder missiles, our guns, or both!

He who hunts the tiger may just end up inside!

Had the interceptors attacked us en route to our close-support target, we would have been handicapped by the heavy bomb load. But with our large wing and turning ability, the A-7D force stands a good chance of getting to the target with its bombs. It goes back to the basics of aerial combat, really. If we see him before he sees us, we can probably avoid his attack and prevent his killing our mission by forcing us to jettison our ordnance.

first developed to improve accuracy and minimize losses in such high-threat areas as North Vietnam. There, against a coordinated enemy defense system of hundreds of radar-controlled anti-aircraft guns (AAAs), plus surface-to-air missiles (SAMs), and fighter-interceptors as well, our fighters had quite a task getting to the target and back.

Assuring target destruction was quite another thing. Many technological advances were made to enable a pilot to hit his target and survive, by using a computer system that would be accurate from longer slant ranges. Now we have such a system that really works.

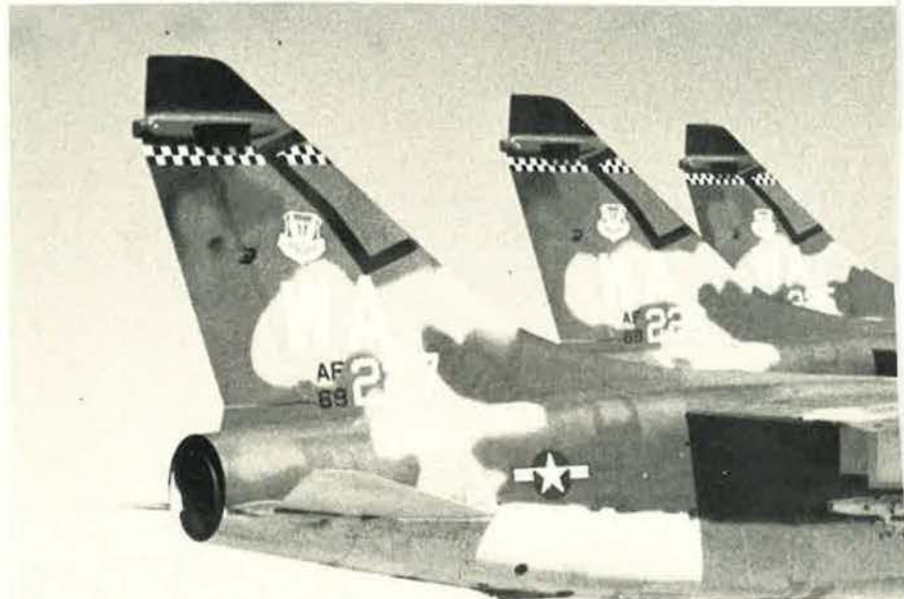
On one of my first tactics training missions in the A-7D, I was instructed to drop a practice bomb, using the automatic *System*, from a much higher altitude than I could achieve any accuracy with manual bombing. The bomb hit right on target! I began to think, "If this system can hit well from way up here, it should be amazing when we get in close to the ground!" And it *is!*

A Close-Support Mission

Perhaps I can better share this amazement with you if we fly an imaginary combat mission in support of friendly troops. Our A-7Ds are loaded with twenty-four 500-pound bombs and 1,000 rounds of 20-mm ammunition for the cannon. All we carry to the aircraft are our helmets and checklists. The parachute is preloaded in the rocket-powered ejection seat, and all the maps we need are in the Projected Map Display System (PMDS).

When the whistle blows, we climb up and strap into a somewhat snug cockpit. Our legs are held in by panels on the sides of the seat to reduce flailing damage if we should eject. The backs of our helmets are immediately clobbered by the "head knocker" safing mechanism, which

The author, Capt. Thomas G. Ryan, is an A-7D pilot with the 355th Tactical Fighter Squadron, Myrtle Beach AFB, S. C. A native of Louisville, Ky., he entered the Air Force in 1967. Captain Ryan flew 141 combat missions in the F-105 while stationed at Takhli Air Base, Thailand, 1969-70.



protrudes from the headrest when the seat is not armed for ejection firing. This is one of my favorite features; it makes it virtually impossible to fly with the seat not ready to eject if you need it.

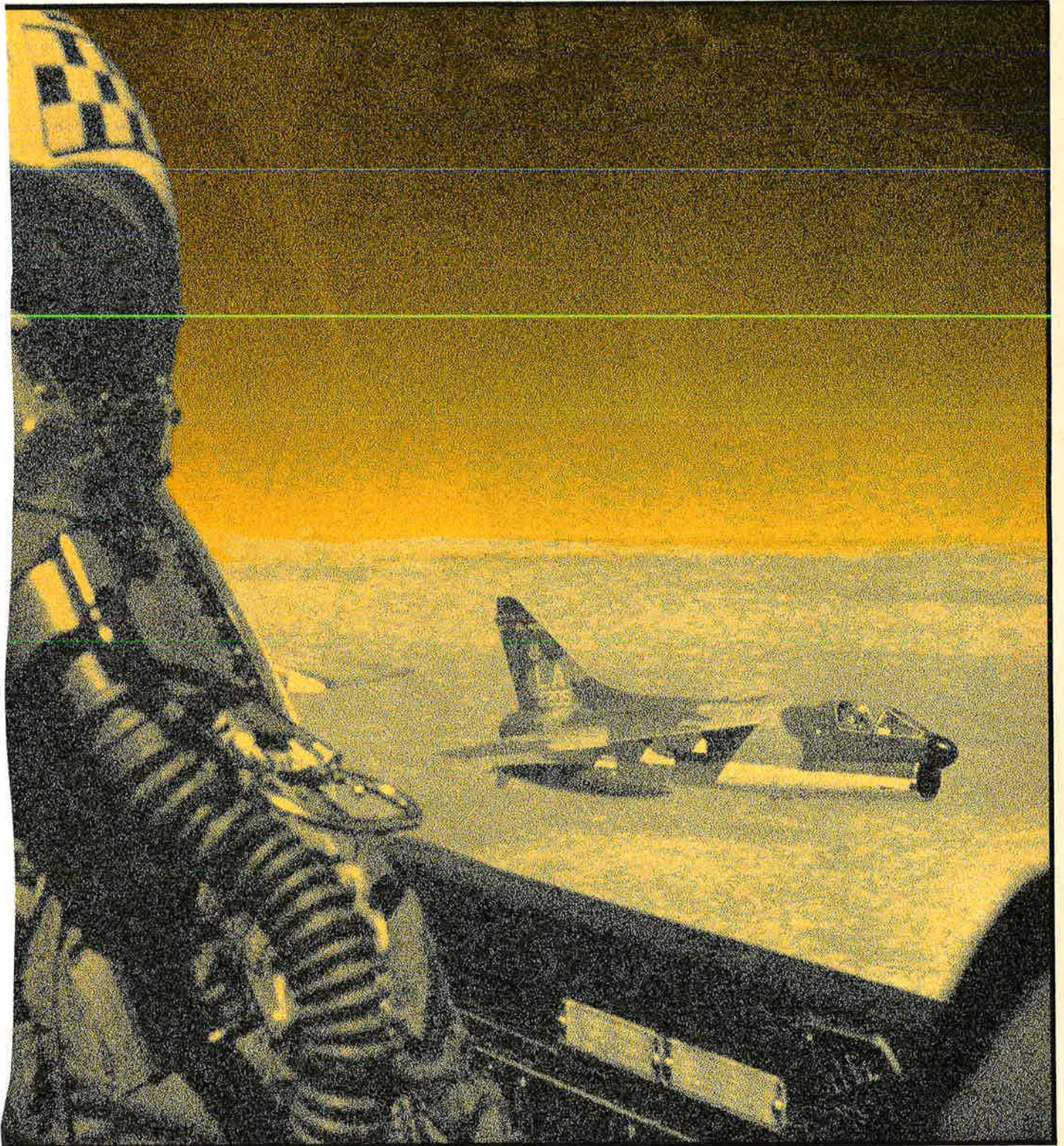
Preparing the A-7D for flight takes just a couple of minutes. We tell *The System* where we are, the heading of the aircraft, where we

Vought builds the A-7D (above) for the Air Force and the A-7E for the US Navy. The particular mission of each service dictates special components for the two versions, but they are basically the same.

want to go (up to nine destinations), and altimeter settings. After this digital dialogue, we can taxi out and take off.

Although the imaginary ground fight is going on amidst a number of monsoon variety thunderclouds, smoke, haze, and dense foliage, we are able to use *The System* to pick our friendly positions out of the murk without lots of time-consuming radio chatter. The ground commander can put us to work right away before the enemy is fully aware of our presence.

Since the A-7D has a very short



The SLUF's "black boxes"—from Forward Looking Radar to the Head-Up Display—are referred to collectively by pilots as "The System." And effective use of "The System" by A-7D pilots is the secret of this attack fighter's success in its close-support and interdiction roles.

his attention to the target and the threat.

Stick and Rudder

A pilot who has never used a HUD is really snowed by his first flight in the A-7D. Looking through the forward windscreen and HUD, he can fly precision instrument maneuvers without ever looking into the cockpit. The HUD symbolically displays airspeed, altitude, angle-of-attack, heading, and—rather than pitch attitude—actual velocity vector of the aircraft to show the pilot where he really is going, rather than where he is pointed.

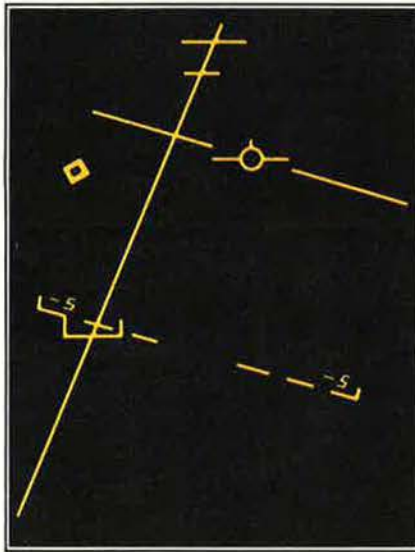
This symbology, moving with the aircraft's flight, enables a new pilot to fly a near-perfect landing on his first mission. If he is making an instrument approach, his transition from instrument to visual flying is immediate because he is looking at the runway through the HUD, rather than at instruments buried in the cockpit.

Airborne, the bird is a cinch to fly. The sequence in which fuel from the tanks is used is controlled automatically, and, once the gear and flaps are up, there are no configuration changes until landing. The aircraft has very rapid control response and yet is unusually stable in both pitch and yaw throughout its speed range. It will depart from controlled flight only if "ham-fisted" into extremely high angles of attack, and it recovers quickly if enough altitude is available. The engine has plenty of power and good response. It is a superb formation aircraft, requiring no roll-trim change at all as you move in close on the wing. In short, it is a simple aircraft just to fly.

But they don't pay us just to fly. Our mission is to drop bombs. The A-7D pilots at Myrtle Beach

AFB, S. C., are all veterans of combat tours in Southeast Asia. They come from various fighter aircraft that used a variety of automatic-release systems that sometimes did not perform as well as a skilled pilot using manual delivery.

None of us was ready to concede



superiority to *The System* without a shoot-off on a gunnery range.

Pilots vs. Black Boxes

The big showdown was no contest. On my first mission to Avon Park gunnery range in Florida, the range officer started to read the bombing winds to us; our flight leader said, "No, thanks!"

This surprised the range officer because manual bombing requires aim-point adjustment for winds, and the winds were twenty-five to thirty knots, and ninety degrees to

With the Head-Up Display—or HUD—(above) an A-7D pilot can fly precision instrument maneuvers without ever looking into the cockpit.

our attack heading. We rolled in for high-angle bombing in sequence, and I can still hear the range officer's voice climbing higher with each bomb impact: "Bull's-eye, leader . . . bull, two . . . BULL'S-EYE, THREE . . . BULL, FOUR!" Granted, they were excellent scores even for the A-7.

All the squadrons at Myrtle Beach compete in a monthly "turkey shoot" in which every available pilot drops six bombs and then strafes. It is not uncommon for one or two pilots to approach a "perfect" score. In a recent contest, one pilot had a total of fifteen feet of miss distance for six bombs and strafed eighty-six percent—a phenomenal range sortie.

Once SLUF pilots have learned the aircraft, they must perfect their skill in using the automatic system. The feeling that "I'm not doing it" disappears when the pilot sees that individual ability really does make a difference in automatic accuracy, just as it does in manual delivery. But technique has been transferred from the difficult job of judging the correct fraction of a second for releasing a weapon to the simpler task of evaluating the quality of *The System's* judgment. But for each pilot the A-7D *System* will deliver ordnance much more accurately than he could manually. Accuracy is imperative to effective close air support of friendly forces in combat.

Most A-7D pilots I know agree that we can confidently provide air support by cross checking the automatic system with our own judgment. Using this technique, we can give our troops the really close support they need when in contact with the enemy. With its accurate 20-mm cannon, the A-7D can safely attack within close distances of friendlies.

Automatic bombing systems were

The Vought Aeronautics Co. A-7D is known officially as the Corsair II and affectionately as the SLUF—for Short Little Ugly Feller. But the performance of this aircraft more than makes up for any shortcomings—real or imagined—in looks. Here, an Air Force pilot describes what it's like flying . . .

A man has only one virginity to lose in fighters, and if it is a lovely plane he loses it to, there his heart will ever be.
—HEMINGWAY

MY FIRST look at the new A-7D Corsair II attack fighter called this quote to mind.

The chubby, thick-winged, gape-mouthed fighter shows an unimpressive silhouette compared with the sleek, high-Mach, multipurpose fighters of recent vintage. My first operational Air Force assignment was in the F-105D Thunderchief, and I felt that I would never have a feeling for any other airplane like my affection for the "Thud."

That first impression of the A-7D—often referred to as the Short Little Ugly Feller, or SLUF—did nothing to erase my agreement with Hemingway. But that feeling soon changed. After fourteen months of exciting flying in the amazing SLUF, I have found that its inner character and operational potential far overcome its aesthetic shortcomings.

Excited and enthusiastic about being in on the "ground floor" of the new A-7D weapon system, I did not fully appreciate how lucky I was until I achieved a measure of skill in using the aircraft in its primary function—ground attack.

Midway through my checkout at Luke AFB, Ariz., I began to "see the picture" and realize the truly great potential of this fighter to easily do things that were either impossible or dangerous in other aircraft. *Voilà!* Here was an airplane designed to do the job it had been given: put bombs on target, anywhere, day or night. Unlike other systems, the A-7D was not designed for one mission and modified for another. It is a mix of proven airframe with Air Force avionics that blend into a first-class attack system.

The SLUF's wings are long and thick, and they bristle with six huge weapon-carrying pylons that can hold up to 15,000 pounds of ordnance. Inside those wings are fuel

tanks, filled with fire-resistant foam, which enable the A-7D to go long distances on just internal fuel. Under its bulbous radome nose, a large intake reveals huge fan blades of a turbofan engine that uses fuel sparingly. With that thick, high-lift wing, the SLUF can carry huge loads of mixed ordnance and provide ground forces with close air support for many hours at low altitude.

For less permissive environments,

That Super- Accurate SLUF

THE A-7D
CORSAIR
II

the A-7D has Sidewinder air-to-air missile pylons on the fuselage, and radar warning electronic countermeasures equipment. Its 20-mm cannon has proved fifty percent more accurate than expected—a great asset.

The A-7D is designed to hit its close-support or interdiction targets with exceptional accuracy, using an automatic system that is unique among attack fighters.

Learning "The System"

Learning to fly the SLUF takes

By Capt. Thomas G. Ryan, USAF

the pilot a few minutes, but learning to use its system effectively may take hours of flying time and weeks of study. A-7D pilots must qualify in many modes of automatic weapons delivery in addition to the standard manual qualifications. Naturally, the automatic criteria are more stringent. Therefore, the pilot becomes a "systems analyst."

There are plenty of systems to analyze: Forward Looking Radar (FLR), Doppler, Inertial Measurement System (IMS), Radar Altimeter, Projected Map Display System (PMDS), and Head-Up Display (HUD), to mention just a few of its "black boxes." Collectively, pilots refer to the total conglomerate as "The System."

This is really quite appropriate since nearly every avionics component is constantly feeding data to, receiving data from, or combining data with inputs from other components. *The System* gives the pilot a continuous awareness of the aircraft's position on the earth; attitude in relation to local vertical; actual velocity vector; and altitude above, and relative bearing from, any chosen target.

This information is gleaned from the Doppler, IMS, and other sensory systems and is used by the tactical computer to display the information a pilot needs to navigate to and destroy the target. Symbols representing aircraft performance and attack data are presented in a soft green light directly on the transparent mirror of the HUD, which is situated in his field of view as he looks through the front windshield.

His position and course of flight are continuously displayed on the map of his PMDS. The information computed by *The System* is also fed into an Automatic Flight Control System (AFCS) that can further free the pilot in combat to devote

the shuttle is being designed," he admitted that while "our present shuttle concept is head and shoulders more economical than any expendable system, it is probably not the final answer.

"We have not closed the door on developing a fly-back booster later on. If space traffic develops as we expect, and as the space program picks up new momentum, it may not be too difficult in, say, eight or ten years, to start on a fly-back booster development. In the interim, we know we are developing a system that can be economically viable for ten or even twenty years even if the combined number of spaceflights of the Air Force and NASA doesn't exceed the annual average we have had over the past five years. These past annual totals were used in the shuttle's economic justification. They did not include the ultraheavy Saturn flights or the very small payloads lofted by the Scout missile, two extreme areas in which the shuttle will not be competitive. Premised on this rather modest traffic model, the present shuttle concept can be expected to pay for itself within a decade or so."

Dr. von Braun pointed out that, instead of developing a fly-back booster stage in the future, some advanced technology not yet in hand may "enable us to someday build a single-stage shuttle." Such a second-generation shuttle may take off horizontally and be built along the lines of the aerospace plane advocated by the Air Force in the early 1960s. This concept centers on the successful development of an engine cycle that involves operating as an air breather, then shifts to a ramjet or scramjet, and finally, in airless space, acts as a rocket-propulsion system. "It all sounds fabulous, but the more we studied the associated problems, the more formidable they became. But future technological progress might well make it possible to consider such an approach for a second-generation shuttle," Dr. von Braun said.

Contract Award by Mid-1972

The Presidential announcement about go-ahead of the space shuttle program included the statement that "this spring we will issue a request for prospective contractors. This summer we will place the shuttle under contract and development will start."

Also this spring, the agency plans to select a site for launch and recovery of the space shuttle, with the aid of a site-selection board that includes Air Force and Department of Defense representation. Eventually, NASA expects that several shuttle sites will be developed, but initially a single joint site is to be used for all military and civilian launches, according to

Dale Myers, NASA's Associate Administrator for Manned Space Flight.

NASA plans to manage the space shuttle program in a centralized fashion, with the Manned Spacecraft Center at Houston designated as the "lead center" in charge of program management, overall engineering, and systems integration as well as responsible for determining basic performance requirements. The Houston Center will also be responsible for the orbiter stage of the shuttle system. The Marshall Space Flight Center in Huntsville, Ala., has been given responsibility for the booster stage and the space shuttle's main engine development. The Kennedy Space Center in Florida is responsible for the design of the launch and recovery facilities.

As yet undetermined, according to Dr. von Braun, is the exact nature of the contractual arrangement with the aerospace industry. The possible spectrum ranges from a single package contract with one prime contractor to several prime contracts covering the key elements of the system. He did point out, however, that "it is certain that, whatever the role of the prime or primes will be, we will need a large number of contractors because the range of know-how required is not found in any one or two companies, but must be provided by a sizable group of industrial companies. The management relationship between the various elements of NASA and this set of prime contractors, associate contractors, and subcontractors is still under study."

The German-born rocket pioneer told AIR FORCE Magazine that the space shuttle's contribution to national and world security "could represent a giant step forward. In a world bristling with nuclear weapons, too much secrecy is dangerous. It seems to me that the more we know about what the other side is capable of, the less chance there is for military miscalculations and a wrong assessment in a confrontation. I think, in addition to its many other blessings, the shuttle is our best hope to attain the 'open-skies' policy advocated so fervently by the late President Eisenhower:

"National security is no longer a purely military matter. The geometric growth of such universal problems as resource depletion, arable land depletion, pollution through pesticides and waste, and population explosion has put mankind on a dangerous course. The planet Earth today represents an integrated system that can best be monitored and resolved through an overview of its ecology, its land use, and its military security from sentinels in space. The shuttle is our best means for doing this job and can make a crucial contribution to global security." ■



The Grumman Aerospace/Boeing team's proposal for an expendable, solid-rocket booster.

date project for ELDO because "it is a well defined piece of hardware that could be built abroad and shipped over here as a single package. It involves new propulsion techniques and offers the added advantage, in psychological terms, that the Europeans can identify with the tug as their own hardware contribution to the shuttle program."

If European participation in the space shuttle, expected to range between ten and fifteen percent of the total dollar value, were to be confined to codevelopment of the avionics package or similar systems, "the management of the complex interface might conceivably cost us as much as the entire European contribution. In other words, we might as well do the whole job ourselves," Dr. von Braun pointed out. He did not expect European development of the tug to pose any significant problems with respect to national security "because what the Air Force puts on top of the tug does not materially affect its basic configuration. Of course, the Air Force might for its own purposes also wish to build its own tug."

Department of Defense space experts regard the latter approach more likely. The Air Force is considering tug designs thoroughly integrated with the military payload, whereby knowledge of one automatically provides clues with respect to the other.

Dr. von Braun explained that NASA's future space stations, already in a preliminary design state, are premised on a building-block approach involving modules that can be delivered into orbit by the shuttle. He pointed out that for missions of this kind, the size of the orbiter's cargo bay and its payload capabilities are also critical. He said full-scale mockups of such modules have been developed by NASA, based on fifteen-foot by sixty-foot shuttle dimensions, and are capable of being put into

space by the orbiter without need for further assembly. They may be used as independent orbital units or they may be plugged into a modular array and become part of a space station.

Individual modules could be designed for use in such specific areas as national security functions, high-energy physics, earth resource sensors, space medicine, and astronomical observation. Such modules could be operated by scientific personnel as part of a space station, or singly in either unmanned or "man-attendant" fashion, Dr. von Braun said. In the latter case, a module could be programmed to perform a given scientific task and placed into a desired orbit, its instrumentation checked out in space, and then left unattended for a period of time. Eventually the information recorded by its instruments would be retrieved and the module itself modified or updated for a different scientific assignment. Every so often, of course, modules would be returned to earth for major factory modification.

The technique of assembling space stations that remain in orbit indefinitely by means of plug-in modules, Dr. von Braun said, looks very attractive because it offers an economical way of combating obsolescence. As sensor technologies progress or equipment and instrumentation in specific areas change, it is obviously more cost-effective to "unplug" the affected module from a space station, bring it back to earth onboard the orbiter, update the equipment, and return it to the space station, than to build a new space station.

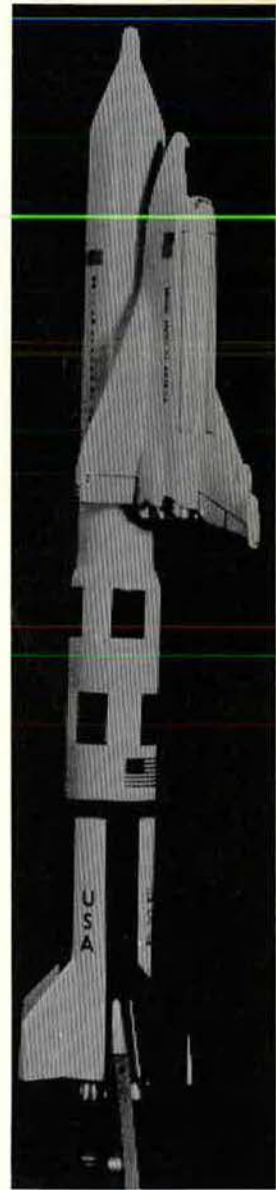
Reasons Behind the Change

In NASA's various trade-off studies that preceded the recent change in the shuttle's design, Dr. von Braun explained, the findings were "that a fully reusable system, consisting of a fly-back booster and a fly-back orbiter, is the most cost-effective system in terms of recurring [operational] costs. But the systems acquisition cost of such a shuttle design would be substantially greater than for the system we have now settled on. NASA decided, therefore, that due to budget considerations it would be more realistic to cut our nonrecurring costs drastically even if that meant a moderate increase in the recurring costs. Of course, the cost per launch must remain substantially below those of any expendable launch system now in the inventory."

Stressing that the budgetary requirements of a fully reusable system would have "absorbed the entire NASA budget, not only eliminating other vital programs but in a way killing off the applications, the very customers for which

Shuttle— Insurance Against Another Sputnik?

NASA, in its FY '73 budget request, describes the space shuttle as this country's "ace in the hole" against Soviet space surprises. The space agency also has revealed that neither its own nor DoD's budget for next year includes provisions for the development of a space tug. As a result, AIR FORCE Magazine was told, "the early missions going into synchronous orbit [via the space shuttle] would make use of existing upper stages, [and will be] variations of the Agena and the Centaur loaded into the shuttle bay for those purposes."



The North American Rockwell/General Dynamics team's recoverable booster and manned, reusable orbiter.



The North American Rockwell/General Dynamics team's proposal for an expendable, solid-rocket booster.

NASA decision was challenged, however, by United Aircraft's Pratt & Whitney Division, a losing competitor last fall, which claimed that NASA had shown favoritism and poor judgment in selecting Rocketdyne. While this charge was immediately denied by NASA, several members of Congress were quick to pick up the cudgel in behalf of their respective constituents. The General Accounting Office was subsequently instructed by Congress to review the NASA decision and is expected to reveal its findings in the near future. In the interim, Rocketdyne was authorized to pursue the program on a temporary and sharply curtailed basis, under a \$1 million-a-month contract.

Twelve-Passenger Orbiter

The orbiter is to be flown by a pilot and a copilot, drawn, in the case of purely civilian missions, from NASA's astronaut corps. (It is likely that the Air Force will absorb into its inventory a number of shuttles, which will be manned by military personnel.) Dr. von Braun said that the orbiter's two flight-crew members are likely to be assisted by two "subsystems managers," seated below the crew deck and in control of such mission support functions as operation of the cargo bay hatches and orbital cargo unloading and checkout.

The cargo area, depending on mission requirements, may be occupied by a low earth orbit satellite, fuel and supplies for space stations, a space tug plus payload for transfer to high-energy orbits or flight paths to the moon or the planets, modular elements for space-station assembly, or passengers. In case of the latter, Dr. von Braun emphasized, "we plan on a strictly 'coffee, tea, or milk' environment. We will be able to accommodate up to twelve passengers whose airmanship won't have to exceed significantly that of an airline passenger. This is of crucial importance because it will enable us to take scientists and other experts into space without the not easily compatible requirement of transforming them into astronauts." He added that since astronaut training is a full-time, stringent job, some scientists can't qualify at all for reasons of age or physical condition, while others who can would have to devote so much time to astronaut training that their scientific work would be shortchanged.

Two-Week Turnaround

A key requirement with respect to the orbiter, in addition to a 100-mission life span, is its ability to "turn around," and be ready to

fly its next mission within two weeks and with a minimum of refurbishing. As a result, Dr. von Braun said the use of ablative materials will be held "to a minimum, but not ruled out." Ablata (materials that burn off in a controlled manner during reentry and thereby shield the vehicle against thermal damage) may be used in a limited way on the leading edges of the wings and at the nose cone, the areas that experience the highest atmospheric heating.

While no firm decisions with respect to the orbiter's material composition have been reached at this time, Dr. von Braun said that most orbiter design studies favor conventional aluminum alloys for the internal structure, which is isolated from the hot supersonic slipstream by nonablating, nonmetallic heat shields. In addition, it is likely that some advanced composites will be incorporated in the design.

One of the key military requirements regarding the orbiter is a good cross-range capability, meaning the ability to maneuver upon reentry to landing sites within a relatively wide corridor. The orbiter's cross range is now expected to be about 1,100 miles, meaning that it will be able to deviate by that distance from a straight-in flight path.

The orbiter's payload, if the full-size vehicle is chosen, will be carried in a cylindrical container about the size of a Pullman car, or somewhat larger than a Greyhound bus. While there had been some initial NASA opposition to the Air Force's insistence on the fifteen by sixty foot, 65,000-pound-payload requirement, Dr. von Braun stressed to AIR FORCE Magazine that "we fully support and favor these criteria for a number of reasons. For one, if we [upon completion of the current Apollo series] plan to visit the moon again, we obviously will do so with the help of the space shuttle. Since we can't fly the orbiter all the way to the moon, we will rely on a tug to take us from the orbiter's low earth orbit to the moon orbit and back. The effectiveness and utility of such an approach is predicated on the availability of a tug of adequate size, payload, and fuel supply. This, in turn, is dependent on the space and weights available in the orbiter's cargo bay."

Neither NASA nor the Department of Defense is now engaged in specific tug development efforts. But various tug designs have been studied by NASA, DoD, and ELDO, the European space organization. President Nixon, in announcing go-ahead on the shuttle program, reemphasized the desirability of international cooperation. Dr. von Braun said NASA considers tug development an attractive candi-



The Grumman Aerospace Corp./Boeing Co. team's proposal for a recoverable, liquid-fueled rocket booster.

including the fuel-tank area, the injector system, and the avionics, are hermetically sealed off. He said that it is NASA's contention that predictions about water-corrosion damage appear to be exaggerated and "disregard the fact that the US Navy has managed to inure some of its most sensitive electronic systems against saltwater corrosion, involving saltwater submersion over periods of years."

The Orbiter Stage

The part of the semireusable space transportation system that is fully evolved and in keeping with the nation's long-term military and civilian space needs is the upper-stage orbiter. Except for small degradations in size and payload dictated by the desire to optimize the system's cost-effectiveness, its specifications are reasonably firm. A congressional critic may have been hyperbolic but nevertheless close to the mark when he termed the booster "a Cadillac riding atop a Model T."

Nevertheless, there are significant changes between the twin-engine orbiter design of 1971 and the present triengine design, principally in the propulsion area and associated techniques. The most obvious change stems from the fact that the new orbiter is essentially "dry," meaning that the liquid-oxygen/liquid-hydrogen fuel needed to propel the vehicle into orbit is carried in an external tank that is jettisoned in space once its fuel is expended. This may prove a considerable fringe benefit, according to Dr. von Braun, "since, being well insulated, it offers us valuable storage space. We are exploring a number of schemes involving the tank's use in our space work." (There are, however, limits to its utility since it is not protected against reentry heat.)

The only fuel carried internally by the orbiter is that required for maneuvering and reentry. With the bulk of the fuel carried externally, the task of meeting the dimensional

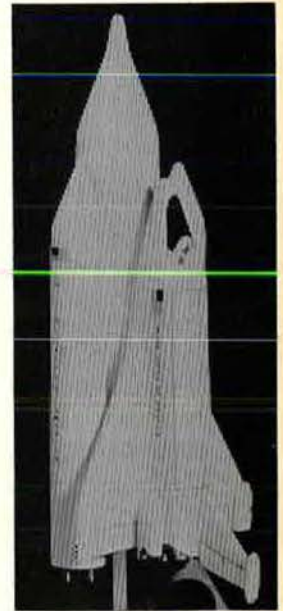
cargo bay and payload criteria was, of course, eased considerably.

The original shuttle concept was premised on the use of the same type of fuel by both the booster and the orbiter as well as on use of the same type of engine by both vehicles. The shift to a different fuel with different performance characteristics (specific impulse) dictated changes in the orbiter's engine design. This stems from the fact that, as Dr. von Braun explained, a liquid hydrogen/liquid oxygen-powered booster imparts greater speed than one using either a kerosene/oxygen or a propane/oxygen mixture, or solid propellants.

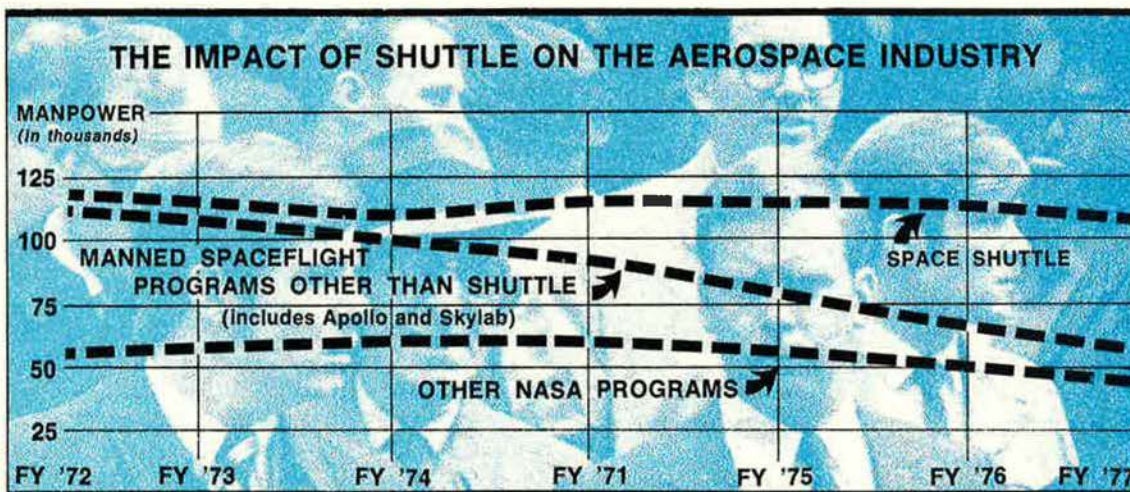
Since under the present concept the orbiter "stages" at a lower speed, meaning that it must provide a greater share of the acceleration needed to achieve orbital (Mach 22) speed, it obviously requires more propellant and greater thrust. This was achieved by changing from two to three engines, by itself a desirable configuration alteration because it improves the vehicle's safety in case of engine failure, according to Dr. von Braun. The new engines each will have a thrust rating of about 470,000 pounds at altitude. The fact that this engine output is down from the 632,000 pounds originally specified is more than compensated for through the use of three engines in place of two.

This change, Dr. von Braun said, includes advantages as well as disadvantages. In terms of the shuttle's overall takeoff weight "it would have been better to let the high specific impulse liquid hydrogen/oxygen engine do more of the job of bringing the orbiter up to orbital speed," he explained. Conversely, the fact that the orbiter engine is no longer needed for the booster makes it possible to optimize it for use by the upper stage alone.

The Rocketdyne Division of North American Rockwell was selected last summer by NASA to design and build thirty-six shuttle engines under a \$500 million contract. This



The North American Rockwell/General Dynamics team proposal for a recoverable, liquid-fueled rocket booster.



The space shuttle program is expected to have a considerable impact on employment in the now-depressed aerospace industry. The chart shows the projection based on the Fiscal Year 1973 budget program, with the space shuttle expected to involve some 50,000 aerospace workers by FY '77.



The McDonnell Douglas Corp./Martin Marietta team's proposal for a recoverable, liquid-fueled booster.

ing the spacecraft into high-altitude orbits whose revolutions are timed with respect to a selected place on the earth's surface. Because the shuttle's orbit altitude is on the order of 100 miles and synchronous orbits require altitudes of many thousand miles, a third-stage vehicle, called a space tug, is required.

The tug's own size, weight, and especially fuel supply, combined with the size and weight of the payload, dictate the shuttle's size. Because liquid hydrogen has a low specific density, voluminous tankage space is a crucial requirement.

NASA's Deputy Associate Administrator for Plans, Dr. Wernher von Braun, told AIR FORCE Magazine that four booster systems are currently under consideration. NASA is likely to select one of them for development this spring. One configuration involves three 156-inch-diameter, solid-propellant boosters, arranged to fire simultaneously and working in "parallel." Another involves four 120-inch-diameter solids, operating in the same mode.

He explained that there are no plans at present to fund new developments in large solid-propellant boosters and that, therefore, the largest available boosters, the 120-inch and the 156-inch-diameter rockets, represent the only viable options.

Dr. von Braun conceded, however, "If we were to select a solid booster stage in order to bring the system acquisition costs down to a minimum, most people believe that the system will be expendable, rather than recoverable. We do have studies in progress to find out if there is a way to make solid boosters recoverable, but the obstacles are formidable and the development would be costly.

"Many people believe that solid boosters make sense only if they are discarded. Others think that up to forty percent savings are possible by recovering solids."

The principal difficulty in making a solid booster recoverable, he said, stems from the fact that solid-fuel rockets use their combustor chamber as propellant storage space, with the result that, upon expending the propellant, "there is a gaping hole in the back through which seawater can enter freely. Thus, the booster may sink. We are examining designs that would ship only a limited amount of water. But we would still be saddled with high refurbishing costs, and their reduction would entail a major and expensive development effort." (In continuation of NASA's long-standing policy, only midocean recovery of the shuttle's booster stage is contemplated.)

On the other hand, Dr. von Braun pointed out that "the use of an expendable booster, while lowering the nonrecurring costs, may drive up the price of each flight to a point where it might be difficult to compete against the operating costs of the Titan III."

All four booster stage configurations can meet the full orbiter payload and size require-

ments. The option of a scaled-down upper stage is under consideration only because of its promise of lowering technological risks as well as costs.

Liquid-Fueled Booster Options

Two schemes involving pressure-fed, liquid-propellant boosters, burning either a mixture of kerosene and liquid oxygen or propane and liquid oxygen, are the other two booster stage configurations currently under study by NASA and its contractors. Either design would represent a completely new development, although premised "on a technology which is well in hand and in a way represents almost a step back so far as the state of the art is concerned," Dr. von Braun said. The choice here, he said, is between either two liquid-propellant systems, strapped side by side in the same manner as the three solid 156-inch boosters, or a much larger single design. The latter, he said, "is essentially a tandem stage arranged beneath the orbiter's fuel tank."

The reason why NASA is examining both parallel and tandem staging with respect to a liquid-fueled booster is that "there is still considerable concern about a system that involves two liquid, or for that matter two solid, boosters pushing side by side. This can lead to unequal thrust which, of course, must be controlled, a task which conceivably may substantially increase the required control moments. This problem is particularly critical in the case of parallel solids where control is premised solely on controlled deflections of the thrust because, unlike liquid-fueled engines, the solid motors can't be throttled. In the case of parallel liquid-propellant boosters, it is at least possible to overcome some of the thrust imbalances by a cross-feed arrangement in the fuel pressurization system and thereby equalize the thrust through active thrust control," Dr. von Braun explained.

Augmenting the thrust of the booster stage with the orbiter's three engines is being considered for the parallel-staged configurations, according to Dr. von Braun. He added: "However, one has to be ready to accept a heavy performance penalty because it means that you have to provide the orbiter with engines that can ignite at sea level. This limits the permissible expansion ratio of their exhaust nozzles, which in turn impairs the system's efficiency at higher altitudes. In other words, the ability to fire up the orbiter's oxygen/hydrogen engines on the launch pad means sacrificing some of the expansion ratios [efficiencies] at the high end."

Both liquid-propellant booster systems currently under study by NASA, Dr. von Braun said, can be so designed that seawater-corrosion damage is minimized. Special valves would be so arranged that the booster's inside,



The McDonnell Douglas/Martin Marietta proposal for a recoverable, liquid-fueled rocket booster.

By Edgar Ulsamer

SENIOR EDITOR, AIR FORCE MAGAZINE

IN JANUARY of this year, President Nixon instructed NASA to undertake the design and development of a space shuttle, "a space transportation system designed to help transform the space frontiers of the 1970s into familiar territory, easily accessible to human endeavor in the 1980s and 1990s." The system envisioned by Mr. Nixon is to "routinize" spaceflight by reducing its costs to possibly one-tenth of the present level and by cutting back on the preparation time required for each launch.

The new space shuttle, the President said, "will make the ride safer and less demanding for the passengers, so that men and women with work to do in space can 'commute' aloft, without having to spend years in training for the skills and rigors of old-styled spaceflight.

"The general reliability and versatility which the shuttle system offers," he said, "seem likely to establish it quickly as the workhorse of our whole space effort, taking the place of all present launch vehicles except the very smallest and the very largest."

The President authorized a program that is to lead to an operational system by the end of this decade. In its developmental phase it is budgeted for \$5.5 billion. The development costs include all research, development and test, and evaluation expenses, as well as two flight-test vehicles. Eventually NASA expects to have an inventory of five vehicles, and an as yet unspecified number is likely to be operated by the Air Force for military missions.

During its peak period, the program is expected to employ up to 50,000 aerospace workers. The space shuttle is to serve military as

well as nonmilitary purposes. In addition, Mr. Nixon stressed, "the continued preeminence of America and American industry in the aerospace field will be an important part of the shuttle's 'payload.'"

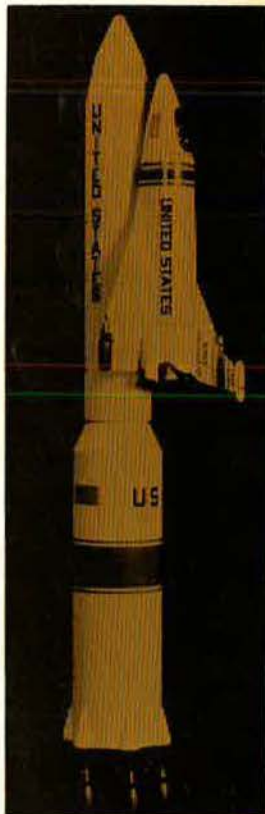
While final specifications are not yet firm, the shuttle can be expected to weigh about 4,700,000 pounds at takeoff and will consist of two stages, an unmanned booster approximately 175 feet tall, and a deltawinged, airplane-like orbiter about the size of a DC-9, powered by three high-pressure oxygen/hydrogen engines. The orbiter will be able to remain in orbit anywhere from a week to a month, depending on mission requirements. The orbiter flies back to earth in airplane fashion and is piloted by two astronauts. It is likely to have a length of about 120 feet, a wingspan of seventy-five feet, and a cylindrical cargo bay area between fourteen and fifteen feet in diameter and between forty-five and sixty feet in length.

The orbiter is to be able to fly up to 100 missions with only minor refurbishing. The time needed for refurbishing, the so-called turnaround time, is not to exceed two weeks. Unit cost is expected to be about \$250 million in current dollars. The bulk of the orbiter's fuel will be carried in an external tank that is jettisoned in orbit.

The system as authorized by the President differs from the fully reusable and fully flyable shuttle advocated by NASA and the Air Force last year (see *September '71 AIR FORCE*). The new approach is pegged at half the estimated cost of the original design. The basic, and in terms of operating cost most critical, difference is that the system as approved will not use a manned, flyable booster, but instead will rely on either an expendable solid-propellant or a parachute recoverable, liquid-fueled lower stage. NASA's pending selection from among the several booster systems currently under study will be based on trade offs between systems acquisition cost and cost per flight. In addition, NASA is trying to determine whether the orbiter can meet the military payload, weight, and size requirement either in full, or only to a somewhat degraded extent.

The Military Requirement

The military requirement and NASA's own needs call for a cylindrical cargo bay fifteen feet in diameter and sixty feet in length, with a payload capability of 65,000 pounds for due-east launches, or 40,000 pounds for launches into polar orbit. (Due-east launches take advantage of the earth's rotational speed to augment the booster's thrust.) The Air Force and NASA view these capabilities as "magic numbers" because almost all military, and many of NASA's, proposed satellites require high-energy, geosynchronous orbits. This means plac-



Top of page: McDonnell Douglas/Martin Marietta expendable, solid-fueled rocket booster. Bottom of page: Grumman Aerospace/Boeing proposal for recoverable, unmanned booster and manned orbiter.

Recent efforts, launched with considerable public impact, to "sell" a shift to a single system and single-basing mode for the nation's strategic as well as tactical deterrence jeopardizes vital defense requirements and narrows the

The Categorical Need for a Mix of

THE Air Force Association 1971-72 Statement of Policy defines the linchpin of US security as a strategic Triad, reinforced by US ground troops and land-based tactical air-power garrisoned in the sovereign territory of those allied countries to whom "we have firm and unequivocal commitments." Ensuring this dual capability of strategic and tactical deterrence, in AFA's view, must be a mix of aerospace, land, and sea forces whose makeup and proportions "must not be confused with service objectives," but should be arrived at solely on the basis of the national strategy of realistic deterrence.

A similar view was expressed by USAF's Chief of Staff, Gen. John D. Ryan, who pointed out that "when in the face of serious external aggression to our allies we have made firm commitments and have underwritten these commitments by garrisoning ground and air units in the sovereignty of our allies, there has been no aggression. NATO and post-1953 Korea are cases in point."

Obviously inspired by arguments that favor moving the nation's entire strategic deterrence to sea are proposed schemes to depend for tactical deterrence on using proximity forces (sea-based tactical air) in place of in-country forces. Recent analyses of this rationale by defense planners concluded that the single-system approach makes no more sense in the tactical arena than it does in the strategic field. The most pervasive deficiency is ambiguity as to US interest. *How* an adversary reads US intentions and resolve is more important than *what* they actually may be. The presence of in-country forces provides a clear and unequivocal commitment.

On the other hand, a force standing off in the extra-territoriality of the high seas may or may not be committed. Further, an attack on an ally in whose territory US forces are garrisoned must be perceived by a would-be aggressor as an attack on the United States. To oversimplify, these analyses found that in-country forces connote certainty and thereby reinforce deterrence, whereas "proximity" forces connote uncertainty and lower the deterrent threshold.

In a practical sense, in-country forces are only as effective as our ability to reinforce and supply them. Recent advances in air mobility, coupled with the rapid operational deployment capabilities of tactical air units stemming from the Bare-Base concept, achieve these goals, and further improvements can be attained as needed. A recent study found, for instance, that a total of thirty tankers of the Boeing 747 type, operating between the US Eastern seaboard and Europe, could provide the fuel needs of all tactical US fighter aircraft currently stationed in Germany and the Benelux countries. A single 747 can deliver 200,000 pounds of fuel for ground storage, an amount sufficient for about fifteen fighter aircraft sorties.

Modernizing the tanker fleet by adding a supersized jet vehicle is considered the only major new requirement to assure adequate tactical air deterrence in the years ahead, assuming that such ongoing projects as the F-15, A-X, the advanced technology fighter, and AWACS will go into the inventory.

There are other advantages to the selective use of in-country forces *augmented* by proximity forces and air mobility, as opposed to *only* proximity forces. In the sense of the studies, the non-Communist world is separated into three basic levels of US interest. The first category is typified by the NATO countries and the Japan-Korea complex. It involves nations firmly allied with the United States and vital to our own security interests, who face a serious, long-term threat of external aggression. Explicit in such a commitment is the US capability for rapid and massive reaction. It follows that such commitments, to be effective and in consonance with the Administration's concept of realistic deterrence, must be confined to crucial and legitimate areas of US political concern. Such a tactical posture reduces the likelihood of proliferating commitments, an erosion of resolve, and forces spread too thin to be effective.

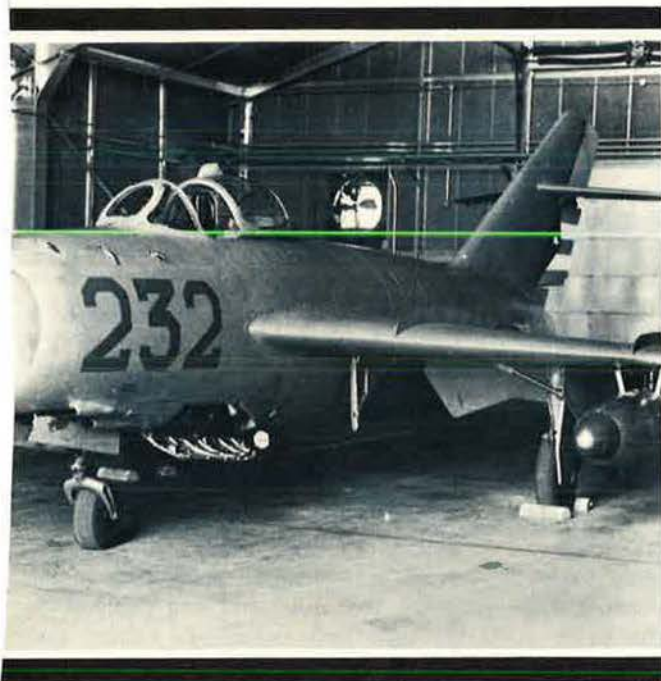
The counter arguments advanced by the advocates of a proximity force policy, is that an ally may deny base rights because the external threat may dwindle or for political reasons. The first condition, in the view of

and obviously is of major concern to the Armed Services Committees of both the House and Senate. No report is complete, however, without reference to the skepticism that prevails in other key areas.

It suffices to call attention to last year's hearings of the Subcommittee on Defense Appropriations of the Senate Appropriations Committee. The Chairman is Allen J. Ellender, who hails from Louisiana and is a political neighbor of F. Edward Hébert.

Mr. Ellender, who has visited Russia and considers himself something of an expert on that country, its intentions and capabilities, says "they are not building bombers to any extent." He says the force they have is old and he fears that "the moment we start building the B-1 . . . they are going to go back and try to imitate us.

"I have contended all along that we have put Russia



This is a MIG-17, built in Russia and flown into Homestead AFB, Fla., by a defecting Cuban pilot, who evaded detection by flying low. The date was October 5, 1969. The aircraft was returned to the Cubans, but the men responsible for US air defenses remained embarrassed.

on the defensive for the last fifteen or twenty years. That is what we have done. That is why you see so many Russian ships in the Mediterranean. We have been in the Mediterranean for twenty-two years, and they just recently have come there."

The hearings were held last April, but the censored transcript was released only about the first of this year. In it, Chairman Ellender engaged in exchanges on Russian military stature with Grant L. Hansen, Assistant USAF Secretary for Research and Development, and Lt. Gen. Otto J. Glasser, Deputy Chief of Staff for R&D.

Mr. Hansen pointed out that the F-106 air defense interceptor is fourteen years old. That situation must

be remedied and other R&D money for the next few years must go to finish development of the B-1, the F-15, the A-X, and AWACS. There are other items essential to our defense, including better surface-to-air missiles, optically aimed weapons, improved reconnaissance devices, unmanned observation platforms, and relays for guidance and control. So far, there is no development program for the IMI.

Mr. Ellender's response was to recall the history of the North American B-70 bomber. He said the project was stopped because the Russians improved their high-altitude defense system, which also forced the US to alter B-52 tactics and put the aircraft on the deck. "How do we know," the chairman asked, "they won't develop a low-altitude defense system that will counter the B-1's low-level capabilities?"

The response was that the B-1 will be versatile; it can go high and fast, and it can go low, using sophisticated penetration aids.

Facing General Glasser, who outlined the case for OTH-B and AWACS, the Appropriations Chairman challenged the spending of "tremendous sums" for a warning system aimed at Russian bombers, arguing that it escalates the arms race. Again, he depreciated the threat from Russian bombers.

General Glasser testified that the OTH-B proposed funding for Fiscal 1972 was \$3.6 million, added to prior funding of \$8.6 million. Then there was this revealing exchange:

CHAIRMAN ELLENDER: In view of the limited threat against the continental United States, just why do you feel it necessary to spend all of these funds to develop new aircraft warning systems?

GENERAL GLASSER: As you know, we have hard evidence of a bomber prototype, which is well advanced in the Soviet Union and which could be in production long before we would be able to put in these reactive defenses.

CHAIRMAN ELLENDER: That has been going on for several years?

GENERAL GLASSER: Yes, Sir.

CHAIRMAN ELLENDER: When we develop a new weapons system, the Russians emulate us or develop a countermeasure to our action. The development of the B-1 may well accelerate the development of more sophisticated Russian bombers. Don't you agree?

GENERAL GLASSER: I am not in a position to agree with you, but I would have to point out that it would be reckless of us to engage in unilateral disarmament.

This discussion, essentially about the chicken and the egg, is going to be continued in 1972. Considering the opinions of Mr. Hébert, Generals McKee, McGehee, and Glasser, Admiral Moorer, and Mr. Ellender, the debate is not likely to wane.

The right answer could be dictated in Moscow.

Until it is, the NORAD command and Congressman Hébert appear to be the only principals truly embarrassed by such events as the flight of Cubana 877. ■

It was suggested by Rep. Samuel S. Stratton of New York that the Cubans might attempt an attack against a US target and Russia would intervene by threatening nuclear war if the US retaliated.

The Admiral said he does not think the Kremlin would be willing to trade Moscow for New York in order to support Castro "on such a junket as these MIGs might indulge in." He puts his faith in continued deterrent power.

Stored Radar

It was while Admiral Moorer was testifying that the inquiry learned there is a backscatter radar (OTH-B) in storage. In early December, at the final session of the Armed Services hearing, witnesses were called from the Office of Naval Research and the International Telephone & Telegraph Corp. (ITT) to discuss the status of this project. A vast amount of the testimony was deleted by Pentagon censors, upon publication of the transcript. What was learned is best summarized in the committee report:

"The brightest spot in this depressing picture was supplied by certain military and civilian witnesses, who testified that Over-the-Horizon Backscatter (OTH-B) radars are in operation overseas today, and have been for some time, and such a unit is now available to provide immediate detection capabilities along our southern perimeter," the report says.

"Experiments with OTH-B detection systems have been conducted since the late 1940s; but at that time results were inconclusive as to their value for military purposes. In the late 1950s, greater attention was directed toward the development of OTH capabilities when the Navy proved it could detect nuclear testing. In the early 1960s, the Navy constructed an OTH-B and began reporting missile launches, as well as nuclear testing.

"Later, techniques were developed to detect aircraft and cruise missiles that can be launched from submarines. The operational capability of OTH was proven in the deployment of such radars overseas. Confirmation of the OTH capabilities has led to plans to develop a sophisticated OTH-B system for US air defenses to be operational in the mid-1970s. However, a used system, which is now available, can provide interim detection capabilities along our southern perimeter."

The report continued:

"Estimates provided by industry witnesses indicated that coverage of the Florida Straits, and practically the entire Gulf of Mexico by the existing OTH-B radar, can be achieved in six months. They also testified that the first-year costs, including refurbishment, installa-

tion, and site preparation, as well as one year of operational manning, are estimated at \$5.7 million.

"The subcommittee urges the Department of Defense to take immediate action to install the presently available OTH-B at a location that would close the gap in our southern defense perimeter. The subcommittee also urges the rapid development, procurement, and deployment of the improved OTH-B to insure the integrity of our entire CONUS defense detection capability. This, of course, is but the first step in the critically needed upgrading of our CONUS defenses which, in addition, must also include the new Airborne Warning and Control System (AWACS) and Improved Manned Interceptor (IMI).

"These two systems can also be operational by the mid-seventies and, when used in connection with the OTH-B, can give this country real defensive security. This must be accomplished with all speed, for each passing day makes more dangerous 'the calculated risk' which has been permitted in the name of economy."

What the report failed to point out in this otherwise revealing summary of OTH-B capabilities is that the new advance in radar contributes to more than our defense against intrusions by airplanes, be they bombers or irritating little flights like that of Cubana 877. The OTH-B, once fully operational, will be part of the continent's strategic warning system.

A New Soviet Bomber

In recent months, the Russian surge to achieve nuclear superiority has been well publicized. *Jane's Weapons Systems*, published last November, reported that the Soviet Union has "overtaken, and in some cases surpassed, the West in developing missiles and other weaponry." More recently, there was the appearance of a new bomber, named "Backfire" by NATO. *Jane's* says it is supersonic with a low-altitude capability at no loss of speed. Also, that "the approximately equivalent US B-1 bomber project is only at the mockup stage, while Russia has two Backfire prototypes flying."

In Colorado Springs, air defense experts argue that the Russian aircraft now in use for offshore missions near North America are a credible threat to the United States. Heaviest is the TU-95 Bear, with an unrefueled range of about 8,000 miles. It can carry a 25,000-pound bomb load.

The commercial version of this airplane, the TU-114, regularly flies nonstop from Havana to Moscow. Bear bombers fly nonstop Moscow to Havana in seventeen hours—that trip has become routine. They are turbo-props.

There is a smaller, medium-range Soviet bomber called the Badger, frequently seen off Alaska, and a supersonic medium-range bomber named Blinder. The Defense Department estimates there are 750 aircraft in these two classes, plus 110 Bears and ninety Bisons, an older all-jet bomber.

The credibility of this threat is accepted at NORAD

"I can say," he told the committee, "that our anti-bomber defense systems are obsolescent and generally nonexistent along our southern border. We still have precisely the same types of weapons that we had in the early 1960s, but they are now ten years older, and we have them in far fewer numbers. In spite of this phase down in weapons and personnel, CINCNORAD's responsibilities have not diminished."

Priority Deployment

Later, the General said he must use what he has on a priority basis. Russia has the capability to threaten our survival and that is why his limited arsenal is deployed the way it is. He said the master plan drawn up in 1967 was based on the premise that the savings achieved by phasing down the system would amortize the procurement of a more modern defense force.

It was repeatedly pointed out that the decisions to phase down air defense are made by the Joint Chiefs of Staff and "at a higher level." NORAD gets its orders from the JCS. The Hébert hearing called Admiral Moorer, JCS Chairman, to testify.

The Admiral, always a blunt witness on Capitol Hill, made no bones of the fact that "fiscal realities" dictate some JCS decisions. He said the big threat from Russia lies in their nuclear missile capability; their bombers could strike targets in the southern states, but better options are in hand at this time.

So far as Cuba is concerned, Admiral Moorer testified that it has Russian MIG-17 and MIG-21 aircraft, the latter with an operating radius that would permit attacks no further away than Florida. American deterrent power, the Admiral believes, is enough to eliminate the risk of such an assault. He indicated the JCS still stands in support of the air defense modernization program drafted in 1967. Under questioning he gave the anticipated operational dates for the OTH-B, IMI, and AWACS projects. The dates were deleted by the censors.

For the improved interceptor, Admiral Moorer suggested, probably for the first time in public, that either the Navy's Grumman F-14 or the USAF McDonnell Douglas F-15 could fill the bill. In Colorado Springs, General McGehee indicated to this reporter that ADC has been working on a proposed modification of the

new USAF aircraft, the F-15, that can fill the requirement later in the 1970s.

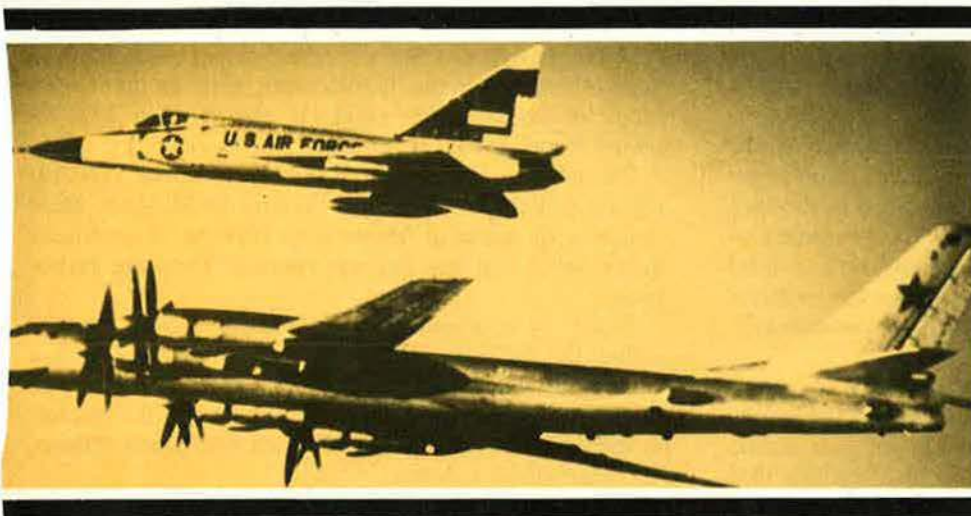
In his testimony, Admiral Moorer somehow did not seem to share the distress of General McKee and Congressman Hébert over their embarrassment at the violation of our airspace and regulations by Cubana 877. He was asked what he would do if he had more money. "Would you fill this gap as a top priority, or put it somewhere else?"

The Admiral replied that he would favor more modernization.

"You might procure the AWACS aircraft, for example, when it becomes available, so that it could be redeployed quickly to establish a barrier along the southern area in order to prevent these single-plane run-ins.

"I think you are always going to have the possibility that a single plane flying on the deck can penetrate almost any system that you could develop. It would be very expensive indeed to build up a system in this area [that would be] 100 percent leakproof. It would be very expensive for the purpose of intercepting one or two aircraft a year, if you consider these priorities that I have discussed.

"On the other hand, I realize fully the psychological impact and the need for the United States to protect this airspace. It is a highly desirable capability, as I have said. But at the rate we have been reducing the defense budget, and viewing at the same time the condition of the current air defense forces, I would have to look at the problem in totality to see just where we should put the money."



Both NORAD and NATO interceptors get plenty of practice intercepting Russian bombers probing our air defense capabilities. In addition to runs along the North American continent and parts of Europe, the Soviets overfly our ships at sea and carry out routine training missions to Cuba.

from State that visa applications for the sugar-cane conference had been denied about a month earlier.

As a matter of fact, the State Department had known for over a year that Cubans were making a determined effort to attend the conference. The Armed Services Committee argues that State "should have brought this information promptly to the attention of all agencies concerned with national security, in order to insure a ready response to a possible illegal entry. However, although the problem was discussed over a period of months, there is no evidence that either NORAD or CONAD was advised of the pending problem or that any contingency plan had been agreed upon."

Further, in discussing NORAD's participation, the report concludes that it was exactly eight minutes after

Tain't Funny

In the early 1950s, when our air defense effort was at a pretty low ebb, ADC personnel were frequently twitted by SAC people about their inability to find and fix SAC bombers on mock penetration missions. The stock answer, wryly offered, was, "Don't worry about it. As soon as the Russians drop their bombs, we'll know where they are and we'll shoot 'em down like flies." It wasn't really funny then and it isn't now, either.

—J. F. L.

the Cubans had deplaned at New Orleans that the command had a call from the State Department representative at the National Military Command Center. The message: Due to Soviet Prime Minister Kosygin's arrival in Cuba that day, the Havana airport was closed and the proposed flight—of Cubana Special One, later Cubana 877—could not take off.

"Under these circumstances," the report says, "it would not be too difficult to understand why NORAD might have been less than certain as to what, if anything, it should do."

General McKee's attitude was stated, loud and clear, on the stand. He was asked whether he was of the opinion that the Cubans really were headed for the conference on sugar, or "did they have something else in mind?"

The answer was that from the way the flight was conducted and the fact that it was not detected "indicates to me that they underflew our radar, which did give coverage in the Cuban area. Also, since they didn't report in at the mandatory reporting points as they should have done, it is my opinion they didn't want us to know they were there until they arrived."

The General was reminded that even though he doesn't have the equipment, he has the responsibility.

"If they had come in, let's say, and dropped bombs or something or other, you would be the fellow that would be on the pan, would you not?"

The General replied this was most likely.

General McKee raised a point of his own about the State Department's requirement for five days' notification of unscheduled flights from Cuba to airports in the US. There had been a long discussion about it, and the USAF captain who got the first word on October 26 testified that he did not know of the requirement.

"That response might have led you to believe that others of us were aware of that requirement," General McKee told the hearing. "The facts are that I was not aware of it, and I have been unable to determine that anyone in NORAD was aware of it."

JCS Chairman

There were two star witnesses heard on the subject of air defense capabilities. In addition to General McKee, the committee had a long session with Adm. Thomas H. Moorer, Chairman of the JCS.

The General reviewed the role of CINCNORAD and his responsibilities to the President, the Prime Minister of Canada, the JCS, the Secretary of Defense, and their military counterparts in Canada. NORAD is binational; it uses the strength of USAF's Aerospace Defense Command (ADC), the Canadian Forces Air Defense Command, and the US Army Air Defense Command.

Back in 1958, when NORAD was established, it had substantial forces. What has happened since then is shown in this tabulation:

NORAD Weapons

	1960	1971
Nike/Hawk batteries	270	63
Fighter squadrons (Reg.)	65	14
Fighter squadrons (ANG)	38	15
Bomarc squadrons	9	7
TOTAL	382	99

By June 30, 1972, the fourteen regular interceptor squadrons will be cut to nine and, by June 30, 1973, reduced again to seven, half of the 1971 strength. The Fiscal 1973 proposed budget, sent to Congress in January, also indicates the Army's surface-to-air batteries will be depleted to only twenty-one. The number of Bomarc squadrons already stands at five instead of seven.

NORAD Radars

	1960	1971
Long-range radars	187	99
Gap fillers	105	0
TOTAL	292	99

In the same time period, personnel assigned for air defense of the continent were reduced by about sixty percent, from 246,720 to 94,575.

In his testimony, General McKee emphasized that he does not have forces to cover our southern approaches. There are from four to six interceptors on alert at Homestead AFB in Florida. He said that in the past year the 20th NORAD region, which is responsible for air defense of the southeastern US, has detected a total of 176 unknown aircraft.

proposed trip from Havana to New Orleans. The message designated the flight as Cubana Special One, not Cubana 877.

This flight plan was filed directly with the Federal Aviation Administration's switching center at Kansas City, Mo., and relayed at once to centers at Houston and Miami as well as the New Orleans International tower. Word also was passed on to NORAD, FAA headquarters, and the State Department. The plan called for Cubana Special One to depart Havana at 9:00 a.m. with estimated arrival in New Orleans at 11:59 a.m. Intended airspeed was 240 miles an hour at an altitude of 14,000 feet.

The Cubans violated a couple of regulations right at the outset. There is a rule, instigated by the State Department and presumably enforced by FAA, that says any flight from Cuba is required to file its flight plan five days in advance. This wasn't the case and when FAA asked Havana if Cubana Special One had taken off, FAA was told it had not departed. In fact, Cubana 877 had already been in the air about forty minutes. On top of this, at no time was FAA told how many passengers were aboard or their identification. Mr. Hébert says one of those aboard was the chief of Castro's central intelligence organization.

"There is no evidence," the Armed Services report says, "that any of the US authorities advised the Cuban authorities that the flight plan filed by Havana failed to conform to US requirements in at least two important respects and, therefore, would not be approved."

Sticky Matter

On the morning of October 26 there was another sticky matter in the news about Cuba that obviously had a bearing on how FAA handled what turned out to be Cubana 877. Washington was concerned about an American Airlines 747 with 235 passengers that had been hijacked to Havana and kept there more than two days. James Murphy, Director of the Office of Air Transportation Security, was the man in charge of the problem on the morning of October 26. Under questioning, he was asked whether he challenged the Cubans when they failed to give five days' notice for the flight.

"We were having a hard time with the Cubans that particular day," Mr. Murphy replied. "The night before—because of the American 747 with 235 people on the ground—the Havana Center told the Miami Center to stop bugging them. They didn't want any more transmissions. We tried to be very selective in communicating with Havana Center until it really counted. . . ."

Mr. Murphy said he waited until fifty-three minutes after the flight plan called for Cubana Special One to have taken off, then ordered Miami to ask whether the aircraft had taken off or not. He suspected, by this time, that Cubana Special One had something to do with the hijacked airplane and the release of the Americans aboard. He said, "We were urging the State Department and other elements to treat the Cubans with courtesy and consideration on their arrival" because he did not want to jeopardize the release of the 747 and the Americans aboard.

As for Cubana Special One, the inquiry found Havana replied to Mr. Murphy's query at 9:54 a.m., saying the aircraft had not departed. Later evidence showed Cubana 877 had taken off at 7:15 a.m. and was in the air for thirty-five minutes before the flight plan was filed. It arrived in New Orleans at 11:17 a.m., nearly an hour earlier than the arrival time estimated in the flight plan for Special One.

The first knowledge US officials had of an impending arrival was a request for landing instructions received at New Orleans International at 10:57 a.m. The aircraft identified itself as Cubana 877 and said it was twenty-five miles away at 4,000 feet. Cubana 877 was cleared for landing at 11:12 a.m. There is no further reference to Cubana Special One.



Unwelcome guests from Cuba prepare for takeoff from airport at New Orleans. Denied visas for US visit, they defied both State Department and FAA regulations.

Who was on board? Twenty-one Cubans who said they came to town to attend an International Sugar Cane Technological Conference. In addition to arriving without an approved flight plan, they had no US visas for admission to this country.

The uninvited and unannounced Cuban guests were put up, for a couple of days, at a Hilton Hotel adjacent to the New Orleans airport. Then they were moved, to quarters that were less expensive to the US government. They spent the next half-dozen days at the Belle Chasse Naval Air Station, where they were bedded down in—of all places—the F. Edward Hébert Bachelor Officers Quarters. From here, they were sent home, without a taste or smell of sugar.

State Not Spared

The committee report does not spare the State Department. Kenneth M. Smith, FAA Deputy Administrator, testified that "we got nowhere" in first efforts to find out whether any visas had been issued.

An hour and twenty minutes after the proposed departure of Cubana Special One, the word came back

The report on that session came up with these conclusions:

1. Existing US air defense is virtually useless. It is more concept than actuality.

2. In a series of economy moves, beginning in 1963, our detection and intercept capabilities have rapidly deteriorated, despite a steadily increasing threat posed by submarine-launched missiles and newly developed Soviet long-range bombers.

3. Because of the failure to maintain a viable US air defense system, sovereign US airspace cannot be effectively protected from intrusions by foreign aircraft, civil or military.

4. A 1,500-mile opening in our air defense exists on the southern US perimeter between Florida and California. The area is virtually devoid of military surveillance and air defense command and control.

5. The Cuban plane incidents of 1969 and 1971 demonstrate that any foreign power can, at will, violate the southern US airspace without detection or interception. More importantly, they suggest that any enemy having the capability to attack from the south would be immune from detection and interception.

Committee Recommendations

The committee made two recommendations to the Secretary of Defense:

1. Accelerate the upgrading of existing outmoded and ineffective continental air defenses by inclusion of the Airborne Warning and Control System (AWACS), the Over-the-Horizon Backscatter Radar (OTH-B), and the Improved Manned Interceptor (IMI).

2. Utilize, as an interim measure for southern air defenses, the OTH-B system presently available for detection and surveillance.

If Mr. Hébert seems unduly alarmed, there are more reasons for it than two airplane sorties from Cuba. The truth is that Soviet bomber flights along the fringes of North America are routine. Alaska, Canada, and Iceland are common territories of interest and the Russian flights are monitored by American and Canadian interceptors. Our Defense Department has a

policy of keeping silent about this, although the Canadian government shows little reticence in this regard. At NORAD Headquarters in Colorado Springs, Colo., there is a file of motion-picture films, taken from accompanying interceptors, of innumerable examples of Russian bombers on probing flights.

General McKee makes it clear to visitors at his command post at Ent AFB, Colo., that the two Cuban flights are different only in that they terminated in the continental US. Soviet bombers fly over our fleets in the Atlantic and Pacific and skirt the continent with regularity. They are checking NORAD's response time. They are recording the frequencies of our command-and-control systems and radars. They are giving Russian bomber crews realistic training. They are observing our naval activity.

And NORAD is not alone in facing these feints. Reports from Europe say Soviet aircraft are probing NATO defenses in the same manner. Almost daily they are testing NATO's ability to react. The British Royal Air Force sees a great deal of Russian Bear and Badger bombers, many of them headed for Cuba. In Castro's country they not only can receive fuel and maintenance, but they profit from the experience of navigating and operating at the edge of the United States.

Like General McKee, Mr. Hébert is interested in broader aspects of the problem than those dramatized by the Cuban act in his own front yard.

In his report on the most recent hearing, the chairman points out there has been little change in our concept of air defense since the late 1950s, when Russian bombers were the only threat. Since then, the missile has assumed stature as a strategic weapon, "although the bomber threat has not significantly diminished."

At the same time, the report says, to save money, air defense forces on the continent have been cut sixty percent. It fixes 1963 as the start of this degeneration. As money became scarcer, the decision was made to deplete the southern defense ring in favor of the northern borders.

Surprised Reaction

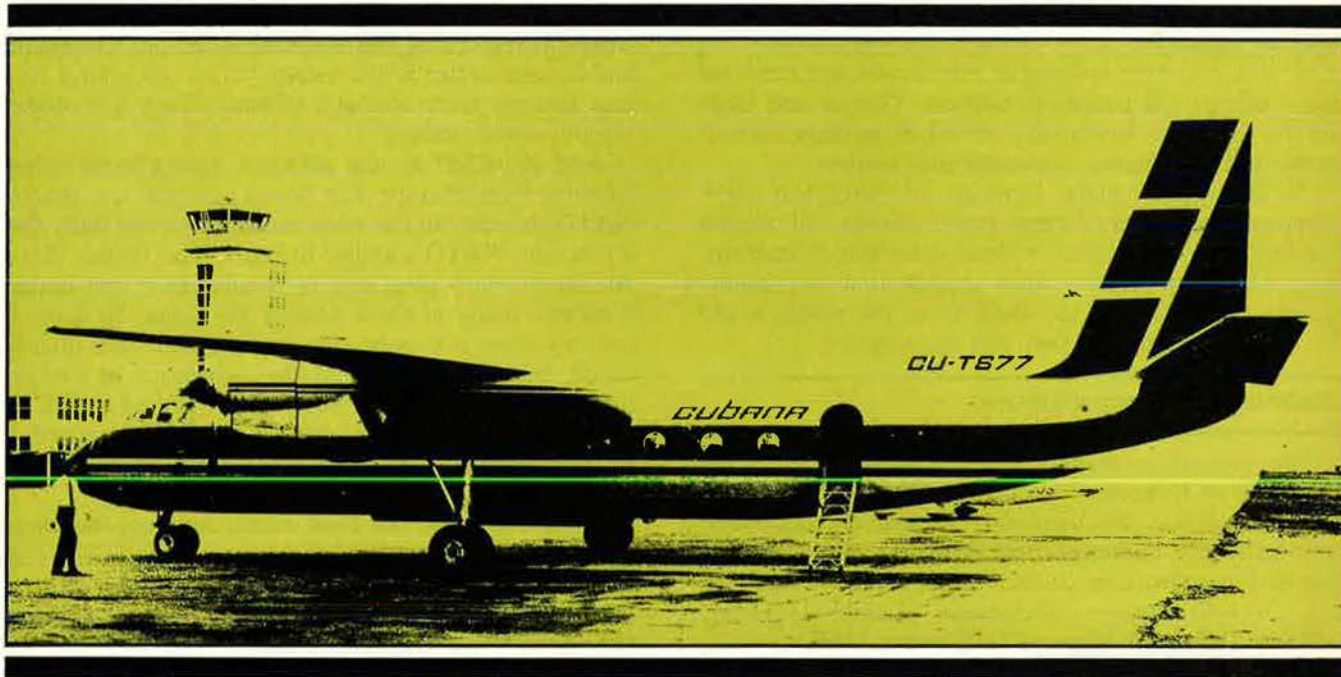
Out in Colorado Springs, a component neighbor of NORAD is USAF's Aerospace Defense Command, headed by Lt. Gen. Thomas K. McGehee. General McGehee sounds a little surprised when he talks about the reaction in Congress to a couple of episodes in which the southern defense ring has been penetrated by airplanes from Cuba. He points out that there was little objection in Congress back in 1963 when the first steps were taken. According to the General's recollection, the first surveillance radar to be dismantled was in Texas. And the only Congressman to complain with vehemence was Edgar F. Foreman, a Texas Republican and Armed Services Committeeman. When the radar was taken out, the hole was called "Foreman's Gap."

Now the gap is about 1,500 miles long, and the Cubans know it can be penetrated with ease. The aircraft that landed in New Orleans last October—Mr. Hébert says it was flown in by Fidel Castro's personal pilot—was designated Cubana 877. Early on the morning of the flight, the Havana Air Traffic Control Center filed an instrument flight rule (IFR) flight plan for a



The flight of Cubana 877 last October 26 approached New Orleans at an altitude of 4,000 feet, undetected. Chart shows where it crossed US Air Defense Identification Zone and should have been challenged.

On October 5, 1969, an armed Cuban MIG-17, flown by a defecting Cuban pilot, arrived undetected at Homestead AFB, Fla. And just last October, a Soviet-built AN-24 transport flew uninvited—and untracked—from Havana to Moisant International Airport in New Orleans. These two incidents—a source of considerable embarrassment to a number of people—have led to a chain of ominous conclusions about . . .



The Gaps in Our Air Defense

By Claude Witze

SENIOR EDITOR, AIR FORCE MAGAZINE

ABOUT two and a half years ago, Gen. Seth J. McKee, Commander in Chief of the North American Air Defense Command (NORAD), was asked by the Joint Chiefs of Staff to evaluate the impact of a proposed shutdown of half a dozen long-range radars, then part of the network guarding the USA from attack by hostile bombers.

The General's reply was that if six radars had to be closed down, for budget reasons, they should be selected from the area along the Gulf of Mexico, because that was the least critical area.

However, he added, "we will be vulnerable to embarrassment by undetected and unchallenged flights entering the US. . . ."

"When was that written?" General McKee was asked last November by Rep. F. Edward Hébert, chairman of the House Armed Services Committee.

The witness gave the date as September 4, 1969.

"You certainly have been embarrassed," the Congressman continued.

"Yes, Sir," was the General's answer.

The General was not alone. Mr. Hébert has been embarrassed, too, most of all last October 26, when a Russian-built AN-24 transport, out of Havana, Cuba, landed at Moisant International Airport in New Orleans. Mr. Hébert represents New Orleans in Congress, and national defense is his personal legislative bailiwick.

The Armed Services chairman had been upset previously, on October 5, 1969, about a month after General McKee wrote to the JCS. That was the day an armed Cuban MIG-17 flew undetected from Havana to Homestead Air Force Base in Florida and landed while the Presidential aircraft, *Air Force One*, was parked nearby.

Both incidents resulted in examinations by Mr. Hébert's committee. It was only two weeks after the New Orleans surprise that his Armed Services Investigating Subcommittee, chaired by the chairman himself, called a hearing.

The Long and the Short of the SLUF

Designer and Manufacturer:

Vought Aeronautics Co., a division of LTV Aerospace Corp.,
Dallas, Tex.

Historical Highlights:

First flight (Navy A-7)	September 1965
USAF A-7 configuration selected	May 1966
First A-7D accepted by USAF	December 1968
First delivery to operational USAF squadron	September 1970

Specifications:

Weight, empty	19,665 pounds
Internal fuel capacity (usable)	1,425 gallons
External fuel capacity	1,200 gallons
Aircraft length	46.13 feet
Aircraft height	16.17 feet
Wingspan	38.73 feet

Powerplant:

Single Rolls-Royce/Allison TF41-A-1 nonafterburning turbofan
jet engine with a static thrust rating of 14,250 pounds.

Performance Summary:

Speed at 5,000 feet, clean	575 knots
—with eight M117 bombs	543 knots
Rate of climb (with 8,200 pounds of ordnance)	6,600 feet per minute
Flight envelope (with 3,500 pounds of ordnance)	Up to seven Gs
Ferry range (with external tanks)	2,643 nautical miles
Takeoff ground roll (with 4,000- pound load)	4,000 feet
Rate of roll (at 5,000 feet)	180 degrees per second at 300–500 knots

Ordnance Flexibility:

Eight external stations (six wing pylons, two fuselage brackets), accommodating almost all USAF weapons; M-61 20-mm internal cannon; two Sidewinder missiles. The A-7D can deliver a combat payload of 15,000 pounds.

This entire scenario presents a picture consistent with the proven capabilities of the A-7D. My fellow pilots have all been pleasantly surprised by the effectiveness of *The System*. They have flown in both high- and low-threat environments in all types of aircraft from Korea to Vietnam. After listening to them and evaluating my own combat experiences, I'm convinced that in an attack on enemy ground forces near US troops or any key target, I want to go in an A-7D.

I'm also convinced that the A-7D will succeed in those missions with fewer sorties and losses, because of its accuracy. That means less cost in both lives and money.

Silver Lining

There is much I have not discussed in telling what it is like to get to know and appreciate the A-7D.

- It has a 2,500-mile unrefueled ferry range, and is air refuelable for longer hops.

- There are many ways to deliver weapons from the A-7D other than the normal attack mode described above. Its radar bombing accuracy is excellent. *The System* has an off-set capability enabling it to hit unseen targets.

- With the addition of LORAN and low-light-level images in the HUD, all-weather and night capabilities of the A-7D may be greatly increased.

- The computer has many functions for storing intelligence data, updating, and self-diagnosis not discussed here.

But what I did want to tell is the story of the difference *The System* makes in flying the A-7D. With today's hyperconsciousness of high cost in military hardware, the A-7D is a silver lining in sometimes very dark clouds. It is complex, but it does work. We are demonstrating daily its ability to get more bombs on target at lower cost to the taxpayer.

For these reasons my affections have been won by that Short Little Ugly Feller. I prefer to think Hemingway's words referred to loveliness of character. If doing its job better than anyone else is a measure of character, then the A-7D is the loveliest of fighters. ■

turn radius, we can keep the target in sight even in dense haze. If we should lose sight of it for a moment in a rain shower, our *System* guides us back to reattack, and the diamond-shaped aiming symbol of the HUD magically remains superimposed on the target.

If the friendly troops were fighting in an area defended by sophisticated weapons with radar-guided fire-control systems, the A-7D Sys-



tem should have an advantage over earlier tactical aircraft because of its comparative standoff bombing accuracy. The manual bomber over North Vietnam was often forced to undergo great risk in order to hit his target. To accurately attack the target he had to achieve certain release parameters of airspeed and dive angle, track the target during the dive delivery, and reduce bombing slant range to the point where he entered the effective range of enemy AAA. Every second he tracked the target he was fired upon.

Wise pilots reduced their straight path tracking time by flying curved approaches and varying dive angles. However, this usually reduced the accuracy of delivery because pre-computed dive angles and airspeeds were much harder to achieve and judge from such an approach.

The mental computation and vulnerable tracking time of manual dive bombing don't exist with the A-7D automatic system. As we attack in the A-7D, we can jink and fly a turning, "curvilinear" approach to the target without being concerned with exact airspeed or dive angle. We constantly change our track through space, presenting a poor target, as we simultaneously designate the target's location to the computer. While other systems, such as F-4 dive-toss, have similar capabilities, their accuracy is less than that of the A-7D.

The System measures slant range by radar, and fixes the location of the target in space while simultaneously computing release conditions twenty-five times per second. Command steering and attack solution anticipation cues are presented in our HUD field of view. We wait until release is imminent before flying the predicted set of bomb impact points over the target.

Now we pull off the target, and *The System* releases our remaining 500-pound bombs with the exact spacing along the ground that we selected in the cockpit. We watch them hit the target with better than ten mile accuracy regardless of wind as we jink away at 600-plus knots indicated airspeed, above the effective range of most AAA weapons. *The System* now shows us the safest planned egress route from the hostile defenses.

Ending Up Inside

Our high-lift subsonic wing is capable of high G loads and shorter turn radii than aircraft with super-

sonic capabilities. Coming off the target run with a full load of 20-mm and two Sidewinder missiles, we can *maintain* 460-520 knots in a tight, level turn at 2,000 feet. But what happens if we're jumped by enemy fighters?

A supersonic fighter would probably have to fly in a vertical plane to match our turn. At very high G loads his missiles are ineffective. If he tried to turn with us and press for a gun attack, we could take the A-7D down to fifty feet and hold a high G turn.

If he still pressed his attack, the enemy aircraft would be forced into an extremely tight nose-down turn in an attempt to get the required lead and depression angle for effective gunfire. At this attitude and altitude he would run the risk of hitting the ground. As a last resort, however, we could force an overshoot by rapidly slowing down and reducing turn radius.

If our attacker pursued at this altitude, his afterburner would be rapidly using up fuel. Our A-7D, using just internal fuel, has enough playtime at full power to fight for half an hour, then fly home with enough fuel left to divert to an alternate base 100 miles away if necessary and land safely. If the enemy broke off the engagement as he ran low on fuel, he might expose himself to our Sidewinder missiles, our guns, or both!

He who hunts the tiger may just end up inside!

Had the interceptors attacked us en route to our close-support target, we would have been handicapped by the heavy bomb load. But with our large wing and turning ability, the A-7D force stands a good chance of getting to the target *with* its bombs. It goes back to the basics of aerial combat, really. If we see him before he sees us, we can probably avoid his attack and prevent his killing our mission by forcing us to jettison our ordnance.

first developed to improve accuracy and minimize losses in such high-threat areas as North Vietnam. There, against a coordinated enemy defense system of hundreds of radar-controlled anti-aircraft guns (AAAs), plus surface-to-air missiles (SAMs), and fighter-interceptors as well, our fighters had quite a task getting to the target and back.

Assuring target destruction was quite another thing. Many technological advances were made to enable a pilot to hit his target and survive, by using a computer system that would be accurate from longer slant ranges. Now we have such a system that really works.

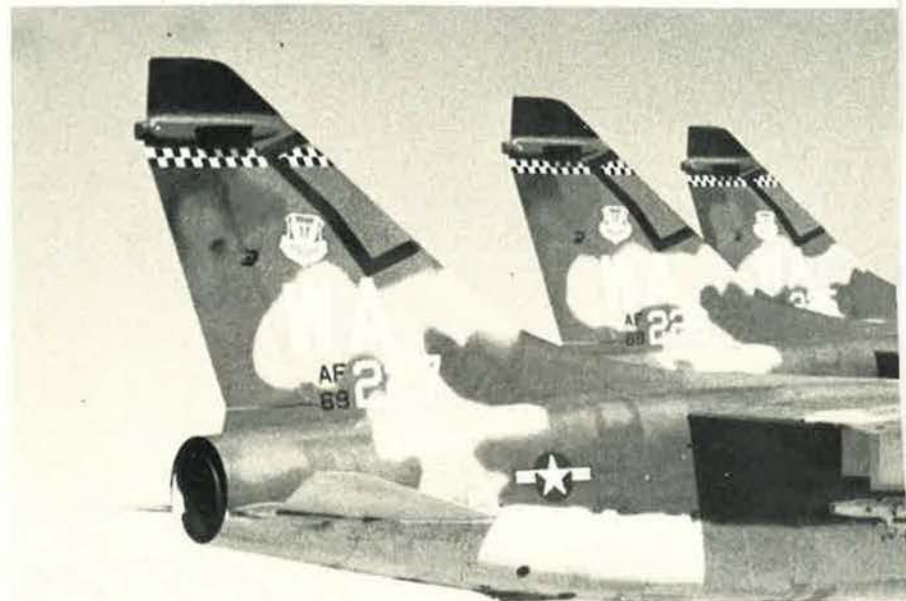
On one of my first tactics training missions in the A-7D, I was instructed to drop a practice bomb, using the automatic *System*, from a much higher altitude than I could achieve any accuracy with manual bombing. The bomb hit right on target! I began to think, "If this system can hit well from way up here, it should be amazing when we get in close to the ground!" And it *is!*

A Close-Support Mission

Perhaps I can better share this amazement with you if we fly an imaginary combat mission in support of friendly troops. Our A-7Ds are loaded with twenty-four 500-pound bombs and 1,000 rounds of 20-mm ammunition for the cannon. All we carry to the aircraft are our helmets and checklists. The parachute is preloaded in the rocket-powered ejection seat, and all the maps we need are in the Projected Map Display System (PMDS).

When the whistle blows, we climb up and strap into a somewhat snug cockpit. Our legs are held in by panels on the sides of the seat to reduce flailing damage if we should eject. The backs of our helmets are immediately clobbered by the "head knocker" safing mechanism, which

The author, Capt. Thomas G. Ryan, is an A-7D pilot with the 355th Tactical Fighter Squadron, Myrtle Beach AFB, S. C. A native of Louisville, Ky., he entered the Air Force in 1967. Captain Ryan flew 141 combat missions in the F-105 while stationed at Takhli Air Base, Thailand, 1969-70.



protrudes from the headrest when the seat is not armed for ejection firing. This is one of my favorite features; it makes it virtually impossible to fly with the seat not ready to eject if you need it.

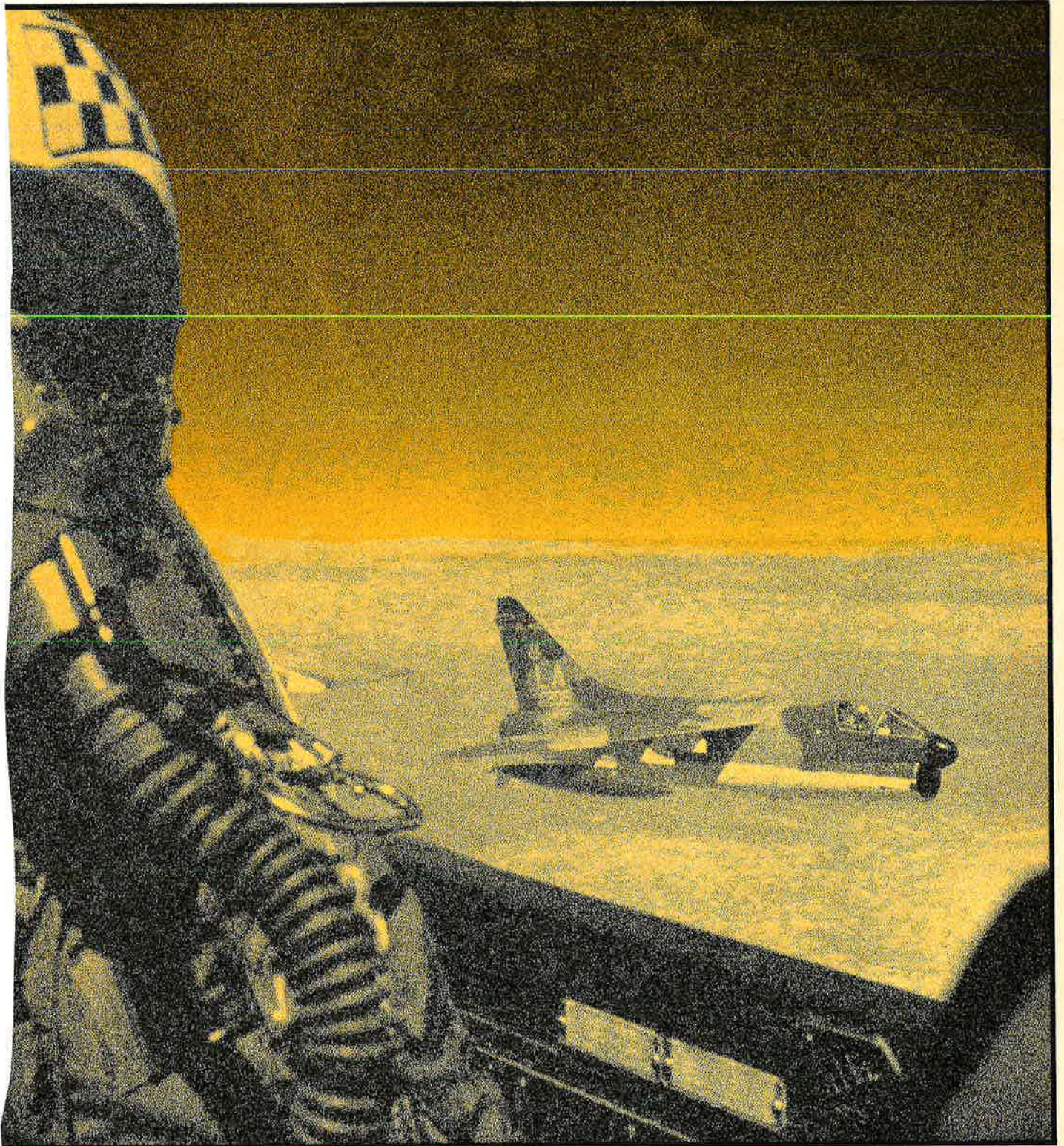
Preparing the A-7D for flight takes just a couple of minutes. We tell *The System* where we are, the heading of the aircraft, where we

Vought builds the A-7D (above) for the Air Force and the A-7E for the US Navy. The particular mission of each service dictates special components for the two versions, but they are basically the same.

want to go (up to nine destinations), and altimeter settings. After this digital dialogue, we can taxi out and take off.

Although the imaginary ground fight is going on amidst a number of monsoon variety thunderclouds, smoke, haze, and dense foliage, we are able to use *The System* to pick our friendly positions out of the murk without lots of time-consuming radio chatter. The ground commander can put us to work right away before the enemy is fully aware of our presence.

Since the A-7D has a very short



The SLUF's "black boxes"—from Forward Looking Radar to the Head-Up Display—are referred to collectively by pilots as "The System." And effective use of "The System" by A-7D pilots is the secret of this attack fighter's success in its close-support and interdiction roles.

his attention to the target and the threat.

Stick and Rudder

A pilot who has never used a HUD is really snowed by his first flight in the A-7D. Looking through the forward windscreen and HUD, he can fly precision instrument maneuvers without ever looking into the cockpit. The HUD symbolically displays airspeed, altitude, angle-of-attack, heading, and—rather than pitch attitude—actual velocity vector of the aircraft to show the pilot where he really is going, rather than where he is pointed.

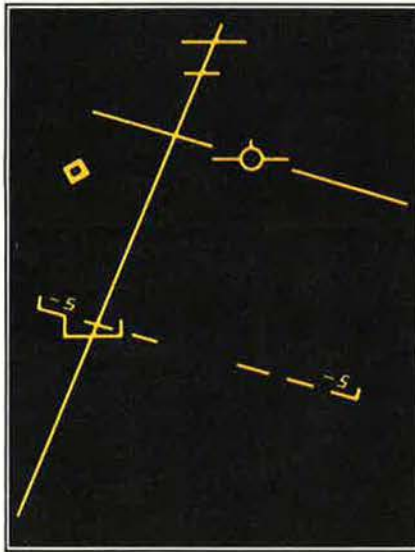
This symbology, moving with the aircraft's flight, enables a new pilot to fly a near-perfect landing on his first mission. If he is making an instrument approach, his transition from instrument to visual flying is immediate because he is looking at the runway through the HUD, rather than at instruments buried in the cockpit.

Airborne, the bird is a cinch to fly. The sequence in which fuel from the tanks is used is controlled automatically, and, once the gear and flaps are up, there are no configuration changes until landing. The aircraft has very rapid control response and yet is unusually stable in both pitch and yaw throughout its speed range. It will depart from controlled flight only if "ham-fisted" into extremely high angles of attack, and it recovers quickly if enough altitude is available. The engine has plenty of power and good response. It is a superb formation aircraft, requiring no roll-trim change at all as you move in close on the wing. In short, it is a simple aircraft just to fly.

But they don't pay us just to fly. Our mission is to drop bombs. The A-7D pilots at Myrtle Beach

AFB, S. C., are all veterans of combat tours in Southeast Asia. They come from various fighter aircraft that used a variety of automatic-release systems that sometimes did not perform as well as a skilled pilot using manual delivery.

None of us was ready to concede



superiority to *The System* without a shoot-off on a gunnery range.

Pilots vs. Black Boxes

The big showdown was no contest. On my first mission to Avon Park gunnery range in Florida, the range officer started to read the bombing winds to us; our flight leader said, "No, thanks!"

This surprised the range officer because manual bombing requires aim-point adjustment for winds, and the winds were twenty-five to thirty knots, and ninety degrees to

With the Head-Up Display—or HUD—(above) an A-7D pilot can fly precision instrument maneuvers without ever looking into the cockpit.

our attack heading. We rolled in for high-angle bombing in sequence, and I can still hear the range officer's voice climbing higher with each bomb impact: "Bull's-eye, leader . . . bull, two . . . BULL'S-EYE, THREE . . . BULL, FOUR!" Granted, they were excellent scores even for the A-7.

All the squadrons at Myrtle Beach compete in a monthly "turkey shoot" in which every available pilot drops six bombs and then strafes. It is not uncommon for one or two pilots to approach a "perfect" score. In a recent contest, one pilot had a total of fifteen feet of miss distance for six bombs and strafed eighty-six percent—a phenomenal range sortie.

Once SLUF pilots have learned the aircraft, they must perfect their skill in using the automatic system. The feeling that "I'm not doing it" disappears when the pilot sees that individual ability really does make a difference in automatic accuracy, just as it does in manual delivery. But technique has been transferred from the difficult job of judging the correct fraction of a second for releasing a weapon to the simpler task of evaluating the quality of *The System's* judgment. But for each pilot the A-7D *System* will deliver ordnance much more accurately than he could manually. Accuracy is imperative to effective close air support of friendly forces in combat.

Most A-7D pilots I know agree that we can confidently provide air support by cross checking the automatic system with our own judgment. Using this technique, we can give our troops the really close support they need when in contact with the enemy. With its accurate 20-mm cannon, the A-7D can safely attack within close distances of friendlies.

Automatic bombing systems were

The Vought Aeronautics Co. A-7D is known officially as the Corsair II and affectionately as the SLUF—for Short Little Ugly Feller. But the performance of this aircraft more than makes up for any shortcomings—real or imagined—in looks. Here, an Air Force pilot describes what it's like flying . . .

A man has only one virginity to lose in fighters, and if it is a lovely plane he loses it to, there his heart will ever be.
—HEMINGWAY

MY FIRST look at the new A-7D Corsair II attack fighter called this quote to mind.

The chubby, thick-winged, gape-mouthed fighter shows an unimpressive silhouette compared with the sleek, high-Mach, multipurpose fighters of recent vintage. My first operational Air Force assignment was in the F-105D Thunderchief, and I felt that I would never have a feeling for any other airplane like my affection for the "Thud."

That first impression of the A-7D—often referred to as the Short Little Ugly Feller, or SLUF—did nothing to erase my agreement with Hemingway. But that feeling soon changed. After fourteen months of exciting flying in the amazing SLUF, I have found that its inner character and operational potential far overcome its aesthetic shortcomings.

Excited and enthusiastic about being in on the "ground floor" of the new A-7D weapon system, I did not fully appreciate how lucky I was until I achieved a measure of skill in using the aircraft in its primary function—ground attack.

Midway through my checkout at Luke AFB, Ariz., I began to "see the picture" and realize the truly great potential of this fighter to easily do things that were either impossible or dangerous in other aircraft. *Voilà!* Here was an airplane designed to do the job it had been given: put bombs on target, anywhere, day or night. Unlike other systems, the A-7D was not designed for one mission and modified for another. It is a mix of proven airframe with Air Force avionics that blend into a first-class attack system.

The SLUF's wings are long and thick, and they bristle with six huge weapon-carrying pylons that can hold up to 15,000 pounds of ordnance. Inside those wings are fuel

tanks, filled with fire-resistant foam, which enable the A-7D to go long distances on just internal fuel. Under its bulbous radome nose, a large intake reveals huge fan blades of a turbofan engine that uses fuel sparingly. With that thick, high-lift wing, the SLUF can carry huge loads of mixed ordnance and provide ground forces with close air support for many hours at low altitude.

For less permissive environments,

That Super- Accurate SLUF

THE A-7D
CORSAIR
II

the A-7D has Sidewinder air-to-air missile pylons on the fuselage, and radar warning electronic countermeasures equipment. Its 20-mm cannon has proved fifty percent more accurate than expected—a great asset.

The A-7D is designed to hit its close-support or interdiction targets with exceptional accuracy, using an automatic system that is unique among attack fighters.

Learning "The System"

Learning to fly the SLUF takes

By Capt. Thomas G. Ryan, USAF

the pilot a few minutes, but learning to use its system effectively may take hours of flying time and weeks of study. A-7D pilots must qualify in many modes of automatic weapons delivery in addition to the standard manual qualifications. Naturally, the automatic criteria are more stringent. Therefore, the pilot becomes a "systems analyst."

There are plenty of systems to analyze: Forward Looking Radar (FLR), Doppler, Inertial Measurement System (IMS), Radar Altimeter, Projected Map Display System (PMDS), and Head-Up Display (HUD), to mention just a few of its "black boxes." Collectively, pilots refer to the total conglomerate as "The System."

This is really quite appropriate since nearly every avionics component is constantly feeding data to, receiving data from, or combining data with inputs from other components. *The System* gives the pilot a continuous awareness of the aircraft's position on the earth; attitude in relation to local vertical; actual velocity vector; and altitude above, and relative bearing from, any chosen target.

This information is gleaned from the Doppler, IMS, and other sensory systems and is used by the tactical computer to display the information a pilot needs to navigate to and destroy the target. Symbols representing aircraft performance and attack data are presented in a soft green light directly on the transparent mirror of the HUD, which is situated in his field of view as he looks through the front windshield.

His position and course of flight are continuously displayed on the map of his PMDS. The information computed by *The System* is also fed into an Automatic Flight Control System (AFCS) that can further free the pilot in combat to devote

the shuttle is being designed," he admitted that while "our present shuttle concept is head and shoulders more economical than any expendable system, it is probably not the final answer.

"We have not closed the door on developing a fly-back booster later on. If space traffic develops as we expect, and as the space program picks up new momentum, it may not be too difficult in, say, eight or ten years, to start on a fly-back booster development. In the interim, we know we are developing a system that can be economically viable for ten or even twenty years even if the combined number of spaceflights of the Air Force and NASA doesn't exceed the annual average we have had over the past five years. These past annual totals were used in the shuttle's economic justification. They did not include the ultraheavy Saturn flights or the very small payloads lofted by the Scout missile, two extreme areas in which the shuttle will not be competitive. Premised on this rather modest traffic model, the present shuttle concept can be expected to pay for itself within a decade or so."

Dr. von Braun pointed out that, instead of developing a fly-back booster stage in the future, some advanced technology not yet in hand may "enable us to someday build a single-stage shuttle." Such a second-generation shuttle may take off horizontally and be built along the lines of the aerospace plane advocated by the Air Force in the early 1960s. This concept centers on the successful development of an engine cycle that involves operating as an air breather, then shifts to a ramjet or scramjet, and finally, in airless space, acts as a rocket-propulsion system. "It all sounds fabulous, but the more we studied the associated problems, the more formidable they became. But future technological progress might well make it possible to consider such an approach for a second-generation shuttle," Dr. von Braun said.

Contract Award by Mid-1972

The Presidential announcement about go-ahead of the space shuttle program included the statement that "this spring we will issue a request for prospective contractors. This summer we will place the shuttle under contract and development will start."

Also this spring, the agency plans to select a site for launch and recovery of the space shuttle, with the aid of a site-selection board that includes Air Force and Department of Defense representation. Eventually, NASA expects that several shuttle sites will be developed, but initially a single joint site is to be used for all military and civilian launches, according to

Dale Myers, NASA's Associate Administrator for Manned Space Flight.

NASA plans to manage the space shuttle program in a centralized fashion, with the Manned Spacecraft Center at Houston designated as the "lead center" in charge of program management, overall engineering, and systems integration as well as responsible for determining basic performance requirements. The Houston Center will also be responsible for the orbiter stage of the shuttle system. The Marshall Space Flight Center in Huntsville, Ala., has been given responsibility for the booster stage and the space shuttle's main engine development. The Kennedy Space Center in Florida is responsible for the design of the launch and recovery facilities.

As yet undetermined, according to Dr. von Braun, is the exact nature of the contractual arrangement with the aerospace industry. The possible spectrum ranges from a single package contract with one prime contractor to several prime contracts covering the key elements of the system. He did point out, however, that "it is certain that, whatever the role of the prime or primes will be, we will need a large number of contractors because the range of know-how required is not found in any one or two companies, but must be provided by a sizable group of industrial companies. The management relationship between the various elements of NASA and this set of prime contractors, associate contractors, and subcontractors is still under study."

The German-born rocket pioneer told AIR FORCE Magazine that the space shuttle's contribution to national and world security "could represent a giant step forward. In a world bristling with nuclear weapons, too much secrecy is dangerous. It seems to me that the more we know about what the other side is capable of, the less chance there is for military miscalculations and a wrong assessment in a confrontation. I think, in addition to its many other blessings, the shuttle is our best hope to attain the 'open-skies' policy advocated so fervently by the late President Eisenhower:

"National security is no longer a purely military matter. The geometric growth of such universal problems as resource depletion, arable land depletion, pollution through pesticides and waste, and population explosion has put mankind on a dangerous course. The planet Earth today represents an integrated system that can best be monitored and resolved through an overview of its ecology, its land use, and its military security from sentinels in space. The shuttle is our best means for doing this job and can make a crucial contribution to global security." ■



The Grumman Aerospace/Boeing team's proposal for an expendable, solid-rocket booster.

date project for ELDO because "it is a well defined piece of hardware that could be built abroad and shipped over here as a single package. It involves new propulsion techniques and offers the added advantage, in psychological terms, that the Europeans can identify with the tug as their own hardware contribution to the shuttle program."

If European participation in the space shuttle, expected to range between ten and fifteen percent of the total dollar value, were to be confined to codevelopment of the avionics package or similar systems, "the management of the complex interface might conceivably cost us as much as the entire European contribution. In other words, we might as well do the whole job ourselves," Dr. von Braun pointed out. He did not expect European development of the tug to pose any significant problems with respect to national security "because what the Air Force puts on top of the tug does not materially affect its basic configuration. Of course, the Air Force might for its own purposes also wish to build its own tug."

Department of Defense space experts regard the latter approach more likely. The Air Force is considering tug designs thoroughly integrated with the military payload, whereby knowledge of one automatically provides clues with respect to the other.

Dr. von Braun explained that NASA's future space stations, already in a preliminary design state, are premised on a building-block approach involving modules that can be delivered into orbit by the shuttle. He pointed out that for missions of this kind, the size of the orbiter's cargo bay and its payload capabilities are also critical. He said full-scale mockups of such modules have been developed by NASA, based on fifteen-foot by sixty-foot shuttle dimensions, and are capable of being put into

space by the orbiter without need for further assembly. They may be used as independent orbital units or they may be plugged into a modular array and become part of a space station.

Individual modules could be designed for use in such specific areas as national security functions, high-energy physics, earth resource sensors, space medicine, and astronomical observation. Such modules could be operated by scientific personnel as part of a space station, or singly in either unmanned or "man-attendant" fashion, Dr. von Braun said. In the latter case, a module could be programmed to perform a given scientific task and placed into a desired orbit, its instrumentation checked out in space, and then left unattended for a period of time. Eventually the information recorded by its instruments would be retrieved and the module itself modified or updated for a different scientific assignment. Every so often, of course, modules would be returned to earth for major factory modification.

The technique of assembling space stations that remain in orbit indefinitely by means of plug-in modules, Dr. von Braun said, looks very attractive because it offers an economical way of combating obsolescence. As sensor technologies progress or equipment and instrumentation in specific areas change, it is obviously more cost-effective to "unplug" the affected module from a space station, bring it back to earth onboard the orbiter, update the equipment, and return it to the space station, than to build a new space station.

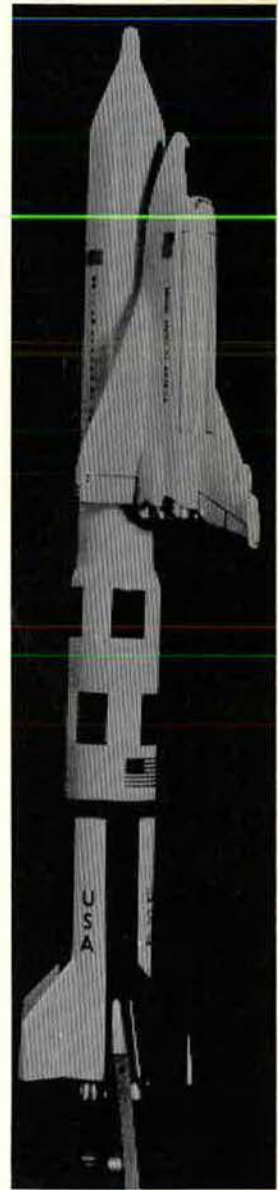
Reasons Behind the Change

In NASA's various trade-off studies that preceded the recent change in the shuttle's design, Dr. von Braun explained, the findings were "that a fully reusable system, consisting of a fly-back booster and a fly-back orbiter, is the most cost-effective system in terms of recurring [operational] costs. But the systems acquisition cost of such a shuttle design would be substantially greater than for the system we have now settled on. NASA decided, therefore, that due to budget considerations it would be more realistic to cut our nonrecurring costs drastically even if that meant a moderate increase in the recurring costs. Of course, the cost per launch must remain substantially below those of any expendable launch system now in the inventory."

Stressing that the budgetary requirements of a fully reusable system would have "absorbed the entire NASA budget, not only eliminating other vital programs but in a way killing off the applications, the very customers for which

Shuttle— Insurance Against Another Sputnik?

NASA, in its FY '73 budget request, describes the space shuttle as this country's "ace in the hole" against Soviet space surprises. The space agency also has revealed that neither its own nor DoD's budget for next year includes provisions for the development of a space tug. As a result, AIR FORCE Magazine was told, "the early missions going into synchronous orbit [via the space shuttle] would make use of existing upper stages, [and will be] variations of the Agena and the Centaur loaded into the shuttle bay for those purposes."



The North American Rockwell/General Dynamics team's recoverable booster and manned, reusable orbiter.



The North American Rockwell/General Dynamics team's proposal for an expendable, solid-rocket booster.

NASA decision was challenged, however, by United Aircraft's Pratt & Whitney Division, a losing competitor last fall, which claimed that NASA had shown favoritism and poor judgment in selecting Rocketdyne. While this charge was immediately denied by NASA, several members of Congress were quick to pick up the cudgel in behalf of their respective constituents. The General Accounting Office was subsequently instructed by Congress to review the NASA decision and is expected to reveal its findings in the near future. In the interim, Rocketdyne was authorized to pursue the program on a temporary and sharply curtailed basis, under a \$1 million-a-month contract.

Twelve-Passenger Orbiter

The orbiter is to be flown by a pilot and a copilot, drawn, in the case of purely civilian missions, from NASA's astronaut corps. (It is likely that the Air Force will absorb into its inventory a number of shuttles, which will be manned by military personnel.) Dr. von Braun said that the orbiter's two flight-crew members are likely to be assisted by two "subsystems managers," seated below the crew deck and in control of such mission support functions as operation of the cargo bay hatches and orbital cargo unloading and checkout.

The cargo area, depending on mission requirements, may be occupied by a low earth orbit satellite, fuel and supplies for space stations, a space tug plus payload for transfer to high-energy orbits or flight paths to the moon or the planets, modular elements for space-station assembly, or passengers. In case of the latter, Dr. von Braun emphasized, "we plan on a strictly 'coffee, tea, or milk' environment. We will be able to accommodate up to twelve passengers whose airmanship won't have to exceed significantly that of an airline passenger. This is of crucial importance because it will enable us to take scientists and other experts into space without the not easily compatible requirement of transforming them into astronauts." He added that since astronaut training is a full-time, stringent job, some scientists can't qualify at all for reasons of age or physical condition, while others who can would have to devote so much time to astronaut training that their scientific work would be shortchanged.

Two-Week Turnaround

A key requirement with respect to the orbiter, in addition to a 100-mission life span, is its ability to "turn around," and be ready to

fly its next mission within two weeks and with a minimum of refurbishing. As a result, Dr. von Braun said the use of ablative materials will be held "to a minimum, but not ruled out." Ablata (materials that burn off in a controlled manner during reentry and thereby shield the vehicle against thermal damage) may be used in a limited way on the leading edges of the wings and at the nose cone, the areas that experience the highest atmospheric heating.

While no firm decisions with respect to the orbiter's material composition have been reached at this time, Dr. von Braun said that most orbiter design studies favor conventional aluminum alloys for the internal structure, which is isolated from the hot supersonic slipstream by nonablating, nonmetallic heat shields. In addition, it is likely that some advanced composites will be incorporated in the design.

One of the key military requirements regarding the orbiter is a good cross-range capability, meaning the ability to maneuver upon reentry to landing sites within a relatively wide corridor. The orbiter's cross range is now expected to be about 1,100 miles, meaning that it will be able to deviate by that distance from a straight-in flight path.

The orbiter's payload, if the full-size vehicle is chosen, will be carried in a cylindrical container about the size of a Pullman car, or somewhat larger than a Greyhound bus. While there had been some initial NASA opposition to the Air Force's insistence on the fifteen by sixty foot, 65,000-pound-payload requirement, Dr. von Braun stressed to AIR FORCE Magazine that "we fully support and favor these criteria for a number of reasons. For one, if we [upon completion of the current Apollo series] plan to visit the moon again, we obviously will do so with the help of the space shuttle. Since we can't fly the orbiter all the way to the moon, we will rely on a tug to take us from the orbiter's low earth orbit to the moon orbit and back. The effectiveness and utility of such an approach is predicated on the availability of a tug of adequate size, payload, and fuel supply. This, in turn, is dependent on the space and weights available in the orbiter's cargo bay."

Neither NASA nor the Department of Defense is now engaged in specific tug development efforts. But various tug designs have been studied by NASA, DoD, and ELDO, the European space organization. President Nixon, in announcing go-ahead on the shuttle program, reemphasized the desirability of international cooperation. Dr. von Braun said NASA considers tug development an attractive candi-



The Grumman Aerospace Corp./Boeing Co. team's proposal for a recoverable, liquid-fueled rocket booster.

including the fuel-tank area, the injector system, and the avionics, are hermetically sealed off. He said that it is NASA's contention that predictions about water-corrosion damage appear to be exaggerated and "disregard the fact that the US Navy has managed to inure some of its most sensitive electronic systems against saltwater corrosion, involving saltwater submersion over periods of years."

The Orbiter Stage

The part of the semireusable space transportation system that is fully evolved and in keeping with the nation's long-term military and civilian space needs is the upper-stage orbiter. Except for small degradations in size and payload dictated by the desire to optimize the system's cost-effectiveness, its specifications are reasonably firm. A congressional critic may have been hyperbolic but nevertheless close to the mark when he termed the booster "a Cadillac riding atop a Model T."

Nevertheless, there are significant changes between the twin-engine orbiter design of 1971 and the present triengine design, principally in the propulsion area and associated techniques. The most obvious change stems from the fact that the new orbiter is essentially "dry," meaning that the liquid-oxygen/liquid-hydrogen fuel needed to propel the vehicle into orbit is carried in an external tank that is jettisoned in space once its fuel is expended. This may prove a considerable fringe benefit, according to Dr. von Braun, "since, being well insulated, it offers us valuable storage space. We are exploring a number of schemes involving the tank's use in our space work." (There are, however, limits to its utility since it is not protected against reentry heat.)

The only fuel carried internally by the orbiter is that required for maneuvering and reentry. With the bulk of the fuel carried externally, the task of meeting the dimensional

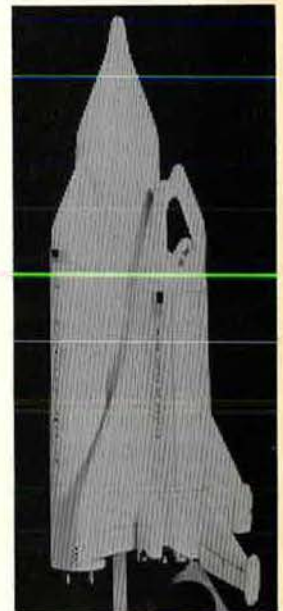
cargo bay and payload criteria was, of course, eased considerably.

The original shuttle concept was premised on the use of the same type of fuel by both the booster and the orbiter as well as on use of the same type of engine by both vehicles. The shift to a different fuel with different performance characteristics (specific impulse) dictated changes in the orbiter's engine design. This stems from the fact that, as Dr. von Braun explained, a liquid hydrogen/liquid oxygen-powered booster imparts greater speed than one using either a kerosene/oxygen or a propane/oxygen mixture, or solid propellants.

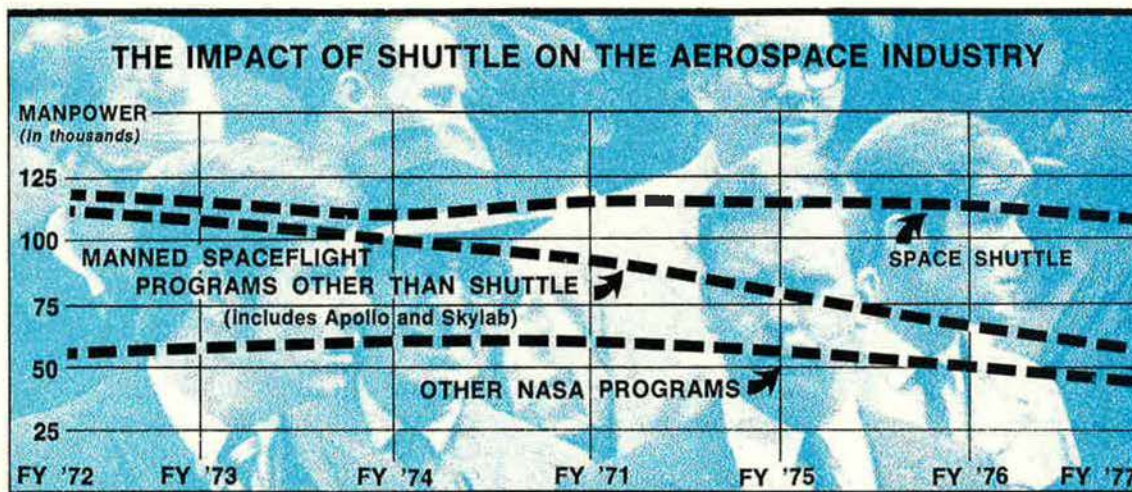
Since under the present concept the orbiter "stages" at a lower speed, meaning that it must provide a greater share of the acceleration needed to achieve orbital (Mach 22) speed, it obviously requires more propellant and greater thrust. This was achieved by changing from two to three engines, by itself a desirable configuration alteration because it improves the vehicle's safety in case of engine failure, according to Dr. von Braun. The new engines each will have a thrust rating of about 470,000 pounds at altitude. The fact that this engine output is down from the 632,000 pounds originally specified is more than compensated for through the use of three engines in place of two.

This change, Dr. von Braun said, includes advantages as well as disadvantages. In terms of the shuttle's overall takeoff weight "it would have been better to let the high specific impulse liquid hydrogen/oxygen engine do more of the job of bringing the orbiter up to orbital speed," he explained. Conversely, the fact that the orbiter engine is no longer needed for the booster makes it possible to optimize it for use by the upper stage alone.

The Rocketdyne Division of North American Rockwell was selected last summer by NASA to design and build thirty-six shuttle engines under a \$500 million contract. This



The North American Rockwell/General Dynamics team proposal for a recoverable, liquid-fueled rocket booster.



The space shuttle program is expected to have a considerable impact on employment in the now-depressed aerospace industry. The chart shows the projection based on the Fiscal Year 1973 budget program, with the space shuttle expected to involve some 50,000 aerospace workers by FY '77.



The McDonnell Douglas Corp./Martin Marietta team's proposal for a recoverable, liquid-fueled booster.

ing the spacecraft into high-altitude orbits whose revolutions are timed with respect to a selected place on the earth's surface. Because the shuttle's orbit altitude is on the order of 100 miles and synchronous orbits require altitudes of many thousand miles, a third-stage vehicle, called a space tug, is required.

The tug's own size, weight, and especially fuel supply, combined with the size and weight of the payload, dictate the shuttle's size. Because liquid hydrogen has a low specific density, voluminous tankage space is a crucial requirement.

NASA's Deputy Associate Administrator for Plans, Dr. Wernher von Braun, told AIR FORCE Magazine that four booster systems are currently under consideration. NASA is likely to select one of them for development this spring. One configuration involves three 156-inch-diameter, solid-propellant boosters, arranged to fire simultaneously and working in "parallel." Another involves four 120-inch-diameter solids, operating in the same mode.

He explained that there are no plans at present to fund new developments in large solid-propellant boosters and that, therefore, the largest available boosters, the 120-inch and the 156-inch-diameter rockets, represent the only viable options.

Dr. von Braun conceded, however, "If we were to select a solid booster stage in order to bring the system acquisition costs down to a minimum, most people believe that the system will be expendable, rather than recoverable. We do have studies in progress to find out if there is a way to make solid boosters recoverable, but the obstacles are formidable and the development would be costly.

"Many people believe that solid boosters make sense only if they are discarded. Others think that up to forty percent savings are possible by recovering solids."

The principal difficulty in making a solid booster recoverable, he said, stems from the fact that solid-fuel rockets use their combustor chamber as propellant storage space, with the result that, upon expending the propellant, "there is a gaping hole in the back through which seawater can enter freely. Thus, the booster may sink. We are examining designs that would ship only a limited amount of water. But we would still be saddled with high refurbishing costs, and their reduction would entail a major and expensive development effort." (In continuation of NASA's long-standing policy, only midocean recovery of the shuttle's booster stage is contemplated.)

On the other hand, Dr. von Braun pointed out that "the use of an expendable booster, while lowering the nonrecurring costs, may drive up the price of each flight to a point where it might be difficult to compete against the operating costs of the Titan III."

All four booster stage configurations can meet the full orbiter payload and size require-

ments. The option of a scaled-down upper stage is under consideration only because of its promise of lowering technological risks as well as costs.

Liquid-Fueled Booster Options

Two schemes involving pressure-fed, liquid-propellant boosters, burning either a mixture of kerosene and liquid oxygen or propane and liquid oxygen, are the other two booster stage configurations currently under study by NASA and its contractors. Either design would represent a completely new development, although premised "on a technology which is well in hand and in a way represents almost a step back so far as the state of the art is concerned," Dr. von Braun said. The choice here, he said, is between either two liquid-propellant systems, strapped side by side in the same manner as the three solid 156-inch boosters, or a much larger single design. The latter, he said, "is essentially a tandem stage arranged beneath the orbiter's fuel tank."

The reason why NASA is examining both parallel and tandem staging with respect to a liquid-fueled booster is that "there is still considerable concern about a system that involves two liquid, or for that matter two solid, boosters pushing side by side. This can lead to unequal thrust which, of course, must be controlled, a task which conceivably may substantially increase the required control moments. This problem is particularly critical in the case of parallel solids where control is premised solely on controlled deflections of the thrust because, unlike liquid-fueled engines, the solid motors can't be throttled. In the case of parallel liquid-propellant boosters, it is at least possible to overcome some of the thrust imbalances by a cross-feed arrangement in the fuel pressurization system and thereby equalize the thrust through active thrust control," Dr. von Braun explained.

Augmenting the thrust of the booster stage with the orbiter's three engines is being considered for the parallel-staged configurations, according to Dr. von Braun. He added: "However, one has to be ready to accept a heavy performance penalty because it means that you have to provide the orbiter with engines that can ignite at sea level. This limits the permissible expansion ratio of their exhaust nozzles, which in turn impairs the system's efficiency at higher altitudes. In other words, the ability to fire up the orbiter's oxygen/hydrogen engines on the launch pad means sacrificing some of the expansion ratios [efficiencies] at the high end."

Both liquid-propellant booster systems currently under study by NASA, Dr. von Braun said, can be so designed that seawater-corrosion damage is minimized. Special valves would be so arranged that the booster's inside,



The McDonnell Douglas/Martin Marietta proposal for a recoverable, liquid-fueled rocket booster.

By Edgar Ulsamer

SENIOR EDITOR, AIR FORCE MAGAZINE

IN JANUARY of this year, President Nixon instructed NASA to undertake the design and development of a space shuttle, "a space transportation system designed to help transform the space frontiers of the 1970s into familiar territory, easily accessible to human endeavor in the 1980s and 1990s." The system envisioned by Mr. Nixon is to "routinize" spaceflight by reducing its costs to possibly one-tenth of the present level and by cutting back on the preparation time required for each launch.

The new space shuttle, the President said, "will make the ride safer and less demanding for the passengers, so that men and women with work to do in space can 'commute' aloft, without having to spend years in training for the skills and rigors of old-styled spaceflight.

"The general reliability and versatility which the shuttle system offers," he said, "seem likely to establish it quickly as the workhorse of our whole space effort, taking the place of all present launch vehicles except the very smallest and the very largest."

The President authorized a program that is to lead to an operational system by the end of this decade. In its developmental phase it is budgeted for \$5.5 billion. The development costs include all research, development and test, and evaluation expenses, as well as two flight-test vehicles. Eventually NASA expects to have an inventory of five vehicles, and an as yet unspecified number is likely to be operated by the Air Force for military missions.

During its peak period, the program is expected to employ up to 50,000 aerospace workers. The space shuttle is to serve military as

well as nonmilitary purposes. In addition, Mr. Nixon stressed, "the continued preeminence of America and American industry in the aerospace field will be an important part of the shuttle's 'payload.'"

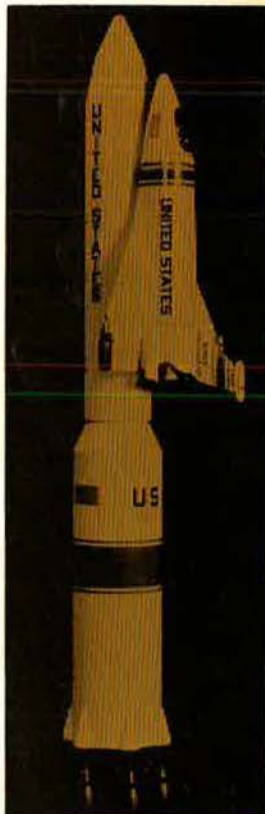
While final specifications are not yet firm, the shuttle can be expected to weigh about 4,700,000 pounds at takeoff and will consist of two stages, an unmanned booster approximately 175 feet tall, and a deltawinged, airplane-like orbiter about the size of a DC-9, powered by three high-pressure oxygen/hydrogen engines. The orbiter will be able to remain in orbit anywhere from a week to a month, depending on mission requirements. The orbiter flies back to earth in airplane fashion and is piloted by two astronauts. It is likely to have a length of about 120 feet, a wingspan of seventy-five feet, and a cylindrical cargo bay area between fourteen and fifteen feet in diameter and between forty-five and sixty feet in length.

The orbiter is to be able to fly up to 100 missions with only minor refurbishing. The time needed for refurbishing, the so-called turnaround time, is not to exceed two weeks. Unit cost is expected to be about \$250 million in current dollars. The bulk of the orbiter's fuel will be carried in an external tank that is jettisoned in orbit.

The system as authorized by the President differs from the fully reusable and fully flyable shuttle advocated by NASA and the Air Force last year (see *September '71 AIR FORCE*). The new approach is pegged at half the estimated cost of the original design. The basic, and in terms of operating cost most critical, difference is that the system as approved will not use a manned, flyable booster, but instead will rely on either an expendable solid-propellant or a parachute recoverable, liquid-fueled lower stage. NASA's pending selection from among the several booster systems currently under study will be based on trade offs between systems acquisition cost and cost per flight. In addition, NASA is trying to determine whether the orbiter can meet the military payload, weight, and size requirement either in full, or only to a somewhat degraded extent.

The Military Requirement

The military requirement and NASA's own needs call for a cylindrical cargo bay fifteen feet in diameter and sixty feet in length, with a payload capability of 65,000 pounds for due-east launches, or 40,000 pounds for launches into polar orbit. (Due-east launches take advantage of the earth's rotational speed to augment the booster's thrust.) The Air Force and NASA view these capabilities as "magic numbers" because almost all military, and many of NASA's, proposed satellites require high-energy, geosynchronous orbits. This means plac-



Top of page: McDonnell Douglas/Martin Marietta expendable, solid-fueled rocket booster. Bottom of page: Grumman Aerospace/Boeing proposal for recoverable, unmanned booster and manned orbiter.

Grade Limitation Act (OGLA)—meaning spaces for 1,000 fewer colonels and 4,500 fewer lieutenant colonels, demotions, reductions in force, and a crippling of the officer promotion system. (See "The Grade Relief Issue," AIR FORCE, February 1972, p. 57.)

Nothing that drastic is likely to happen, but the possibility exists that Congress will decide on some intermediate action between OGLA and what the Air Force is seeking. This could leave the Air Force with a real problem. If, for example, extension of the 1966 temporary relief from OGLA is the option chosen, the Air Force is still in trouble. It will not be able to continue to promote officers as early as it does now, and the long-range consequences could be even more severe.

The root problem is that the Air Force's permanent grade ceiling—the portion of its officers it can have in each of the field grades (major, lieutenant colonel, and colonel)—is prescribed by OGLA. The law was drafted in 1954 and met USAF needs at that time. The USAF officer force then was younger than that of the other services, and, with fewer officers senior enough for promotion to the field grades, the Air Force needed fewer authorizations at the top of its rank structure. Consequently, Air Force authorizations for colonels and lieutenant colonels under OGLA are

tighter than those of the other services.

As the officer force matured, OGLA limits became stifling. Five times between 1959 and 1966 the Air Force returned to Congress and received temporary relief. In 1966, Congress granted relief in a six-year package, which expires at the end of this fiscal year.

Perhaps the most wrenching feature of all the grade legislation up to now has been that the limits work on a sliding scale. When the total number of officers goes up, field-grade authorizations go up. If the officer force diminishes, field-grade slots drop, too. There is precious little reaction time. When the authorized fiscal year-end strength is cut, it usually happens about midway in the fiscal year. This gives the Air Force only about six months to slim down to its new size, and to reduce the number of field graders on active duty proportionately.

If a large force cut must be made quickly, the corresponding reduction in field grades cannot be worked through attrition, so some officers must be demoted or forced out of service.

There is considerable interest in the issue on Capitol Hill. Rep. Otis Pike (D-N. Y.) is chairing a subcommittee of the House Armed Services Committee that is looking into the military grade situation. Concerned by grade escalation—fewer Indians, more chiefs

than in the past—the committee pointed to a need for the military to justify its requirements. The House Appropriations Committee is also concerned, and has charged the Secretary of Defense with reviewing his Department's officer requirements.

The Air Force has drafted a careful proposal (see box), which would sacrifice the prospect of large or quick leaps ahead in promotion in return for long-range stability. The proposal has two key features:

First, the field-grade authorizations would be tied less tightly to officer force size. At present, for example, if USAF has 104,001 officers in all, it can have exactly 19,236 majors. With 116,000 officers, 21,352 majors are allowed. For force sizes in between, the authorization is determined by precise interpolation. Under the proposal, the Air Force would have a fixed limit on majors—24,540—so long as the total officer force size stayed within the range of 104,001 through 116,000. It isn't a try for more slots across the board; the Air Force is asking for increases in its authorization for majors, but proposes fewer lieutenant colonel and colonel billets at many force levels.

Secondly, the Air Force would be given time—up to five years—to adjust if the officer force drops into a lower range. This would do more than allow the Air Force to absorb cuts through attrition. It would also give stability to the promotion system, allowing the Air Force to set definite promotion points from which it would not have to retreat.

The Air Force is willing to:

- Make do with fewer lieutenant colonels and colonels than it is now authorized when the total size of the officer force is high.

- Forget about catching up with the other services in promotion. The Army and Navy now promote officers earlier in their careers than the Air Force does. The proposal would stabilize USAF promotion points where they are.

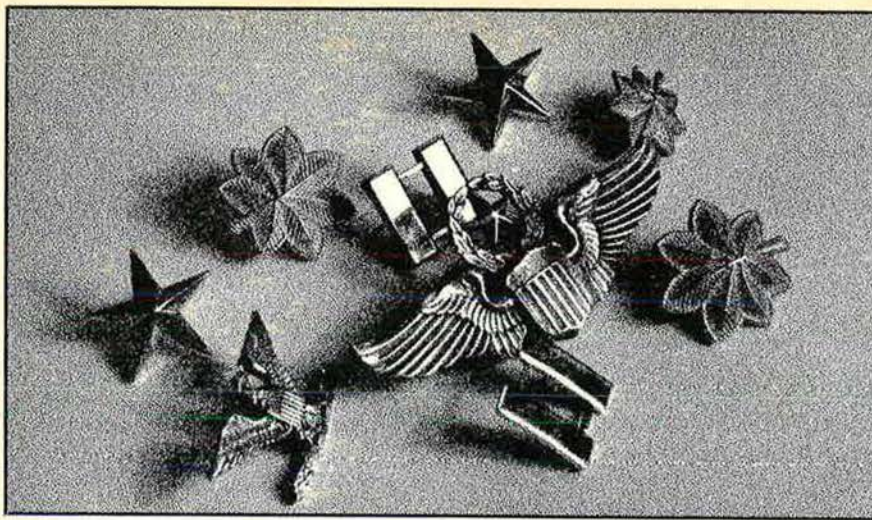
- Surrender the possibility of fast promotions during a force buildup.

A return to OGLA is pretty well ruled out, not just on the basis of what it would do to people—i.e., demotion of 1,600 officers in the first year, early retirement for more than 1,300, and force-out short of retirement for another 1,000—but because of the cost involved.

Suppose the Air Force did have to divest itself of large numbers of senior officers. An equal number of young officers would then have to be recruited to replace them. (OGLA controls the grade mix of officers, not the number. Neither the force size

USAF OFFICER GRADE PROPOSAL PROMISES STABILITY						
TOTAL COMMISSIONED OFFICERS ON ACTIVE DUTY	MAJOR		LT. COL.		COLONEL	
	Now	Prop.	Now	Prop.	Now	Prop.
83,001 TO 92,000	15,477 TO 17,098	18,801	10,477 TO 11,562	11,027	4,685 TO 5,008	4,898
92,001 TO 104,000	17,098 TO 19,236	22,032	11,562 TO 13,009	12,723	5,008 TO 5,439	5,435
104,001 TO 116,000	19,236 TO 21,352	24,540	13,009 TO 14,455	14,026	5,439 TO 5,869	5,864
116,001 TO 129,000	21,352 TO 23,628	26,381	14,455 TO 16,021	14,977	5,869 TO 6,336	6,156
129,001 TO 143,000	23,628 TO 26,052	28,739	16,026 TO 17,709	16,071	6,336 TO 6,838	6,227

At present, grade authorizations are tied precisely to officer force levels, so even minor fluctuations have an effect. The Air Force proposes a "range" approach. Authorizations would not change so long as the officer force stayed within the limits of the same range.



nor the job to be done would be reduced by a return to the 1954 grade structures.) The Air Force estimates, and says the figure is conservative, that the ensuing increase in procurement and training costs would exceed \$100 million between Fiscal Years 1973 and 1975. In addition, increased retirement and separation costs would total more than \$12 million.

The impact of extending the 1966 relief would not be so cataclysmic, but personnel planners regard it as inadequate for the Air Force's needs. The size of the USAF officer force has been trending downward since 1968, and the decline is projected to continue. Even if the reduction is no more severe than present expectations, the Air Force, in all probability, will have no choice but to roll back its promotion phase points.

Next year, the phase point to major would slip from the eleventh to the twelfth year. (Army now promotes to major and the Navy to lieutenant commander in the eighth year.) The phase point for some lieutenant colonels would go from the seventeenth to the eighteenth year. (Army and Navy both promote at fourteen years.) By 1975, colonel promotions would come in the twenty-second year, rather than in the twenty-first, as now. (Army and Navy phase point is twenty years.)

If force reductions are greater than projected—and this is a very real possibility—then demotions, force-outs, and soaring costs for procurement and training could result.

Among the items the Air Force has in its presentation kit for Congress is TOPLINE, the officer portion of the new long-range USAF Personnel Plan. TOPLINE identifies the Air Force's personnel requirement, including the ideal force structure by grade, and charts a rational course to achieve it.

A fresh, critical look at officer re-

quirements was a part of drafting TOPLINE. That review has some credibility because, in some cases, it called for less, not more, rank. For example, it diagnosed the existing grade/experience standard for pilots and navigators as too rich, and said that only thirty percent of the active flyers should be beyond their twelfth year in service.

Grade intensification is not unique to the military. Business, too, has more executives in its upper ranks than it did ten years ago. The Department of Labor recently compared the distribution of executives at various corporate ranks in 1960 and in 1970.

It found, for example, that the number of engineers holding positions roughly equivalent to Air Force lieutenant colonel or above had grown from 10.4 percent to 15.8 percent during the decade. The percentage of personnel executives in these grades was up from 21 to 23.3 percent. In comparison, the number of Air Force officers in the grade of lieutenant colonel or higher increased from 12.4 to 17.7 percent.

USAF is banking on TOPLINE logic and demonstrated ability to manage its personnel resources to convince Congress that the proposal is sound. ■

New General Officers

PROMOTIONS: To be **Brigadier General:** Ranald T. Adams, Jr.; Timothy I. Ahern; John G. Albert; Kenneth E. Allery; John F. Barnes; Richard M. Baughn; Stanley H. Bear; Robert S. Berg; David D. Bradburn; James R. Brickel; John W. Burkhardt; Rupert H. Burris; Leslie J. Campbell, Jr.; Charles G. Cleveland; Harold E. Confer; Walter F. Daniel; Bennie L. Davis; Clyde R. Denniston, Jr.; Walter D. Druen, Jr.; William H. Fair-

brother; Charles A. Gabriel; William F. Georgi; William H. Ginn, Jr.; Lawrence N. Gordon; Guy E. Hairston, Jr.

Raymond L. Haupt; Richard C. Henry; James R. Hildreth; Lovic P. Hodnette, Jr.; Ethel A. Hoefly; Frank O. House; Hilding L. Jacobson, Jr.; John R. Kelly, Jr.; Paul Krause; Louis W. La Salle; Richard L. Lawson; Lloyd R. Leavitt, Jr.; Louis G. Leiser; Solomon E. Lifton; Ralph J. Maglione, Jr.; Lyle E. Mann; Howard E. McCormick; Henry J. Meade; Kenneth P. Miles; Robert L. Moeller; James S. Murphy; Paul W. Myers; Benton K. Partin; Freddie L. Poston; James O. Putnam; George E. Reynolds; David E. Rippetoe, Jr.; Billy F. Rogers; John M. Rose, Jr.; Robert E. Sadler.

Thomas M. Sadler; Carl G. Schneider; Richard H. Schoeneman; Winfield W. Scott, Jr.; Leland C. Shepard, Jr.; John R. Spalding, Jr.; Thomas P. Stafford; Eugene B. Sterling; Glenn R. Sullivan; Mervin M. Taylor; William A. Temple; Lucius Theus; Robert C. Thompson; Robert F. Titus; John C. Toomay; Fred A. Treyz; Hoyt S. Vandenberg, Jr.; George M. Wentsch; Charles L. Wiison; William B. Yancey, Jr.; James A. Young.

Senior Staff Changes

B/G Harry M. Darmstandler, from Military Asst. to C/S, SHAPE, Brussels, Belgium, to Cmdr., 12th Strategic Missile Div., SAC, Davis-Monthan AFB, Ariz. . . **B/G Edmund B. Edwards**, from Dep. Dir., Plans, DCS/P&O, Hq. USAF, to Dep. Dir., Military Support, Dept. of Army, Washington, D. C., replacing retiring M/G Courtney L. Faught. . . **Col. (B/G Selectee) Billy J. Ellis**, from Asst. for General Officer Matters, DCS/P, Hq. USAF, to Cmdr., 40th Air Div., SAC, Wurtsmith AFB, Mich., replacing B/G Eugene L. Hudson.

B/G Alfred L. Esposito, from DCS/P, Hq. AFSC, Andrews AFB, Md., to Exec. Dir., Procurement and Production, DSA, Cameron Station, Alexandria, Va., replacing retiring B/G James R. Pugh, Jr. . . **B/G Eugene L. Hudson**, from Cmdr., 40th Air Div., SAC, Wurtsmith AFB, Mich., to Dep. Asst. DCS/Ops, 7th AF, PACAF, Tan Son Nhut Airfield, Vietnam. . . **M/G Rollin B. Moore, Jr.**, from Cmdr., Hq. AFRES, Robins AFB, Ga., to Cmdr., Western AFRES Region, Hamilton AFB, Calif., replacing M/G Russell F. Gustke.

RETIREMENTS: M/G Courtney L. Faught; B/G Harold F. Funsch; B/G Michael C. McCarthy; M/G Edward M. Nichols, Jr.; B/G James R. Pugh, Jr. ■

MIA/POW Action Report

By William P. Schlitz

ASSISTANT MANAGING EDITOR, AIR FORCE MAGAZINE

Latest Proposal

At this writing, the dust has not settled following President Nixon's January 25 revelation of the secret plan proposed to Hanoi as a means to end the war.

The plan included a fixed date for the withdrawal of US forces—six months after the plan's acceptance—and included in exchange provisions for freeing all prisoners of war and a cease-fire throughout Vietnam.

The plan, coordinated with the government of South Vietnam, also called for the resignation of South Vietnam's President Nguyen Van Thieu and Vice President Tran Van Huong one month before new elections in which the Viet Cong would participate.

The President said that the plan had been proposed by National Security Adviser Dr. Henry Kissinger several times to North Vietnamese negotiators in Paris, with no response to date.

While there was some speculation as to why the President chose this particular time to reveal the state of the unsuccessful private talks, Administration officials said that there were three main reasons: an attempt to spark a response from Hanoi; to demonstrate that the government was



Air Force Academy Superintendent Lt. Gen. A. P. Clark chats with AF Academy Officers' Wives Club members before his address in January. From left, Mrs. Herman Knapp, chairman of the Colorado Springs for MIA/POW organization, Mrs. Ben Pollard, and Mrs. James Steadman. The three are SEA POW wives. General Clark spoke to the club about his experiences as a POW in Germany during World War II.

doing everything it could to end the war and free the prisoners; and to show that the US was not the instigator of any increase in the fighting.

While Hanoi did castigate each of

the plan's eight points, it didn't immediately reject it, leading to a slender hope, at least, that future negotiations may prove more fruitful. Thus far, however, the North Vietnamese have remained intractable.

The latest Administration proposals are the most extensive concessions the US has offered to end the war.

On Behalf of Children

In November of 1970, a Long Island, N. Y., business executive read a magazine article depicting the struggle that the son of an American POW had putting himself through school in his father's absence.

To businessman J. Kevin Murphy it seemed intolerable that, on top of everything else, the children and families of MIA/POWs should have to worry about financing an education.

No stranger to involvement in civic matters, Murphy soon had things humming. First came a meeting with several business and political acquaintances to explore ways of alleviating the situation.

It soon became evident that to

POW Named Man of the Year

Air Force Capt. Leroy W. Stutz, a prisoner in North Vietnam for more than five years, has been named the 1971 Mo-Kan [Missouri-Kansas] Area Man of the Year. Captain Stutz is a native of Effingham, Kan.

"In view of the times and the many contributions made by the youth of the country, we believe Captain Stutz has contributed the most in service above self, not only to his nation, but to the Mo-Kan area and is highly deserving of the honor," said the selection panel of area civic leaders who picked Captain Stutz over thirty-six other regional candidates.

"Also significant is that in honoring this young man we show that he as well as other POWs in Southeast Asia have not been forgotten at home," the citation added. Competition for Area Man of the Year honors is sponsored by the Atchison, Kan., *Daily Globe*.

Awaiting Captain Stutz's return are his wife Karen, and son Brian, six, who knows his father only from photographs. Captain Stutz's RF-4C Phantom went down on December 2, 1966, on his sixty-fourth mission, and he was listed as missing in action. It was thirty-two months before his family even learned he was alive. Since then, they have received several letters and postcards from him.

Captain Stutz was graduated from the Air Force Academy in 1964.

MIA/POW

generate tuition funds on a piecemeal basis through grants and such from the business community would be un-governable. A better way—a blanket approach that would provide for all the children from whatever state—had to be found.

The solution finally arrived at: to encourage all the state legislatures to pass measures that would provide tuition to state universities, colleges, and trade schools.

This method seemed the most reasonable, since it dovetailed with the extension in 1970 of the federal G.I. Bill that grants MIA/POW dependents \$175 per month for a total of thirty-six months for expenses in connection with higher education.

Since the scholarship campaign got under way, "the response from a cross section of citizens and political leaders all across the country has been fantastic," said Mr. Murphy. "It has been quite inspiring."

Since those early days, Murphy's

group has evolved into the National POW/MIA Scholarship Program, led by a committee made up of a number of distinguished Americans. Among them: former astronaut Frank Borman; League of Families Counsel Charles W. Havens, III; and the late USAF Gen. Emmett "Rosy" O'Donnell (see February '72 issue, p. 15).

As evidence of the committee's bipartisanism, both GOP National Committee Chairman Robert Dole and Democratic National Committee Chairman Lawrence O'Brien are members.

Approval of the program, too, has come indirectly from the White House; at a National Legislative Leaders Conference in San Diego last November, Defense Secretary Melvin R. Laird strongly endorsed the scholarship program. And Brig. Gen. Daniel "Chappie" James, Deputy Assistant Secretary of Defense for Public Affairs, who is heavily committed to the MIA/POW problem, has taken an interest.

Although the form of the legislation may vary from state to state, depending on existing statutes, the scholarship committee is working for bills that would provide for the tuition whether or not the father returns from SEA. (This is only reasonable since in



The POWs wait and hope. With the praise and doubt about President Nixon's peace proposals came a League of Families decision to form a Nonpartisan Political Action Committee to publicize the POW issue and the various candidates' positions on it. The League won't endorse a Presidential candidate.

some cases children have been fatherless for many years, and the tuition payments would be little enough recompense for that time lost.)

With the program spread throughout the fifty states, the cost to any one would be infinitesimal, while the ultimate benefit to the total of 2,050 children involved would be great. As time goes on, of course, more and more of the MIA/POW children would reach an age to benefit.

The scholarship committee suggests that all those in favor of the program write to state legislators. State legislative bodies in session this year have either completed or have draft measures in the works. Several have already passed the bills. In many cases, encouragement for legislation to provide the scholarships is being directed through area League of Families organizations.


* * *

In federal legislation introduced recently to benefit the MIA/POWs, a bill by Sen. James Buckley (Conservative-Republican-N. Y.) would "exempt from income taxation the compensation payable to Vietnam POW/MIAs during the period in which such persons are held prisoner or missing" and would include civilian personnel. The New Yorker is also backing a bill to increase from forty to sixty-five the number of service academy appointees the President can name, with the added spaces going to the offspring of MIA/POWs.

Sen. John G. Tower (R-Tex.) introduced a measure that those captured in battle in Vietnam and held prisoner anytime since January 1, 1960, would earn a "Prisoner of War Medal." ■

Aerospace Historian

the journal of aerospace history and affairs.



ACROSPACE HISTORIAN contains articles, book reviews, museum news, photographs and other features stressing the importance and relevance of the lessons of the past for the present and the future, with emphasis on history of the Air Force.

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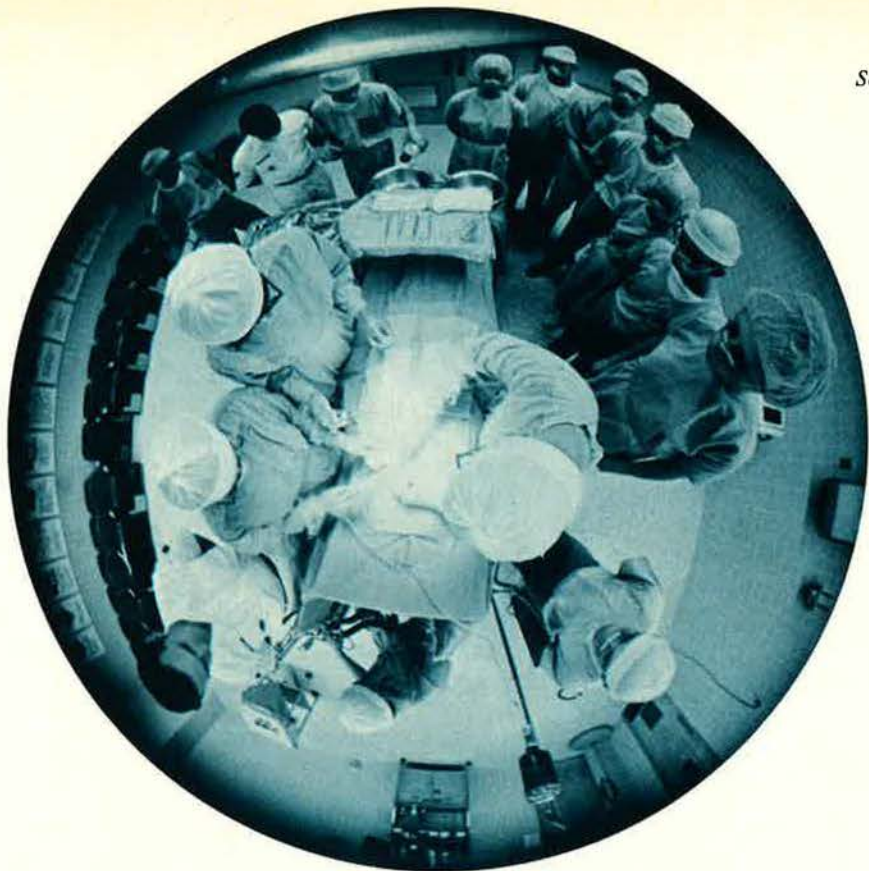
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Some Air Force medical service courses have already won civilian recognition.

A veteran's top-quality Air Force training is one thing. Documenting it in a way that's meaningful to the civilian world is another. Now, the needed link is coming with . . .

A Community College For the Air Force

By Capt. John T. Correll, USAF



Lt. Gen. George B. Simler explains how the Community College will pull together an airman's education and training experiences.

The author, Captain Correll, is presently assigned to the staff of AIR FORCE Magazine under the Education With Industry (EWI) program.

RANDOLPH AFB, TEX.
IN LINE with new trends in American vocational education, the Air Force plans to activate its own community college here this spring.

It will be a different kind of school, to be called the Community College of the Air Force. There are no classrooms at the home "campus" in San Antonio. Its initial task will be to provide the airman a transcript of his in-service education and training in a form acceptable to civilian schools and employers. At the same time, the Air Force is proceeding toward full civilian accreditation for its technical training centers. Provided this happens, the Community College will grow to a consortium of accredited schools—hopefully within two years.

The Community College was created to serve the unique needs of USAF airmen, whose training now receives limited recognition in the civilian world, and who often have difficulty in consolidating the academic credits they earn while in uniform.

"I'm convinced that this is one of the most progressive steps the Air Force has taken in the interests of its people and in the interest of the country, from the national resource standpoint, in twenty-five years," said Lt. Gen. George B. Simler, Commander of the Air Training Command, of which the Community College will be a part.

Col. John L. Phipps, ground-level planner in the Community College venture, and who holds a Ph.D. in Education, will serve as the institution's first president.

"What we're doing is not in isolation," Colonel Phipps observed. "We're a part, really, of a larger movement in American education as a whole."

He cites a number of recent attempts to recognize educational experience outside the traditional model. These include establishing a University Without Walls for the Department of Housing and Urban Development, in which unconventional course material can be accredited, and the practice of the New York Board of Regents in

granting academic credit on the basis of examinations to any student, registered or not.

The Community College will issue a transcript, with credits from both its own accredited technical schools and college-level courses the airman took in off-duty time.

"We are starting out with the objective of giving these young men credit for the things that they achieve in the technical training area while they're in the service," General Simler told AIR FORCE Magazine. "In the initial stages, we're going to work very closely with the academic institutions that are interested in working with us through the various accrediting associations."



The idea for a Community College of the Air Force was born in ATC, but planners here soon sought the counsel of two other commands—Air University and the Air Force Academy—both of which had extensive experience in higher education and long association with the civilian academic world. In Lt. Gen. Albert P. Clark of the Academy and Lt. Gen. Alvan C. Gillem II of Air University, General Simler found enthusiastic colleagues. Together, they proposed the concept to the Pentagon, where both the need for and the value of a Community College of the Air Force were quickly recognized.

For true volunteers, the Air Force's biggest enlistment incentive is training and a chance to gain job skills.

Vocational training is the Air Force's biggest recruiting incentive. Human Resources Laboratory researchers discovered that many young people enlisted because they wanted training and a chance to improve their skills.

The Air Force provides that kind of training. Its courses—ninety percent of which teach skills that can be used in civilian occupations—are equal or superior to the material taught in the top vocational and technical schools. Nevertheless, a veteran's training is very difficult to certify in a way that is meaningful to anyone outside the Air Force.

In addition, some airmen have accumulated many hours of college credits on their own time, seldom leading up to anything because they didn't stay in one place long enough to graduate, and had trouble transferring their work to a new school when they moved.

"In my opinion," General Simler declared, "there is a big deficiency in the recognition of the kinds of technical training we do in the Air Force. The employer may or may not have any knowledge of the degree of that training, the depth of it, the value of it, or the academic hours that went into making this man a qualified technician. So what we're attempting to do in this idea of a Community College of the Air Force is pull all that together."

As soon as the Community College data system is built and Air Force course content is translated into civilian language and semester hours—probably about midsummer 1973—the Community College of the Air Force will begin issuing transcripts to ATC-trained airmen. (At present, the planners aren't sure just how far back in history they can go with the transcript service, but say they plan to serve as many people as possible.)

Such a transcript will be valuable to a prospective employer as well as to the airman.

"I anticipate that the transcript will be favorably received, because it's going to give an employer a definitive record of what this young man has accomplished," General

Simler continued. "It will not only contain information on how he did in his training, but will include how he did subsequent to that in on-the-job training and in the Weighted Airman Promotion System. It will also contain any other courses he has been able to take from civilian institutions. The employer will have a very clear record of what this fellow has achieved—probably a better record from the standpoint of the personnel man who's going to hire him than anything else he'll get from any other candidate. It'll be a real pedigree."

One of the pillars on which the Community College of the Air Force is built is the Utah project, carried



out by the Air Force Association's Aerospace Education Foundation and the U.S. Office of Education (see page 69).

In 1967, Utah placed three Air Force courses—in their original form—in civilian high schools, vocational schools, and a college. The Air Force materials proved as efficient and more popular than the previously used material. This prompted a seminal question: If ATC courses are taught in college for college credit, then why not arrange for direct college credit for Air Force people when they take these courses in the Air Force?

The breakthrough came when

Col. John L. Phipps (above) will serve as first president of the Community College of the Air Force.

ATC's Sheppard Technical Training Center at Wichita Falls, Tex., was accepted last July as an affiliate of the Southern Association of Colleges and Schools. This is the first step toward accreditation, which can be conferred by a vote of member schools following a year of self-study by an affiliate to document the manner in which it meets Association standards.

General Simler instructed other ATC schools to take similar initiatives and seek affiliate status from the accrediting agency in their areas. The tech schools at Keesler AFB, Miss., and Lackland AFB, Tex., as well as the Security Service's school at Goodfellow AFB, Tex., have since affiliated with the Southern Association of Colleges and Schools. ATC's two other technical training centers—at Chanute AFB, Ill., and Lowry AFB, Colo.—are in the area of the North Central Association, which does not have an affiliation step in its accrediting process. Both Chanute and Lowry, however, are working on self studies to present to the Association.

Accreditation, ATC points out, is highly desirable because it provides assurance to institutions of higher education that an independent educational accrediting association has conducted a thorough review of Air Force technical training and found it to meet comprehensive standards.

At present, an individual who has received Air Force training can ask a college or university to give him credit for that training. The American Council on Education provides a listing of most military courses, and, where appropriate, recommends that credit be given for those courses. There is no requirement, however, that institutions accept military training for credit, and accreditation is expected to increase the likelihood that credit will be given.

"We're going to get some very serious questions about the Community College of the Air Force and its purpose," General Simler predicted. "We'll be tasked to justify why we should be accredited, I'm

sure, and we feel that we have all the justification that we need, and that we can support our position."

Acceptance by civilian educators is especially important.

"We work hand in glove with the academic civilian world," General Simler asserted. "To this point in time, they have been most cooperative and most receptive."

Community College planners have been advised all along by civilian educators, and the school's advisory committee will include a number of educators, as well as Air Force officials and people from other federal agencies.

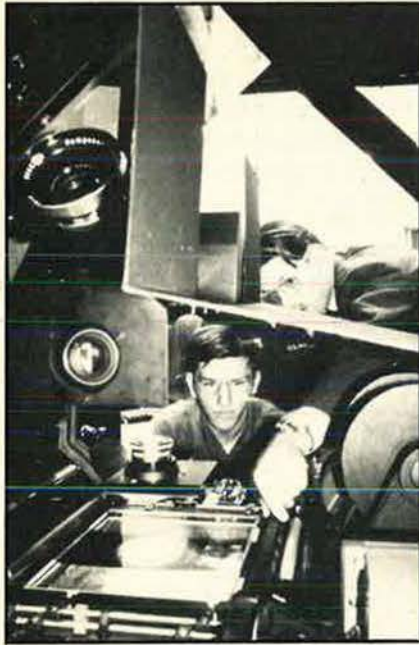
"The key idea behind the Community College of the Air Force



concept," stressed Colonel Phipps, "is that existing Air Force technical training programs can be documented as formal education experiences. These experiences—supplemented by further formal instruction and experience—can be molded to meet the requirements of licensing and certifying agencies and educational institutions."

In a forthcoming article for ATC's *Instructor Journal*, Colonel Phipps wrote: "The importance of degrees, licenses, certificates, and other symbols of qualification in today's society cannot be overemphasized. The world of work has been called a 'certified meritocracy'—a world in

Accreditation for their training will be a real advantage for airmen like the student machinists above.



An ATC instructor initiates student airmen in maintenance of the Variscan magnifying viewer.

which doors open only to those who have the 'papers' attesting to their achievements. Perhaps that is too Orwellian a view, but few would argue that diplomas often sharply separate the socioeconomic status of some members of our society from others who are equally deserving,



The complexities of the communications business are among the vocational skills taught by the Air Force.

but lack formal recognition of their qualifications."

Parallel to the effort to accredit ATC tech schools, the physician's assistant training program at Shepard is already accredited by the American Medical Association. Graduates can be licensed in several states.

On the surface, it would seem that accrediting and certifying an airman's skills to make him more competitive in the job market would work to the detriment of Air Force

recognized skills that are usable by them.

"I think we can compete in the numbers of people we take in annually to retain a sufficient number for our own purposes. We should have a flow of people into and out of the Air Force on their initial enlistment. We don't want to retain everybody. It just wouldn't be healthy for us."

(General Simler's comments on retention carry special credibility. Through December, his Air Training Command led the entire Air Force in retention rates for the year, having reenlisted 46.7 percent of its first-term airmen who were eligible to reenlist.)

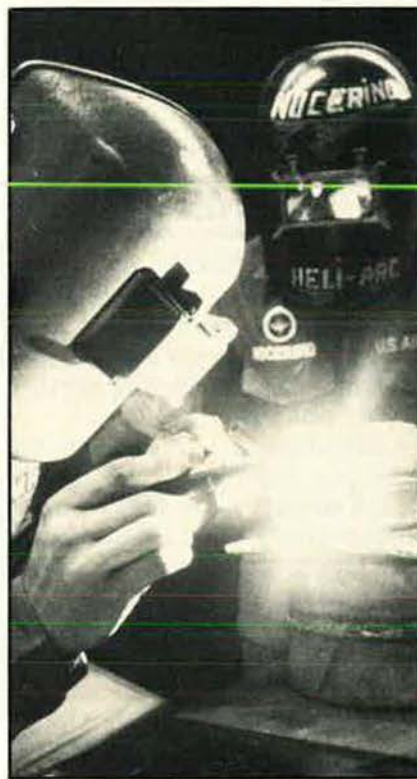
There are benefits to the career man, too, and they go beyond the increased prestige accruing to him as a certified master of his trade. He will be in an improved position to seek post-service employment.

"He isn't going to be in the Air Force forever," General Simler pointed out. "If a youngster who comes to us at seventeen years of age leaves after twenty years of service, he's only thirty-seven years old."

The President's National Advisory Council on Vocational Education has expressed keen interest in the Community College of the Air Force and, along with representatives of AFA's Aerospace Education Foundation, will visit San Antonio this spring for a firsthand look.

The benefit to society in general will be significant. Each year, more than 100,000 veterans leave the Air Force, trained for work in civilian occupations. With the coming of the Community College of the Air Force, they will represent a skilled manpower resource that can be drawn upon much more readily than is now possible.

"We haven't run into any problems that we haven't been able to resolve," General Simler said. "We've been able to justify our position as we moved along, each step of the way—and I think this will probably maintain itself. The only thing that remains is a lot of hard work."



Each year, more than 100,000 skilled veterans leave the Air Force, well trained for civilian occupations.

retention. General Simler doesn't foresee any great problem.

"First of all," he said, "I think we have an obligation to Americans who come into the Air Force to provide them this kind of service, regardless of whether they stay in the Air Force or return to civilian life. I think we have an obligation to the industry of the United States to provide them with a man who has

In 1967 AFA's Aerospace Education Foundation broke new ground. It was then that the Foundation joined forces with the U.S. Office of Education in an innovative plan to adapt certain USAF-developed vocational courses for use by the civilian community. Since then, the ambitious experiment has produced some impressive results. Here is the U.S. Office of Education's own report on the . . .

Utah



project

**AIR
FORCE
TRAINING
GOES
CIVILIAN**



CAN THE technical and vocational education systems used in training military personnel in the US armed forces be transferred to civilian schools?

How effective would they prove? Would they be accepted by the students?

With the military leaning heavily on audio-visual techniques and programmed instruction, would switching a technical course to a public school classroom mean a big investment in equipment for the civilian school?

Could the average high school, post-secondary technical school, or college vocational instructor adapt to the military approach to education, even in technical areas?

These were just a few of the questions that officials of the Office of Education and vocational-technical educators from military and civilian life sought answers to in launching the Utah project, an eighteen-month experiment designed to determine whether US Air Force courses and teaching materials could be used in the Utah state public school system.

The Aerospace Education Foundation, 1750 Pennsylvania Ave., N. W., Washington, D. C., an affiliate of the Air Force Association, was given a grant from the Office of Education to conduct the experiment.

Utah was selected as the laboratory, first, because the presence of a major Air Force installation (Hill Air Force Base) and the burgeoning electronics and technical industry serving it had created a growing demand for skilled technicians, and, second, because farsighted Utah educators had already done the spadework for such a project.

"Nothing like this had ever been done before," according to James H. Straubel, who headed the project for the Aerospace Education Foundation.

"There had been scattered borrowing by schools near US military installations in the past. Occasionally, someone from a school close to a base would borrow a film. Or a teacher from the school might visit the base and sit in on a training class. But there was no organized transfer of information and techniques."

How It Started

The Utah project got under way in March 1967, when representatives from the state's Division of Vocational and Technical Education met with representatives of the state's Air Force Association and the Foundation's Educational Technology Advisory Committee. Using a ten-year projection of manpower needs in Utah, the group determined there were certain job priority areas—electronics, medical technician, and aircraft maintenance. The Air Force representatives, reviewing their training programs in these areas, came up with nineteen

courses. Out of these, the Utah educators selected three—electronics principles, aircraft mechanics, and medical service specialist (or nurse's aide). Then the nuts-and-bolts job of making the actual course transfers began.

Certain schools in the state system were selected for the test. Informal meetings and workshops were held at these schools with the teachers who would be taking part, and the teachers visited the Air Force bases where the courses were taught.

Don James, an instructor in electronics at Utah Technical College, a post-secondary technical school at Provo, is one of three teachers who visited Lowry AFB near Denver, Colo., to take a first-hand look at the electronics course.

"We spent a week there sitting in on classes, reviewing films, and meeting with the military instructors," he says. "It was quite an experience and it opened our eyes to some new techniques in education. We felt there were parts of

Force medical service specialist course (nurse's aide) to be tested at Utah Technical College in Salt Lake City.

The new courses were not simply dropped into the curriculums at the test schools. The experiment was set up so that a conventional course and a modified course, which was an Air Force/conventional course mix, were taught parallel to the straight Air Force course.

The design of the experiment varied with each course. About 250 students, the total enrollment in basic electronics at five schools ranging from high school to college, were involved in the electronics portion. The three test groups were established. The modified group, essentially, received extra math and laboratory work.

Only Utah State University was involved in the aircraft mechanics course, and the two test groups alternated between conventional and Air Force instruction. Tests were given to the



In Utah project classes, generous use was made of such Air Force-developed teaching aids as these workbook materials and electronic instrumentation.

the course that wouldn't quite do for us, but we finally decided to take the whole package."

Three Courses Selected

Three Air Force courses were finally selected and scheduled for testing:

- A ninety-hour segment from the Air Force standardized electronics principles course, to be tested at Weber State College at Ogden; Dixie College at St. George; Utah Technical College at its Provo and Salt Lake City campuses; and Jordan High School in Salt Lake City.
- A sixty-hour segment of the Air Force aircraft mechanics course, to be tested at Utah State University at Logan.
- A twenty-hour segment from the Air



Utah youngsters utilize USAF film library as a major part of the automated instructional methods.

students at various stages to measure learning. For the nurse's aide test, one group received the Air Force instruction while the other got the conventional instruction.

It became clear as the experiment got under

way that the military and civilian instruction were marching to different drummers.

The Air Force approach to the teaching of all three courses was performance oriented, unlike its civilian counterpart.

Given a specific amount of instructional input, for instance, the Air Force demanded an equivalent performance level from its students. If the course was designed to train aircraft maintenance mechanics, then the Air Force expected to produce an aircraft maintenance mechanic at the end of a specific period of instruction.

The approach to the same subjects in the civilian schools tended to be more loosely organized. Less attention was given to specific objectives. The Air Force course in electronics could qualify a student for a job as a basic technician in industry. The same student going through a conventional electronics course, how-

ever, would come out with nebulous skills, and he would require retraining before he could do the same job.

The Air Force courses, in addition, leaned heavily on audiovisual aids and programmed instruction. Much of the instruction consisted of films that led the student through the course materials in easy-to-understand stages. Each film ran between ten and forty minutes. During pauses on the screen, the instructor in the film had the students answer questions on a pre-distributed study guide. Students also used laboratory manuals that were an extension of the filmed lessons.

A Whole New Approach

For the civilian teachers, it was a whole new approach. It altered their role in the classroom. Most quickly adapted to the changes, but

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a few, admittedly, had difficulty and said they preferred the old ways better.

"It speeded up the teaching process tremendously," states Mr. James. "It was great for new teachers, especially. It gave them a concrete lesson plan and it provided a simplified approach to complex subjects."

Leon Devries, who teaches electronics at Cyprus High School in Salt Lake City, says the Air Force materials have been "invaluable" in his own teaching.

"Basics are basics in electronics, and that's what the students get from the Air Force materials. At first, the kids were bothered by the pauses and the repetition in the films. But they got the point and accepted it after I explained the reasons behind it."

He adds that introducing the Air Force course in electronics didn't involve any extra expenses for the school.

"The school district already had the films. I found an old movie projector the school had hidden in a storage closet and set it up in a small room next to the shop. The boys go in there to see the films. If one of the boys has missed something, he can go into the room by himself, switch on the projector, and review what he's missed."

The vocational instructor, whose electronics course runs for two hours, says that having the student put answers on a piece of paper while he's watching the film, as required in the Air Force course, "reinforces the lesson for the student."

Other teachers agree. "My students can hear an explanation a dozen times," observes one teacher, "but it doesn't really sink in until they put it down on paper."

Jordan High School found that a one-hour electronics course using Air Force materials just wasn't enough time to reach and hold the student, and subsequently dropped the course.

Mrs. Margaret Nelson, a nursing instructor at Utah Technical College, describes the Air Force materials for teaching the nurse's aide course as "beautiful." She adds that it "introduced us to how effective programmed instruction could be, and we've gone over to it in part." Since the test was conducted, however, and partially as a result of it, the college has shortened its nurse's aide course even more. The training time was reduced to help meet a growing shortage of nurses in the state.

That the Air Force courses could be adapted with good educational results in civilian high schools, post-secondary technical schools, and colleges was demonstrated in the Utah project. An independent evaluation of the project shows that students enrolled in the Air Force courses

generally score slightly higher than the students in the conventional courses, and they also retain the information longer.

Teachers Are Enthusiastic

The teachers involved in the project invariably are enthusiastic about the Air Force instructional methods and learning materials. As one teacher sums it up, "It got results. The students learned." Most of the teachers, at the same time, insisted on adapting the materials in their own way. One teacher added extra increments of mathematics to the electronics course, for example. Another assigned his students additional laboratory projects that were related to the filmed Air Force teaching. Another made up his own work sheets for students to use while they were viewing a film. Essentially, however, the core of the course was that of the Air Force.

The Utah Division of Vocational and Technical Education has taken over funding of the program since the experiment was completed. It is now working to introduce other Air Force instructional units into the state's public school system. In the field of electronics alone, new course units totaling 540 hours have been accepted for use from the Air Force. These include units on D.C. circuits, A.C. circuits, solid-state devices, vacuum tubes, oscillators, receiver principles, servomechanisms, wave-shaping circuits, and microwave principles. The A.C. and D.C. units are being introduced into high schools and the balance will go into post-secondary schools and colleges.

"The Air Force materials could easily be used by other school systems around the country, but it would be important to adapt them to local job market conditions," says Mr. Straubel of the Aerospace Education Foundation. "The Air Force courses would be a basic curriculum package—a starting point. Then local educators, manpower specialists, and local industry representatives could review the package and utilize it to meet the long-range employment needs for their particular area."

The Aerospace Education Foundation, meanwhile, is looking to the future and anticipates requests from other civilian school systems for its courses. It is making a complete inventory of courses now being used by the Air Force. Of these, about 100 course units are seen as being potentially transferable to civilian schools. The subject categories include data processing, clerk-administration, health occupations, transportation, auto mechanics, machinists, radio communication, and others.

Thus, it appears that the greatest impact of the Utah project still lies in the future. For the Office of Education, the experiment was one more contribution that its sponsored research is making to progress in the nation's vocational education programs. ■

By Don Steele

AFA AFFAIRS EDITOR

THE UTAH STATE ORGANIZATION . . .

cited for consistent and effective programming in support of the mission of AFA, most recently exemplified in its fourth annual "Project Navajo," a community-action program.

Project Navajo 1971, sponsored by the Utah AFA for the fourth consecutive year, resulted in the distribution of some sixty tons of food, clothing, medical supplies, toys, and other items to more than 100,000 Navajos on their 24,000-square-mile Utah-New Mexico-Arizona reservation.

An aerial fleet from the **945th Military Airlift Group** at Hill AFB, Utah,

Air Force ROTC spearheaded a drive at the Lincoln Elementary School in **Orem, Utah**, that netted the project 5,600 cans of food, weighing some four tons.

Five tons of usable clothing were donated by the Ogden Rescue Mission. Three tons of flour were donated by the Big-J mill in **Brigham City** to match pound for pound that pur-

human beings toward another. It is indicative of the willingness on the part of many fine people to sacrifice their time, efforts, and money to bring a truly joyful Christmas spirit to the Navajo nation. [We] will long cherish your concern and generosity."

Delegates to the **New Jersey AFA's** twenty-third annual convention, held recently in Atlantic City, N. J., elected **Amos L. Chalif** to succeed **Mrs. Mamie Kinsley** as President for 1972. Other officers elected are: **Joseph J. Bendetto** and **Daniel B. McElwain**, Vice Presidents; **Lloyd G. Nelson**, Treasurer; and **James P. Grazioso**, Secretary.

During the convention's Awards Banquet, Exceptional Service Awards were presented to **McGuire AFB**, "for continuous assistance and service in carrying out our Air Force mission"; and to the **Air Force Association National Headquarters Staff**, "for their guidance, leadership, and inspiration in the development of adequate aerospace power for the betterment of all mankind."

The State AFA's **Sal Capriglione Memorial Airpower Award** was presented to the **Curtiss-Wright Corp.**, "for many years of assistance and support to fulfill the responsibilities imposed by the impact of aerospace technology on modern mankind."

The **Sal Capriglione Chapter** received two awards—the **Best Programming** and the **Community Relations Awards**. The State AFA's **Aerospace Education Award** went to the **Thomas B. McGuire, Jr., Chapter**, while the **Garden State Chapter** received an award for **Outstanding Service** to the New Jersey AFA.

The **Thomas B. McGuire, Jr., Memorial Award**, a new award for "dedication and service with the Air Force Association (New Jersey)," was presented to **James P. Grazioso**, a past president of the New Jersey AFA and its current secretary.

State AFA Certificates of Appreciation were presented to **Phyllis Gajdos**, **William Howard**, and **Thomas Lynch**.

AFA Certificates of Honor were presented to the **Salem Standard**



At an Indian hospital at Monument Valley, Ariz., Utah AFA President **Glen Jensen** gives a blanket to three children during the state organization's "Project Navajo." It was the fourth consecutive year for the program.

carried twenty tons of the goods to Kirtland AFB, N. M., where trucks loaned by **Whitfield Transportation, Inc.**, carried it to the southern half of the reservation. The balance of the material was carried by Whitfield trucks from Hill AFB to the northern half of the reservation.

Utah AFA President **Glen Jensen** led a ten-man delegation of AFA members who loaded and unloaded the goods.

Mr. Jensen reports that the list of cosponsors has grown. Participating Utah agencies this year included Hill AFB, Defense Depot Ogden, Internal Revenue Service, Thiokol Chemical Corp., twenty-three elementary schools, four junior high schools, Brigham Young University, the *Deseret News*, Brigham City Chamber of Commerce, Dugway Proving Grounds, Fort Douglas, the Boeing Co., local retail merchants, and many others.

chased by AFA's **Golden Spike Chapter**.

Pharmaceuticals, operating tables, a mobile dental lab, and other medical items were donated by two agencies that are new this year—**Mather AFB** and **Sacramento Army Depot**—both in California.

The goods were collected and brought to Hill AFB by Air Force, commercial, and private trucks. At the base, they were sorted, packed, and loaded onto the Whitfield trucks and Air Force aircraft. The **National Defense Transportation Association**, whose member companies supplied the commercial trucks, worked closely with the Utah AFA in the shipping phases of the huge project.

How do the more than 100,000 Navajos on the reservation feel about the Utah AFA's annual project? Tribal Council chairman **Peter MacDonald** says, "I believe Project Navajo represents one of the finest gestures of

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and *Jersey Men* newspaper, and to **Mrs. A. H. Keen**, a staff writer for the paper, for their "outstanding service to the cause of human rights by virtue of taking positive action in behalf of Americans who are missing in action or held prisoner of war in Southeast Asia." **Joseph Dunphee**, Advertising Sales Manager, accepted for the paper.

Daniel B. McElwain was master of ceremonies, and **Amos L. Chalif**, President-elect, made brief remarks of acceptance.

The **Fresno Chapter's** 1971 Air Force Honors Night Banquet and Awards Ceremony, held to observe the twenty-fourth anniversary of the United States Air Force and to pay tribute to the Strategic Air Command, also provided a formal platform for the Chapter and local Air Force units to recognize their outstanding members.

Col. Norris M. Overly, Mather AFB, Calif., one of the first Americans to be released from a North Vietnamese prison camp, was the principal speaker. AFA National Director **Jack Withers** of Dayton, Ohio, was master of ceremonies.

Two highly decorated Southeast Asia returnees received special recognition. They are: **Lt. Col. Ronald H. Markarian**, Office of Assistant Chief of Staff, Intelligence, Directorate of Intelligence Systems, Hq. USAF, who served as an Air Intelligence officer in South Vietnam and at Hq. Pacific Air Forces in Hawaii; and **Maj. John V. Sargeant, Jr.**, Castle AFB, Calif., who flew more than 200 combat missions in B-52s while stationed in Guam and Thailand.

Award recipients included **William G. Estep**, a past president of the Fresno Chapter, who was named the Chapter's "Man of the Year"; and **Ralph DeSolla**, a World War I Navy pilot who was honored for his fifty years of devoted service to the nation.

Awards and citations, far too many to list here, went to outstanding members of the USAF, AF Reserve, Air National Guard, AFROTC, Civil Air Patrol, and the Fresno Chamber of Commerce Military Affairs Committee.

Mrs. John B. McKamey and **Mrs. Theodore F. Kopkman**, whose husbands are Navy pilots now POWs in North Vietnam, were honored guests.

Special guests included **Rep. B. F.**

Sisk (D-Calif.), who introduced **Colonel Overly**; **Fresno Mayor Ted C. Wills**; **Assemblyman Kenneth Maddy**; **City Councilman P. J. Camaroda**; **Maj. Gen. George W. Edmonds**, Chief of Staff, California Air National Guard; **Brig. Gen. E. S. Harris, Jr.**, Commander of the 14th Strategic Aerospace Division (SAC), who represented the Strategic Air Command; **Commodore J. M. Tully, Jr.**, USN, Commander Fleet Air Lemoore; **Col. Russell Downey**, Commander, 4017th Combat Crew Training Squadron (SAC), Castle AFB; **Capt. John Alvis**, USN, Base Commander, Lemoore Naval Air Station; and **David Hayden**, World War I Medal of Honor winner.

AFA leaders attending included National Director **Will H. Bergstrom**, and the following California AFA officers: Executive Committee Chairman **Eugene L. DeVisscher**, President **Floyd Damman**, Vice President **Stan-**



children from Denver neighborhoods who are treated to frontline views of F-100 flights and tours of the Colorado Air National Guard facilities at **Buckley ANG Base**.

The children are briefed on the night's mission by **Lt. Col. John France**, Commander of the 104th Tactical Fighter Group and a member of the Front Range Chapter. They are permitted close-up views of night takeoffs and landings from the end of the runway. Then each youngster is given a go at "driving" one of the Supersabres parked in the hangar.

The evening is climaxed with movies of in-flight refueling operations, and a chicken dinner, complete with soft drinks.

Chapter President **James Hall**, a major in the Colorado Air National Guard and a Past President of AFA's Los Angeles, Calif., Chapter, encourages other members of the Chapter to assist with the tours and dinners

During Fresno Chapter's Air Force Honors Night, SMSgt. Milton R. Sprouse, left, receives a Chapter Certificate of Merit from AFA National Director and Master of Ceremonies Jack Withers for "outstanding individual service" to AFA.

ley Hyrn, Secretary **Barbara Rowland**, Treasurer **Gordon Meinert**, and Organization Director **Ed Stearn**.

Fresno Mayor Ted Wills, who served as honorary chairman for Air Force Week, issued a proclamation urging all citizens "to observe the Air Force anniversary by visiting local Air Force units and displays and to join in saluting the Strategic Air Command, the major Air Force command we [Fresno and AFA's Fresno Chapter] honor this year."

In conjunction with its Air Force Honors Night Banquet and Awards Ceremony, the Fresno Chapter hosted the **Midyear Conference of the California AFA**. At the conference, California AFA and Chapter leaders discussed programming, problems confronting Chapters, and assessed the effectiveness of the State Organization and its Chapters in furthering the goals and objectives of the Air Force Association.

The **Front Range Chapter** of Denver, Colo., recently initiated a unique "Big Brother" program. Guests at this monthly program are underprivileged

We commend Major Hall and members of the Front Range Chapter on a most effective and worthwhile program, a program that will contribute much to the furtherance of AFA's mission and objectives.

The observance of the sixty-eighth **Anniversary of Powered Flight** on December 17 at Kitty Hawk, N. C., a one-day program cosponsored annually by the Air Force Association, The First Flight Society, the National Aeronautic Association, and the National Park Service, included First Flight Ceremonies at the Wright Memorial Visitors Center and the Wright Memorial Luncheon at the John Yancey Motor Hotel.

Rear Adm. Jesse Johnson, USN (Ret.), a former President of The First Flight Society and a member of AFA's **Tidewater, Va., Chapter**, presided at the First Flight Ceremony. Other participants included: **Lorimer W. Midgett**, President, The First Flight Society, and the **Rev. Hank Wilkinson**, Pastor of the Kitty Hawk Methodist Church. The Northeastern High School Band and Majorettes from



AFA's 26th ANNUAL CONVENTION AND AEROSPACE BRIEFINGS AND DISPLAYS

WASHINGTON, D.C. • SEPTEMBER 18-19-20-21

Proudly saluting the 25th ANNIVERSARY of the United States Air Force



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Some 50 companies will present their latest advances in aerospace/defense hardware at the 1972 Aerospace Development Briefings and Displays, to be held in conjunction with AFA's 26th Annual National Convention at the Sheraton-Park Hotel in Washington, September 18-21.

The Briefings and Displays offer a unique combination; the physical presentation of aerospace/defense equipment . . . and . . . informative company briefings, in the booth, to key military, government, and industry personnel. Morning attendees are assembled into parties of 20 persons each and are escorted from briefing to briefing on schedule. Afternoon attendees may select any presentation offered in any order of preference.

Last year, 5,483 persons participated in the Briefings and Displays, including 189 General Officers and Admirals and 549 Colonels and Naval Captains. The Secretary and the Chief of Staff of the Air Force were honored at a reception in the Exhibit Hall, attended by some 2000 guests.

This year's Convention salutes the 25th Anniversary of the United States Air Force, established in 1947; thus attendance at the 1972 Briefings and Displays is expected to be the largest yet. The Briefing concept was developed by AFA in 1964 and has been widely acclaimed for its ability to guarantee exhibitors an audience in their booth on schedule.

Over 18,000 square feet of display space have already been assigned for 1972. Companies wishing to participate in the Briefing and Display Program should contact AFA as soon as possible. A minimum of 300 square feet is required to conduct briefings; no minimum is required to display only.

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AFA News

Elizabeth City, N. C., directed by **Scott Callaway**, provided special music, and F-4s from the **335th Tactical Fighter Squadron**, Seymour Johnson AFB, N. C., flew an aerial tribute.



Maj. Bill Morris, of Colorado ANG and AFA's Front Range Chapter, with friends during a monthly "Big Brother" Chapter program at Buckley ANG Base.

During the presentation of memorial wreaths, a wreath was presented from AFA's **Wright Memorial Chapter** of Dayton, Ohio.

Air Force and AFA representatives included: **Col. William Carpenter**, Director of Information, Headquarters Command, USAF; AFA National Director **A. H. Duda, Jr.**; and **J. R. Smith** of AFA's Tarheel Chapter, Raleigh, N. C.

This year, the Wright Memorial Luncheon program included tributes to the memory of the late **Ralph V. Whitener** by **S. Wade Marr**, a Director of The First Flight Society, and **G. Barney Rawlings**, Executive Director, Las Vegas Convention Authority and President of AFA's **Las Vegas Chapter**.

It was largely Ralph's efforts that led to establishment of The First Flight Society, the Wright Memorial Visitors Center, and the First Flight Airstrip. His career included service to all four sponsors of this annual event. (See page 41 of the November '71 issue of *AIR FORCE Magazine*.)

Portraits of this year's additions to the First Flight Shrine—**Col. Robert M. White**, USAF, the first pilot of a winged aircraft to be designated "As-

tronaut" by flying to an altitude of 59.6 miles in the X-15 on July 17, 1962; and the late **Lt. Thomas E. Selfridge**, USA, the first military officer in the world to pilot an airplane, May 18, 1908—were unveiled by **Mrs. Frederick G. Kellond** of Washington, D. C., and **Mrs. Ralph V. Whitener** of Annandale, Va.

The **First Flight Shrine** was established by The First Flight Society to honor those who have accomplished notable "firsts" in the field of flight. Among those honored in previous years are Orville and Wilbur Wright, Amelia Earhart, Charles A. Lindbergh, Col. Charles "Chuck" Yeager, Jacqueline Cochran, James H. Doolittle, Glenn H. Curtiss, the crew of Apollo-11, Dr. Igor I. Sikorsky, and Wiley Post.

In conjunction with a meeting of AFA's **Organizational Advisory Council** in Fairborn, Ohio, members of the Council (the Vice Presidents for AFA's twelve regions), received a series of briefings from commands located at Wright-Patterson AFB.

The program opened on Thursday evening, January 13, with an AFA reception at the Wright-Patterson

This Is AFA

The Air Force Association is an independent, nonprofit airpower organization with no personal, political, or commercial axes to grind; established January 26, 1946, incorporated February 4, 1946.

Objectives

• The Association provides an organization through which free men may unite to fulfill the responsibilities imposed by the impact of aerospace technology on modern society; to support armed strength adequate to maintain the security and peace of the United States and the free world; to educate themselves and the public at large in the development of adequate aerospace power for the betterment of all mankind; and to help develop friendly relations among free nations, based on respect for the principles of freedom and equal rights for all mankind.

Membership

Active Members: US citizens who support the aims and objectives of the Air Force Association, and who are not on active duty with any branch of the United States armed forces—\$10 per year.

Service Members (nonvoting, nonofficeholding): US citizens on extended active duty with any branch of the United States armed forces—\$10 per year.

Cadet Members (nonvoting, nonofficeholding): US citizens enrolled as Air Force ROTC or JROTC Cadets, Civil Air Patrol Cadets, Officer Trainees, or Cadets of a United States Service Academy—\$5 per year.

Associate Members (nonvoting, nonofficeholding): Non-US citizens who support the aims and objectives of the Air Force Association and whose application for membership meets AFA Constitutional requirements—\$10 per year.

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AFA STATE CONTACTS

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma, Tuscaloosa): **John H. Haire**, 2604 Bonita Circle, Huntsville, Ala. 35801 (phone 453-5499).

ALASKA (Anchorage, Fairbanks, Kenai): **Gordon Wear**, Box 777, Fairbanks, Alaska 99701 (phone 452-4411).

ARIZONA (Phoenix, Tucson): **William P. Chandler**, One S. Norton Ave., Tucson, Ariz. 85719 (phone 624-8385).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Frank A. Bailey**, 605 Ivory Dr., Little Rock, Ark. 72205 (phone 988-3432).

CALIFORNIA (Burbank, Edwards, Fairfield, Fresno, Harbor City, Hawthorne, Long Beach, Los Angeles, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, Santa Barbara, Santa Clara County, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Floyd Damman**, 11055 Candor St., Cerritos, Calif. 90701 (phone 675-4611, ext. 2274).

COLORADO (Boulder, Colorado Springs, Denver, Pueblo): **Roy A. Haug**, Mt. Bell 1st Nat'l Bank Bldg., Rm. 402, Pikes Peak at Fejon, Colorado Springs, Colo. 80903 (phone 636-1296).

CONNECTICUT (Torrington): **John McCaffrey**, 117 Bridge St., Groton, Conn. phone 739-7922).

DELAWARE (Wilmington): **Vito A. Panzarino**, Greater Wilmington Airport, Bldg. 1504, Wilmington, Del. 19720 (phone 328-208).

DISTRICT OF COLUMBIA (Washington, D. C.): **Tom Turner**, c/o Fairchild Industries, Germantown, Md. 0767 (phone 948-9600).

FLORIDA (Bartow, Broward, Daytona Beach, Ft. Walton Beach, Gainesville, Homestead, Jacksonville, Miami, Orlando, Panama

City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa): **Daniel F. Callahan**, Deputy Director of Administration, Kennedy Space Center, Fla. 32899 (phone 867-3740).

GEORGIA (Athens, Atlanta, Savannah, St. Simons Island, Valdosta, Warner Robins): **H. L. Everett**, 822 Capt. Kell Dr., Macon, Ga. 31204 (phone 929-3035, ext. 5509).

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IDAHO (Boise, Burley, Pocatello, Twin Falls): **Carl W. Tipton**, 1511 Juanita, Boise, Idaho 83706 (phone 344-0348).

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KANSAS (Topeka, Wichita): **Earl Clark**, 4512 Speaker Rd., Kansas City, Kan. 66106 (phone 342-7030).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Ruston, Shreveport): **Ralph F. Chaffee**, 4431 Fern Ave., Shreveport, La. 71104 (phone 865-0086).

MARYLAND (Baltimore): **Richard Boyd**, 2101C Town Hill Rd., Baltimore, Md. 21234 (phone 661-7271).

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NORTH CAROLINA (Charlotte, Fayetteville, Goldsboro, Raleigh): **H. Fred Waller, Jr.**, 3706 Melrose Dr., Raleigh, N. C. 27604 (phone 832-6014).

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Delsey Rd., Hillsboro, Ore. 97123 (phone 648-4204).

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SOUTH DAKOTA (Rapid City, Sioux Falls): **Don Hedlund**, 2701 W. 24th St., Sioux Falls, S. D. 57105 (phone 336-1376).

TENNESSEE (Memphis, Nashville, Tullahoma): **James W. Carter**, Williamsburg Rd., Rt. 3, Brentwood, Tenn. 37027 (phone 834-2008).

TEXAS (Abilene, Austin, Big Spring, Corpus Christi, Dallas, Del Rio, El Paso, Fort Worth, Houston, Lubbock, San Angelo, San Antonio, Sherman, Waco, Wichita Falls): **Herbert G. Bench**, P. O. Box 5003, 1600 Pacific, Dallas, Tex. 75222 (phone 742-9555, ext. 567 or 568).

UTAH (Brigham City, Clearfield, Ogden, Salt Lake City, Provo): **Glen L. Jensen**, 1293 W. Fifth South, Salt Lake City, Utah 84104 (phone 359-4485).

VERMONT (Burlington): **R. F. Wissinger**, 158th CAM Sd, Burlington International Airport, Vt. 05401 (phone 863-4494).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Richmond, Roanoke): **Richard C. Emrich**, 6416 Noble Dr., McLean, Va. 22101 (phone 426-3020).

WASHINGTON (Bellevue, Port Angeles, Seattle, Spokane, Tacoma): **Norman D. Rowley**, 7425 Ruby Dr., S. W., Tacoma, Wash. 98498 (phone 593-3713).

WISCONSIN (Madison, Milwaukee): **Gene Grob-schmidt**, 4840 S. Howell Ave., Milwaukee, Wis. 53207 (phone 483-6462).

WYOMING (Cheyenne): **Fred Milam**, Box 745, Cheyenne, Wyo. 82001 (phone 634-2134).

AFA News

AFB Officers' Mess. Special guests included: **Lt. Gen. F. C. Gideon**, Vice Commander, Air Force Logistics Command (AFLC); **Lt. Gen. James T. Stewart**, Commander, Aeronautical Systems Division (AFSC); **Maj. Gen. Ernest A. Pinson**, Commander, Air Force Institute of Technology; **Brig. Gen. Edmund A. Rafalko**, Commander, 2750th Air Base Wing (AFLC); and **Col. George R. Weinbrenner**, Commander, Foreign Technology Division (AFSC).

Others included **Col. Thomas F. Rew**, Commander, 17th Bomb Wing (SAC); **Col. Bernie S. Bass**, Director, Air Force Museum; **Col. A. G. Lynn**, Dep. Director of Information, AFLC; **Lt. Col. R. V. Blandin**, Vice Commander, Air Force Orientation Group; AFA President **Martin M. Ostrow**; AFA National Directors **Joe L. Shosid** and **Jack Withers**. Also, **James H. Straubel**, AFA's Executive Director; **Robert Maltby**, Ohio AFA President; **Robert M. Watson**, a member of AFA's Civilian Personnel Council; **Melvin Gerhold**, a member of AFA's AFOTC Council; **Lt. Charles P. Azukas**, Chairman of AFA's Arnold Air Society Alumni Council; **Gerald W. Kaufhold** and **Lewis E. Michael**, Ohio AFA Vice President and Secretary, respectively; **Don Wilson**, Columbus Chapter President; **E. H. Nett**, Wright Memorial Chapter President; and **James D. Wohlford**, Akron Chapter President.

On Friday morning, General Stewart gave opening remarks after which the following briefings were presented: "ASD Overview" by **Capt. David Messner**; "The Air Force of the Future" by **Col. F. J. McNamara, Jr.**, and **R. C. Lenz**; and "The Soviet Technological Challenge" by **Col. John W. Farr**, **Lieutenant McCrillis**, and **Lieutenant Bose**, of the Foreign Technology Division (AFSC).

Following the briefings, the Council members were guests at a luncheon hosted by **Gen. Jack G. Merrell**, Commander, Air Force Logistics Command.

During the Council's meeting, which was chaired by President Ostrow and lasted from 2:30 p.m. until 10:00 p.m., membership, programming, inactive Chapters, and other matters pertaining to AFA's field organizations were discussed.

On Saturday morning, members of the Council were given a special tour of the Air Force Museum by **Col.**



During the Wright Memorial Luncheon, **John Yancey**, center, donor of portraits of aviation greats to the First Flight Shrine, presents a portrait of the late **Ralph V. Whitener** to his widow, **Alice**, as the Whitener children—**Bob**, **Larry**, and **Kathi**—look on.

AFA's Organizational Advisory Council meeting in Fairborn, Ohio (seated, from left): **Chuck Burnette**, Chairman; AFA President **Martin M. Ostrow**; **B. D. Osborne**; guest **Jack Withers**; **Joseph Assaf**. Standing: **J. G. Bro-sky**; **A. A. West**; **W. D. Flaskamp**; **R. S. Lawson**; **A. E. Harris**; **W. K. Kelly**; **J. C. Price**; **Stan Mayper**.



At Langley, Va., Chapter's recent NCO Appreciation Dinner, from left, **SMSGt. C. G. Arnold**, 1st Sergeant, TAC NCO Academy; **A. A. "Bud" West**, Vice President for AFA's Central East Region; and **Gen. William W. Momyer**, Commander of the Tactical Air Command.

Bernie Bass, Director of the Museum.

AFA's Project Officer for the meeting, **Bernard D. Osborne**, Vice President for AFA's Great Lakes Region, and the Air Force Project Officer, **Col. A. G. Lynn**, Deputy Director of Information (AFLC), are to be congratulated on having arranged a most enjoyable and informative program for the Council.

IN SYMPATHY . . . AFA extends its deepest sympathy to the family and friends of two dedicated AFAers who died recently.

O. Earl Wilson of St. Louis, Mo., died on January 18. Earl was a former Vice President for AFA's Midwest Region.

Col. H. J. Odenthal, USAF (Ret.), of Falls Church, Va., died on January 21. Colonel Odenthal was active in northern Virginia and Washington, D. C., AFA activities several years ago, and served actively on committees at several AFA National Conventions. Colonel Odenthal was a pioneer airman, a veteran of World Wars I and II, and assisted in the rescue of **Orville Wright** from the airplane crash in which **Lt. Thomas Selfridge** was

killed, at Fort Myer, Va., September 17, 1908.

COMING EVENTS . . . Iron Gate Chapter's Ninth Annual Air Force Salute, New York Hilton Hotel on March 24 . . . **California AFA Convention**, Rickey's Hyatt House, Palmdale, Alto, April 14-16 . . . **Massachusetts AFA Convention**, Hanscom AFB, April 22 . . . **Florida AFA Convention**, the Tides Hotel & Bath Club, Redington Beach, May 5-7 . . . **Washington AFA Convention**, Aggie's Motel, Port Angeles, May 19-20 . . . **Utah AFA Convention and Education Symposium**, Salt Lake City, May 23-25 . . . AFA's Dinner honoring the **Outstanding Squadron** at the Air Force Academy, the Broadmoor, Colorado Springs, Colo., June 3 . . . **Virginia AFA Convention**, Executive Motor Hotel, Richmond, June 17 . . . **Pennsylvania AFA Convention**, Holiday Inn, Swickley, June 23-24 . . . **New York AFA Convention**, Plattsburgh, June 24 . . . AFA's Twenty-sixth **National Convention and Aerospace Development Briefings**, Sheraton-Park Hotel, Washington D. C., September 17-21.

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Offers equal coverage at the same low cost for flying and non-flying personnel. No geographical or hazardous duty restrictions or waiting period. Insurance up to \$20,000 plus \$12,500 accidental death benefit. Cost of insurance has been reduced by dividends in most years since 1961. All Air Force personnel, on active duty, in the National Guard and in the Ready Reserve are eligible to apply.

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Protects rated personnel on active duty against loss of flight pay through injury or illness. Guaranteed even against pre-existing illnesses after 12 consecutive months in force. Grounded policyholders receive monthly payments (tax free) equal to 80% of flight pay—the equivalent of full government flight pay, which is taxable.

5 EXTRA CASH INCOME HOSPITAL INSURANCE

Puts up to \$40 a day cash in your pocket for every day you or an insured member of your family is hospitalized. Cash benefits for up to 365 days. No physical examination required. You use benefits any way you see fit. All AFA members, *active-duty and civilian*, up to Age 60 are eligible to apply.

2 CIVILIAN GROUP LIFE INSURANCE

For non-military members of AFA. \$10,000 of protection at exceptionally low cost. Double indemnity for accidental death except when the insured is acting as pilot or crew member of an aircraft. Waiver of premium for disability. Choice of settlement options.

4 ALL-ACCIDENT INSURANCE (now includes pilots and crew members)

Offers all AFA members worldwide, full-time protection against all accidents—now even including accidents to aircraft pilots and crew members. Coverage up to \$100,000. Two plans: complete, low-cost family protection under the popular Family Plan (including all children under 21), or individual coverage. Includes medical expense benefits, and automatic increases in face value at no extra cost.

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ANY OR ALL AFA
INSURANCE PLANS**

AIR FORCE ASSOCIATION
Insurance Division

1750 Pennsylvania Ave., N.W.
Washington, D.C. 20006

Without obligation, please send me complete information about the AFA Insurance Program(s) checked at right.

Name

Rank or Title

Address

City

State Zip

- Military Group Life Insurance
- Civilian Group Life Insurance
- All-Accident Insurance
- Flight Pay Insurance
- Extra Cash Income Hospital Insurance



Bob Stevens'

"There I was..."

Perils of instrument night approaches
Differ somewhat for players and coaches,
But for rapid aging, it's hard to beat
A spectator view from a damp right seat...

SUSPICIONS CONFIRMED-

IT'S A DARK and STORMY NIGHT; INSIDE THE
SNUG GCA SHACK WE SEE-

UH...YER 50 FEET HIGH...NOW
YER A HUNNERT FEET HIGH...COMING
DOWN...WATCH IT...NOW YER GOING 50
FEET LOW...DECREASE YOUR RATE OF
DESCENT...CORRECTING NICELY...OVER
THE THRESHOLD...TAKE OVER VISUALLY
FOR LANDING... I CALL



THANKS TO
BOB HOWARD
COLUMBUS, OHIO

AVIATION GLOSSARY

ALTIMETER SETTING

'THE PLACE WHERE
THE ALTIMETER SETS-
USUALLY HIDDEN BEHIND
THE CONTROL COLUMN
DURING A TIGHT INST-
RUMENT APPROACH'



THANKS TO COL.
JETHRO E. CULPEPPER
C.O. CONFEDERATE AF



THE CO-PILOT ON AN INSTRUMENT APPROACH



'CLEARED FOR APPROACH,
CEILING 300, VIZ 1/2...'



'YOU'RE 200
FT. LOW...'

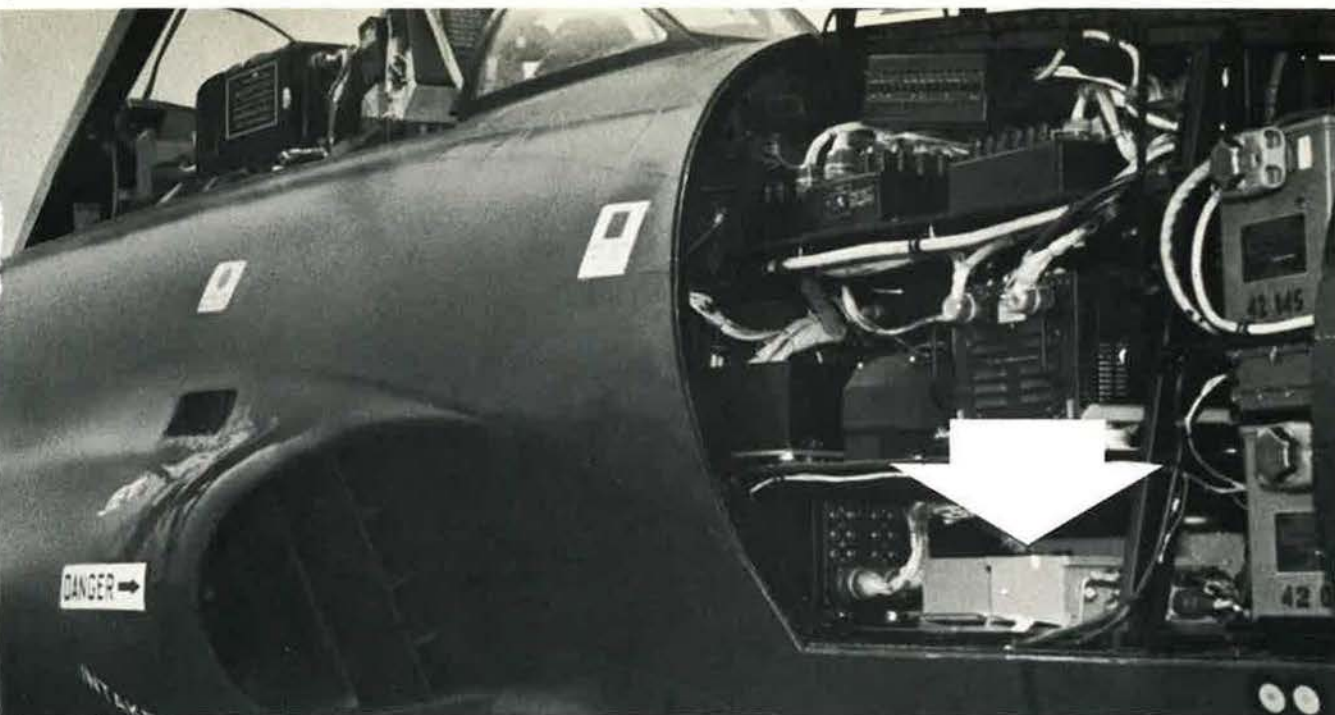


'APPROACHING
MINIMUMS, STILL LOW'



'TAKE OVER and
LAND VISUALLY'

Bob Stevens



AN/DKW-1 vehicle subsystem mounted in QT-33 drone.

plug-in RPV

Any remotely piloted vehicle becomes ready for your tactical mission when you plug in this Motorola RPV airborne package.

The AN/USW-3 system provides command, control, tracking, and telemetry. The ground or airborne control stations let the RPV fly all-altitude with high "g" maneuverability as a single aircraft, in multiples, or in formation.

Handover from one controller to another is automatic, eliminating the need for voice communication. But the voice link is always there if you want it. And the modular design provides more flexibility than any other system available. Pre-programmed terrain following, automatic multiple aircraft rendezvous, automatic jinking, and automatic operation of mission packages are simple since it's computer controlled. The manual override lets you make changes even while the mission is enroute.

The engineering excellence of the system goes beyond command and control. To increase flexibility it's lightweight, helicopter transportable, and designed so there's a high degree of component commonality between station types.

This new plug-in system defines the the state-of-the-art. Combinations of the seven different control stations making up USW-3 will almost certainly accommodate any mission scenario you can dream up.



AN/PSW-1 is first control station, now under service test at Pt. Mugu, California.

It even has built-in capability for discrete or proportional command functions — or any combination you want of each. It uses digital data transmission, but the output can be analog, digital, or both.

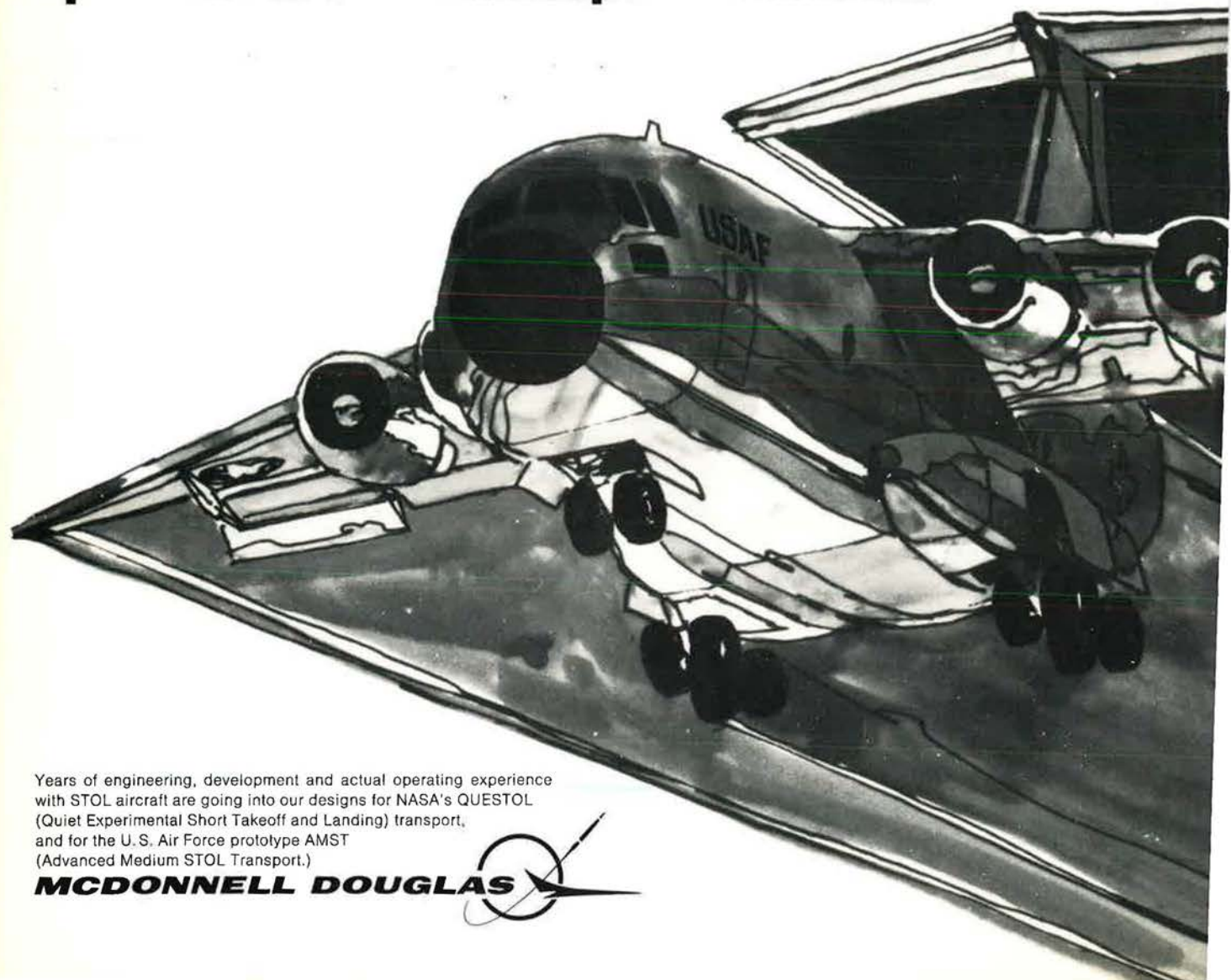
Don't lose time and money re-investing in R&D for a plug-in RPV system that exists. Instead, call or write for information on the AN/USW-3. Motorola Government Electronics Division, Drone Electronics Group, 8201 E. McDowell Rd., Scottsdale, Arizona 85257. (602) 949-3172.



MOTOROLA



**McDonnell Douglas has the people,
the experience and the technology to build
the nation's newest experimental and
operational STOL transports on time.**



Years of engineering, development and actual operating experience with STOL aircraft are going into our designs for NASA's QUESTOL (Quiet Experimental Short Takeoff and Landing) transport, and for the U. S. Air Force prototype AMST (Advanced Medium STOL Transport.)

MCDONNELL DOUGLAS

