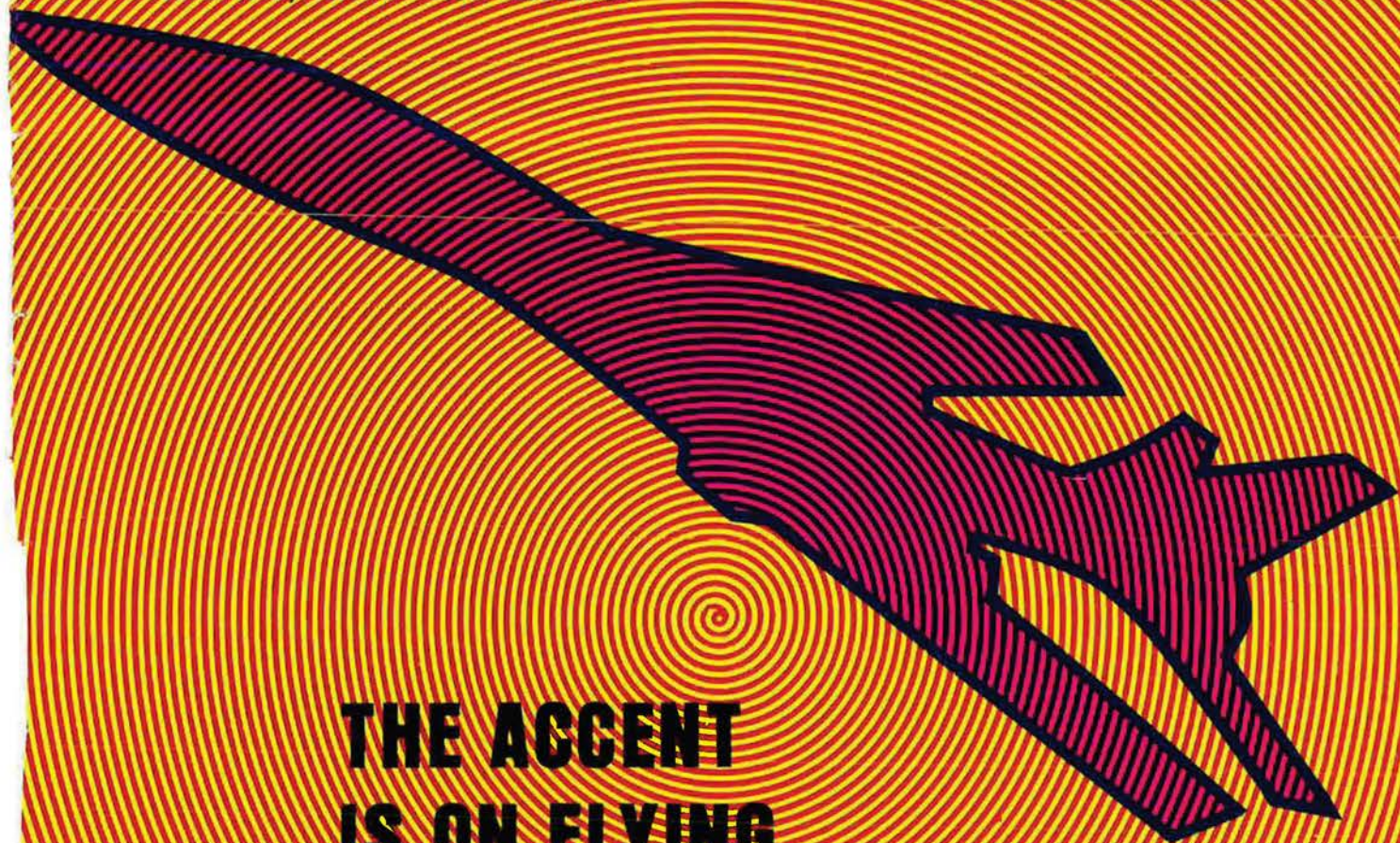


JUNE 1971 / \$1

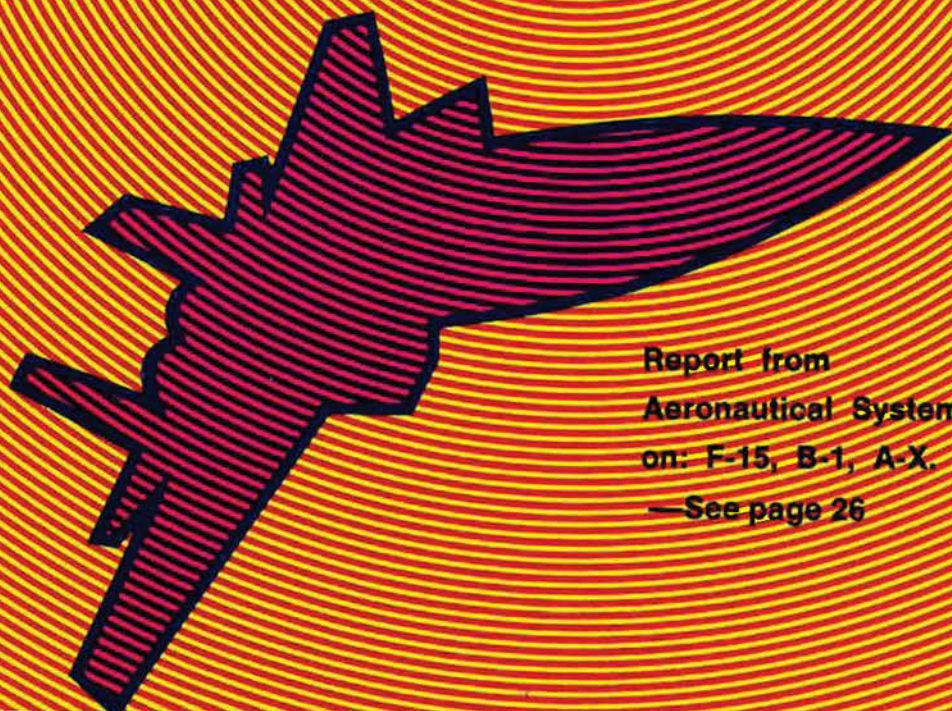
# AIR FORCE

*Published by the Air Force Association*

MAGAZINE

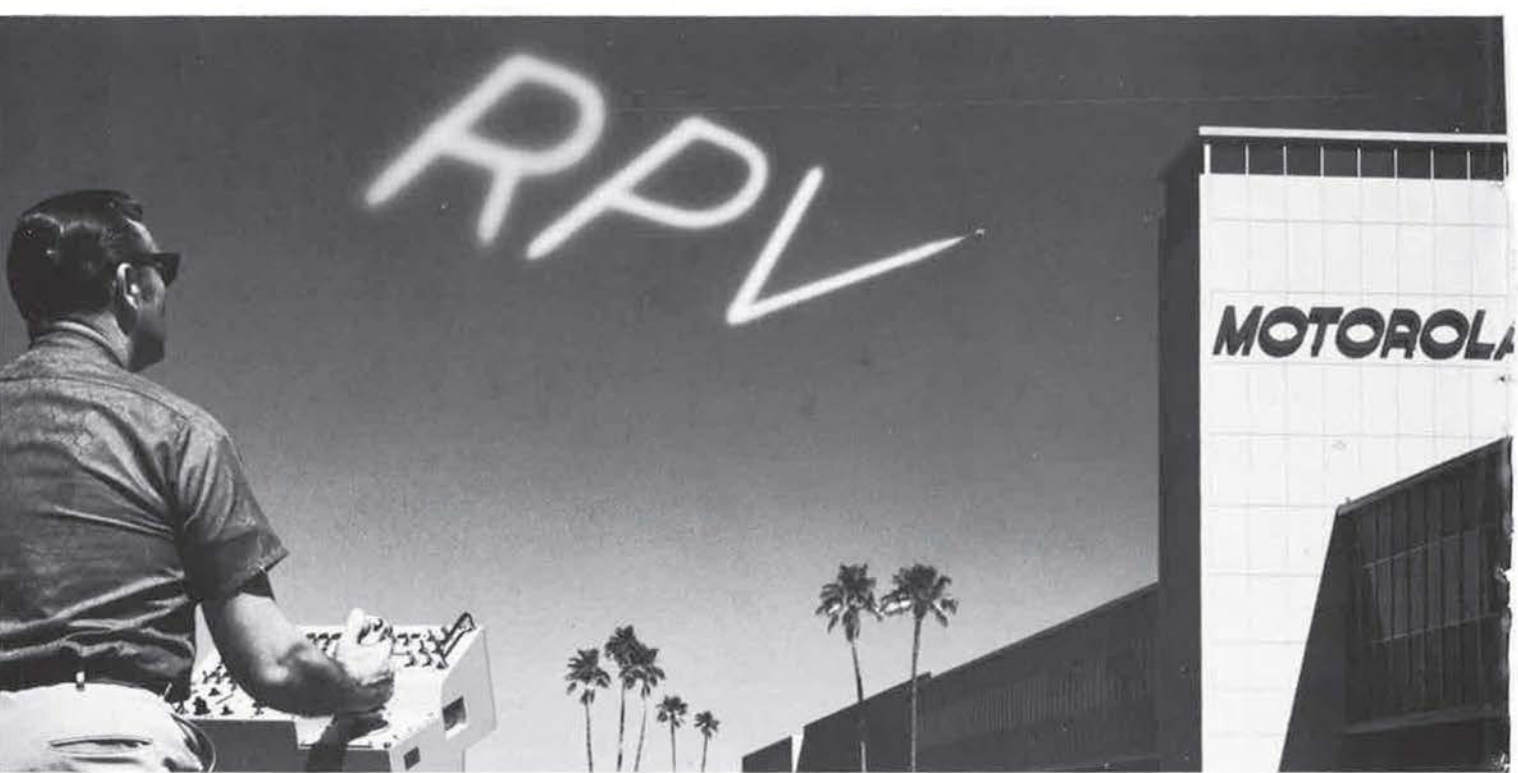


**THE ACCENT  
IS ON FLYING**



Report from  
Aeronautical Systems Division, AFSC,  
on: F-15, B-1, A-X.

—See page 26



# ITCS

**AN/USW-3**

There's a new and cost effective concept for Tactical Drone operations: Motorola's Integrated Target Control System. It is well qualified for a wide variety of tactical missions for Remotely Piloted Vehicle (RPV) programs. The system will meet RPV mission requirements concerned with Reconnaissance, Interdiction and Air Defense. ITCS is already well into development with service test hardware delivery beginning in July of this year. Production hardware can be available in nine months ARO. Here are some features of ITCS which make it particularly suited to the remotely piloted vehicle.

- Command/telemetry update rates compatible with supersonic requirements.
- All-attitude, single, multiple and formation drone control capability.

Single compact vehicle subsystem operates with all seven control stations.



- Capability for discrete or proportional, or any combination of either type command functions.
- Digital transmission with digital or analog data outputs or both.
- Manual or Automatic Mission Control.
- 250-mile range, expandable to 400 nautical miles.
- Modular design for flexibility in adapting to mission requirements.
- A telemetry link will accommodate a wide variety of mission sensors.
- Seven control stations which can be used singularly or in combination for maximum mission flexibility.

For your ITCS brochure write: Motorola Government Electronics Division, Radar Operations, 8201 East McDowell Road, Scottsdale, Arizona 85252, or call (602) 949-3172.



**MOTOROLA**



# The Buffalo can hop in and out of 400 yards with ~~6~~ tons on its back.

9

Now 40,000 hours

North American Rockwell and de Havilland Aircraft of Canada have a unique cargo plane—the C-8B Buffalo. It's a front line, (STOL) tactical support aircraft.

A proven, off-the-shelf airplane, the C-8B's design and development costs were jointly funded by the U.S. and Canada. In fact, the airplane is designed to U.S. Mil Specs with 95% of the aircraft material of American origin. Every Buffalo sold returns one million dollars to the U.S. economy.

The Buffalo lands on just about any makeshift strip because of its rough-field landing gear and extremely steep approach. It can zero in on a postage stamp, staying within the confines of a small, protected area.

It can deliver to the front lines virtually all the air transportable and palletized equipment now in the field. The cargo bay is not volume limited.

It climbs out in little more than 1,000 feet. (Specifically,

with a payload of 11,750 lbs. on a dry sod field, the Buffalo will clear a 50-ft. obstacle 1,000 ft. from brake release.) This gives the Buffalo greater mobility for military peace keeping missions.

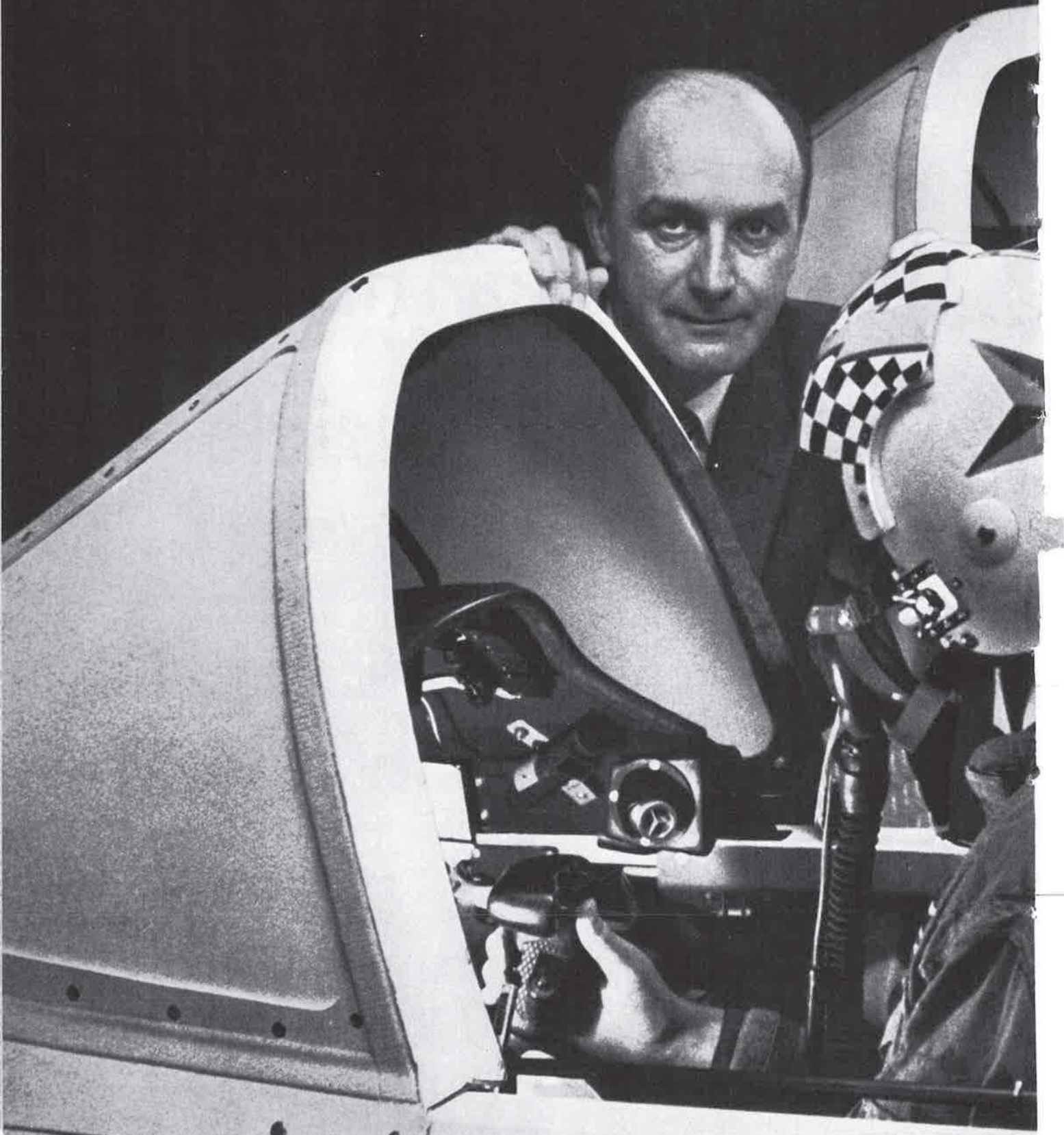
Add to this, that the C-8B Buffalo is already in production and has proved itself in over 15,000 hours of operational use and you've got a flying machine that can lend support to any situation.

*The only STOL aircraft with MM hrs./HR ft. less than 7 is a Buffalo.*



**We said we could train four jets  
yet independently, in a multi**

***When we say it, we mean it.***



# pilots simultaneously, cockpit simulator.



Jim Kelley, Goodyear Aerospace Division Manager, and his team produced a system that programs four different flight problems simultaneously to four TA-4J cockpits. One digital computer, combined with cockpit motion systems, lets each student fly his mission, read the action on his instruments, feel the loads on his controls and anatomy, and hear his engine.

Four 2F90's—sixteen cockpits—four digital complexes—have been delivered to specifications. Four more 2F90's will be delivered under a contract with Naval Training Device Center, Orlando, Florida.

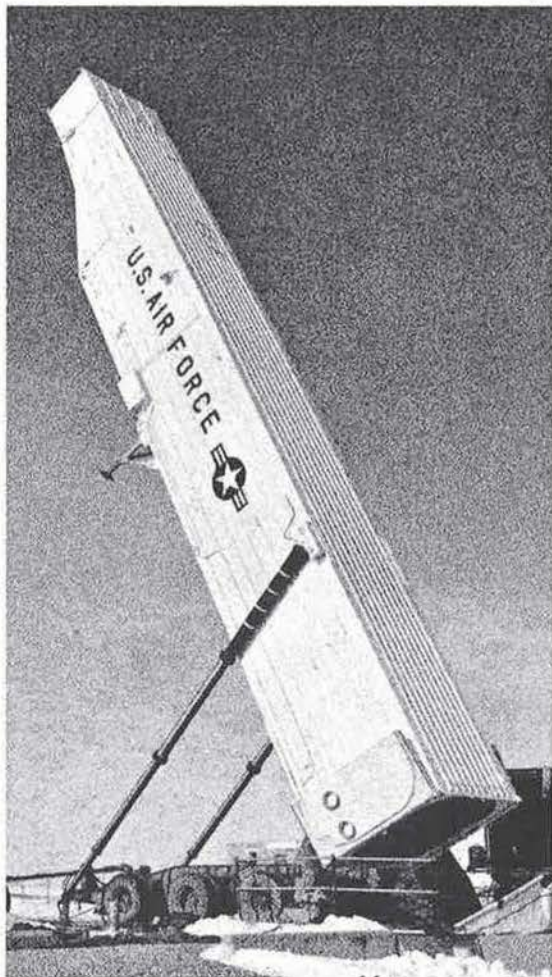
For further information on our simulation capability, write Goodyear Aerospace Corporation, Dept. 911AA, Akron, Ohio 44315.



Device 2F90, now training jet pilots at Naval Air Station, Kingsville, Texas.

**GOODYEAR**  
AEROSPACE

# The First Team delivers under budget.



Mobile transporter deposits Minuteman in its silo at Minot AFB, N.D.

Minuteman is a \$1-billion-a-year effort. Yet in this age of soaring costs, the program saved nearly \$15 million last year, and is projected to save another \$200 million over the next five years. Without sacrifice in quality or performance.

Autonetics is proud to be a member of the First Team, supplying inertial navigators, on-board

computers and checkout equipment—fully 99 percent of electronics guidance and control—to three generations of this magnificent bird.

Like other members of the First Team—the Air Force, associate primes and thousands of subs—Autonetics Aerospace and Marine Products Division has participated in the full growth of the missile, from drawing

board to silo.

The goal has always been maximum potential and value and never change for the sake of change, which is where the overruns start.

In all, an extremely well-managed program, particularly when you consider that Minuteman is the most advanced unmanned aerospace system ever built.



**Autonetics**  
North American Rockwell

# AIR FORCE

MAGAZINE

VOLUME 54, NUMBER 6

Published by the Air Force Association

JUNE 1971

## THIS MONTH

- 10 **The B-1 Is a Must** / An Editorial by John F. Loosbrock
- 14 **Threats: At Home and Abroad** / By Claude Witze
- 26 **The Accent Is on Flying** / By Edgar Ulsamer
- 27 **The F-15**
- 31 **The B-1**
- 34 **The A-X**
- 36 **Israel's Air Force—In a Class by Itself** / By William Leavitt
- 43 **China's Military: A Growing Political Force**  
By Ralph L. Powell and Helena F. Powell
- 48 **Igloo White** / By John Frisbee
- 54 **The Soviet Space Effort—An Analysis**  
By Foy D. Kohler and Dodd L. Harvey
- 60 **The British Armed Forces . . . What's Ahead?**  
By Stefan Geisenheyner
- 64 **The Military: Repository of Moral Resource**  
By Gen. Sir John Winthrop Hackett
- 65 **Jane's All the World's Aircraft Supplement**
- 82 **Is Your Safety Belt Fastened?** / By Col. Cal Carpenter, USAF (Ret.)
- 94 **A Coming Upturn in the Aerospace Industry** / By Edgar Ulsamer

## THIS MONTH'S COVER . . .

The sleek lines of USAF's aircraft-to-be symbolize the complex systems that will contribute to USAF's deterrent power in the 1970s. —See page 26.



## THE DEPARTMENTS

- 6 Airmail
- 14 Airpower in the News
- 17 MIA/POW Action Report
- 19 Aerospace World
- 25 Index to Advertisers
- 73 Airman's Bookshelf
- 78 The Bulletin Board
- 81 Senior Staff Changes
- 88 AFA News
- 90 This Is AFA
- 96 There I Was

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## Review Rebuttal

*Gentlemen:* What is most disappointing about Herbert Roback's review of *The War Profiteers* ["Airmen's Bookshelf," April issue] is his failure to face squarely and responsibly any of the major issues raised by the book. His principal tactic is hit-with-an-epithet-and-run. Rather than dealing with what the book has to say about the contract system, phrases like "jumbled narrative," "sloppy research," and "errors of fact" are tossed carelessly about in what appears to have been a desperate effort to discredit the author. But a string of adjectives do not add up to an analysis or a credible critique.

A reviewer has a responsibility, it seems to me, to back up his criticism with facts. Yet the one concrete example cited (to prove "massaging of data") is so flimsy that it indicates a serious gap in Mr. Roback's understanding of the procurement process.

One of the theses of *The War Profiteers* is that the Pentagon has failed to enforce the statutes intended to control defense contracting. The Truth-in-Negotiations Act is a prime case in point, and in the book I refer to the 1967 study of the General Accounting Office as part of the evidence showing how lax implementation of this law has been. Mr. Roback never responds directly to this point. Instead, he selects a quotation from the book summarizing the GAO report and follows it with a statement from the report itself. The contrast is supposed to demonstrate how I strayed from the original source. However, the quotation from the GAO report does not even mildly contradict what I said about it. The fuzzy charge that I massaged the facts is not supported by the language quoted.

GAO indeed concluded that the absence of records identifying cost data indicated widespread noncompliance with the law, on the part of both the government and the contractors. Any question about this conclusion was dispelled in the 1967 hearings of the Subcommittee on Economy in Government when the following exchange about the report took place between Senator William Proxmire and Comptroller General Elmer Staats:

CHAIRMAN PROXMIRE: "Would you agree there is a serious lack of compliance?"

MR. STAATS: "Yes."

CHAIRMAN PROXMIRE: "And a comprehensive lack of compliance?"

MR. STAATS: "Yes. We felt the matter was so important that we were not willing to rest just on a few isolated cases, and that is the reason we took 242 cases of either prime or first-tier subjects."

CHAIRMAN PROXMIRE: "What were the results of your findings in some of those cases?"

MR. STAATS: "In our report which we sent to the Congress, which is dated January 16, it indicated very widespread noncompliance with the law.

"... We found 185 of the 242 procurements examined in the first phase were awarded under requirements of the law and procurement regulations for submission of cost or pricing data and certification that the data submitted was accurate, complete, and current.

"However, in 165 of these awards we found that the agency officials and prime contractors had no records identifying the cost or pricing data submitted and certified by offerors in support of significant cost estimates."

The fact that 242 procurements were initially examined is not the relevant issue. Only 185 of that group came under the law, and 165 of those were in noncompliance. Since neither the agency officials nor the contractors had any records identifying the data required by the law, there was an implication that none had been requested.

Had Mr. Roback included the remainder of the paragraph in *The War Profiteers* from which he took the quote, he would have had to inform your readers that in 1968 a subcommittee of the House Armed Services Committee was also critical of the lack of government enforcement of the Truth-in-Negotiations law.

Mr. Roback and AIR FORCE Magazine seem more interested in misspelled words than mismanaged programs and misplaced taxpayers' dollars. Mr. Roback complains about my spelling of Roswell Gilpatric's name, but makes no effort to reply to my view of Mr. Gilpatric's role in the F-111 program—a view that has been recently reinforced by the report of the McClellan Committee. Ironically, AIR FORCE Magazine erred when it inserted "sic" in the GAO passage quoted by Mr. Roback, thereby mis-

takenly faulting GAO for its use of the word *offeror*. Both the *er* and *or* endings are acceptable. Mr. Roback and AIR FORCE Magazine would do much better if they concentrated on the substantive matters at hand.

RICHARD F. KAUFMAN  
Counsel and Staff Economist  
Joint Economic Committee  
Congress of the United States  
Washington, D.C.

• *Mr. Kaufman is the author of The War Profiteers.*—THE EDITORS

## USMC Fan

*Gentlemen:* Your April issue carried a brief supplement from *Jane's* that included factual information on the McDonnell Douglas A-4 Skyhawk.

As a Marine Corps aviator, I've been flying the Skyhawk for over fourteen years and deeply appreciate the Association's interest in publishing data on a plane that is flown by another service. Thank you.

Just for information, let me say that after pushing the "Lil Hawk" at carrier decks, anti-aircraft guns, and an iron runway at Chu Lai, I have developed an affection for it as a trusted friend. As a squadron commander, I began to regard the Skyhawk as a brand name and not a particular aircraft—since with each succeeding model the breed has improved.

Thanks again for the kind words about our "tinkertoy."

LT. COL. THOMAS M. D'ANDREA,  
USMC  
Washington, D.C.

## The Good (?) Old Days

*Gentlemen:* I fail to understand your triad argument in the March editorial "Triad—and True."

Out in the Pacific Northwest, cows rest on mattresses in private compartments. They are milked in milking parlors. The milkers stand below the cow level and attend the *milking machines* standing up.

Maybe you've missed something.

WILLIAM RUETER  
Kent, Wash.

• *I was talking about how cows were milked when I was a boy. There were a few milking machines around then, but most people were too poor to buy them.*—THE EDITOR

## Liddell Hart

*Gentlemen:* Enjoyed your article "The



Legacy of Liddell Hart," by Richard A. Mason, in the April issue. Was very interesting and informative.

Sir Basil H. Liddell Hart was truly one of the greatest military historians and strategists and had a major part in winning World War II.

An excellent article and would like to see more of this type.

ARTHUR O. SHACKMAN  
North Hollywood, Calif.

### SAGE Centers

*Gentlemen:* Reference your article on ADC, "The Combat Commands Mark 25 Years," in the March issue.

In 1957, there were no operational SAGE centers. The first element of the SAGE system to begin tactical operations was the New York Sector at McGuire AFB, N.J., which became operational in the spring of 1958. The Boston Sector at Stewart AFB, N.Y., was the second operational facility, some six weeks later. The 26th Air Division (SAGE) began operations at Hancock Field, Syracuse, N.Y., on January 1, 1959, with a full complement of sector direction centers reporting into that first combat center by February 1. That complement included the New York, Boston, Washington, Bangor, and Syracuse Sectors.

In 1957, ADC still operated a large network of manual radar stations, reporting into manual control centers where tracking was done by grease pencils — backward — on multilevel plexiglass boards. Until the end of 1958, the manual radar sites in the New York/New Jersey area continued to operate as backup to the SAGE system, providing data to the manual control center of the old 26th Air Division at Roslyn, N.Y., commanded by then Brig. Gen. Arthur C. Agan. Thus, the SAGE era really began on January 1, 1959.

COL. E. M. ABRAMSON, USAF (RET.)  
Annandale, Va.

• *Colonel Abramson is right. The New York Sector SAGE Center at McGuire AFB, N.J., became operational June 27, 1958.*—THE EDITORS

### Minuteman Missiles

*Gentlemen:* I refer to your articles on ten years of solid performance of the Minuteman ICBMs in your March issue. I wish to compliment you on their excellence, except for the fact that you neglected to mention the role of the Air Force Logistics Command in the Minuteman Program except to state that the Site Alteration Task Forces work with the Air Force Logistics Command.

The AFLC becomes a partner with the Strategic Air Command in the logistics support of Minuteman once

each missile, launch facility, and launch control facility is produced and checked out. The range of AFLC responsibilities in supporting SAC is perhaps best portrayed by the following listing of workloads accomplished by AFLC in support of Minuteman just during Fiscal Year 1970:

(a) 249 Minuteman missiles were overhauled and repaired in the Ogden Air Materiel Area's Missile Assembly and Maintenance Shops.

(b) 801 Minuteman missiles were transported to and from operational wings and test sites with equipment supplied by or arranged for by the Ogden Air Materiel Area.

(c) 2,518 operational and maintenance technical data improvements were processed.

(d) 1,657 Minuteman Guidance and Control Systems were repaired or overhauled.

(e) 828 Materiel Improvement Projects were successfully completed.

Thousands of AFLC people and many millions per annum of AFLC-managed dollars are involved in Minuteman logistics support, which we feel is extremely important in the Minuteman success story. Many of these people are members of AFA's Utah Chapters frequently cited in your magazine. SAC and AFLC have an excellent record of joint dedication and cooperation in maintaining an extremely high Minuteman "in the green" percentage and in assuring improving system reliability over the years. This record is as worthy of recognition as the success of efforts related to research, development, and production covered in your articles.

COL. EDWARD D. HAWKINS  
Minuteman AFLC Systems Manager  
Hq. Ogden Air Materiel Area (AFLC)  
Hill AFB, Utah

• *Our apologies to all concerned. We blew this one.*—THE EDITORS

*Gentlemen:* As an ATC Minuteman Missile Launch Officer Instructor, I read with interest your excellent treatment of Minuteman's ten-year history. However, one error was noted: The Minuteman II missile is approximately 55.8 feet long, not 59.8 feet, as stated. This latter figure is the length of the new Minuteman III missile.

CAPT. MALCOLM J. CONWAY  
Vandenberg AFB, Calif.

### Charter Members

*Gentlemen:* The Silver Anniversary Issue of AIR FORCE Magazine . . . lived up to the standard of excellence and interest of all previous issues.

The capsule history of AFA, including the graph on page 48, was quite interesting, but omitted one sta-

tistic that would have been interesting to those of us who have been in AFA from the very beginning. No mention was made of the number of us who are Charter Members, and became such a quarter of a century ago, and how many of those original members are still with AFA. . . .

A. E. ALLSCHWANG  
Brookline, Mass.

• *AFA's records were not overly complete in the beginning, and we have been unable to come up with a reliable figure on the number of original Charter Members. As of now, however, 1,744 are still with us.*—THE EDITORS

### Wing Historian Award

*Gentlemen:* The Strategic Air Command is very appreciative of the publicity you gave to the Air Force Wing Historian of the Year Award, page 17. However, the winning unit was the 93d Bomb Wing, not the 98th.

JOHN T. BOHN  
Command Historian  
Hq. Strategic Air Command  
Offutt AFB, Neb.

• *Allah be praised—for a change, our team didn't fumble the ball! The caption with the USAF photo stated the 98th. We're happy to set the record straight.*—THE EDITORS

### Research Project

*Gentlemen:* I am currently engaged in obtaining information for research concerning casualties suffered by MIG-15 fighter units in Korea and also about the role of the "Honchos" (Russian volunteers) in Korean air combat.

I would like to contact any pilots who flew with the 4th or 51st Fighter-Interceptor Groups in Korea between December 17, 1950, and July 27, 1953. In particular, anyone who flew wingman for the late Capt. Joseph McConnell (51st) and the late Maj. George A. Davis (4th Fighter Wing).

Would especially like to contact Maj. James F. Low (4th); Col. Harold Fischer (51st); Sam P. Young (2d Lieutenant in July 1953); and Henry Buttelmann (1st Lieutenant in July 1953).

Any assistance would be appreciated.

2D LT. STEVEN L. WILKINS  
Apt. A-18, Lively Oaks Apts.  
8101 - 83d Ave., S.W.  
Tacoma, Wash. 98498

### Memorial to Graduates

*Gentlemen:* The Alumni Association of the US Army War College has constructed a memorial at Carlisle Barracks honoring those War College graduates who have been killed in ac-

## Airmail

tion. This memorial will include the names of these graduates on a bronze plaque.

We are requesting assistance in our search to identify all of these individuals. If you know of an Army War College graduate who was killed in action or by hostile fire any time since 1904, it would be of great help if you would send us his name. We will then have the information verified by the responsible service prior to placing it on the memorial.

COL. R. R. BRESNAHAN  
Secretary, USAWC Alumni Assoc.  
Carlisle Barracks, Pa. 17013

### Stalag III Vets

*Gentlemen:* I would like to correspond with other veterans of the 862d Bomb Squadron, 493d Bomb Group, Eighth Air Force (Debach, England), who were POWs in Stalag III, Germany.

JAMES H. SMITH  
5714 Rimpau Blvd.  
Los Angeles, Calif. 90043

### Where Are All Those "Snoopers"?

*Gentlemen:* I am interested in forming an annual reunion of "Snoopers," members of the old 868th Bomb Squadron (H), of World War II. The 868th was a low-altitude, radar-bombing squadron that served on Guadalcanal, Munda, Los Negros, and points west in 1943-44.

Would appreciate help with names, addresses, literature, etc.

DR. V. D. SPLANE  
3236 W. Broward Blvd.  
Fort Lauderdale, Fla. 33312

### Infield's Book

*Gentlemen:* I would appreciate hearing from any readers who were involved with "Operation Frantic," the shuttle bombing missions between England, Italy, and Russia by the Eighth and Fifteenth Air Forces during World War II. I am interested in experiences of those who participated in the ground operations, prior negotiations with the Russians, and in the air operations.

The information is needed for a book I am writing.

GLENN INFELD  
3507 4th Ave.  
Beaver Falls, Pa. 15010

### For Sale

*Gentlemen:* I have in my possession, in mint condition, thirty-six issues of the *Air University Quarterly Review*,

from Volume I, No. 1, through Volume IX, No. 4, Spring 1947 through Winter 1957-1958.

I would like to sell these issues at their original price of 50¢ each, or \$18 for the lot. I only want to sell them as a lot.

P. F. DEBOY  
5112 Westland Blvd.  
Baltimore, Md. 21227

*Gentlemen:* Back in early 1943, the 351st Bomb Group (H) was born in Denver, Colo. It flew as a group overseas to its base in England with the Eighth Air Force. At that time, the USAF commissioned Capt. Clark Gable and a camera crew to fly with the 351st. This he did, and in doing so captured on color film and sound some of the finest combat film ever taken over the skies of Festung Europa.

This film, now a collector's item, runs on two large 16-mm reels of approximately 2,500 feet. It is narrated by Captain Gable. It runs from the flight from Denver through the Group's twentieth mission and covers such "sundry" items as briefings, awards, the stay at a rest home, Catholic Mass with Lt. Pete Brobanzili singing "Ave Maria"; and such names as Col. Wm. A. Hatcher; Sgt. Phil Hull from Springfield, Mo.; Sgt. Ken Hull, Merkins, Okla.; pilot Lt. Theo. Agropolis; bombardier Lt. Dan F. Stevens, Chicago, Ill.; and Sgt. Tim Tuchem, the Navajo from Arizona; the first mission action to Courtrai, Belgium, on April 5, 1943; thence to Emden, Kiel, St. Nazaire, and so on and on.

It is a fine film, and although I am myself a survivor of twenty-seven missions with the 447th Bomb Group, I find myself now in difficult times. For this reason I am offering this film to anyone who is interested. You may send your price offer direct to me at the address below. I will close this "auction" on the last day of the month of the issue in which this letter is published.

As Dad used to say, "This is going to hurt me more than it will hurt you." But I have no recourse.

WILLIAM C. ERDBRINK  
729 S. Potomac St.  
Baltimore, Md. 21224

## UNIT REUNIONS

### Class 45-17B

We're trying to locate members of Class 45-17B, bombardiers, of Childress Army Air Field, Tex., who were graduated on June 13, 1945. A reunion is planned for August but we've had a bit of difficulty locating some of the

men. There were 202 in our group and we've been able to locate only about 125 so far. Any bit of help or information would be appreciated.

Arthur L. Goss, Principal  
Rollo Elementary School  
Earlville, Ill. 60518

### CBI Hump Pilots Association

The China-Burma-India Hump Pilots Association will hold their 26th annual reunion August 19-22, at the Ramada Inn, Cocoa Beach, Fla. For further information contact

Dr. William Jackson  
917 Pine Blvd.  
Poplar Bluff, Mo. 63901  
Phone: (314) 785-4896

### Silver Wings Fraternity

The 13th annual convention of the Silver Wings will be held at San Jose, Calif., on Thursday, Friday, and Saturday, August 19-21, 1971, at the Hyatt House, just a mile from San Jose Municipal Airport. All interested in attending should contact

John A. Guglielmetti  
21 N. Fifth St.  
San Jose, Calif. 95112  
or  
Russ Brinkley  
Silver Wings Fraternity  
Box 1228  
Harrisburg, Pa. 17108

### 92d Bombardment Group

Former personnel of the 92d Bombardment Group and the 1st Combat Crew Replacement Center, Eighth Air Force, stationed at Bovingdon, England, are planning a reunion. Response from the previous notice has been excellent, but please send names and addresses of others mentioned in replies.

Col. John R. Mitchell, USAF (Ret.)  
2525 Ocean Blvd., F-4  
Corona del Mar, Calif. 92625

### 450th Bomb Squadron

The first reunion of the 450th Bomb Squadron, 322d Bomb Group (M), will be held August 20-21, at the Rock Lande Lodge, Branson, Mo. Men who served with the squadron should contact

Eugene Allen  
410 Homer Rd.  
Minden, La. 71055

### 468th Bombardment Group

The reunion of former members of the 468th Bombardment Group, 58th Bombardment Wing, will be held August 5-8, at Niagara Falls, N. Y. Chairman is Harold Mufford  
57 N. Hartland St.  
Middleport, N. Y. 14105

*Reminder: In order to meet our printing deadlines, reunion notices should be in this office at least eight weeks prior to the issue in which they are to appear.*

# SCIENCE/SCOPE

An all-plastic missile body has been developed for the U.S. Air Force by Hughes. Plastic reinforced with chopped glass fibers is molded into four identical segments, which are then bonded together. During two structural tests, there were no failures below the design levels at temperatures up to 270°F and missiles tested to destruction withstood two times the required loads. Advantages of plastic missile bodies include low cost, reduced radar reflection, greater resistance to corrosion and fewer accidental dents and scars from field handling.

A lightweight hand-held holography camera, which Hughes originally developed for NASA to determine the feasibility of taking three-dimensional microscopic photos of the lunar surface, may have important industrial applications. Its 3-D images would be valuable for non-destructive testing, stress and vibration analysis, biomedical and industrial microscopy, and flow-field visualization in wind tunnel testing of aircraft designs. The holocamera weighs only 17 lbs. and fits into a 12x13x6-inch case.

The U.S. Army's TOW antitank missile is being delivered in quantity from a new assembly line -- said to be the most fully automated in the guided missile industry -- at Hughes' Tucson, Ariz. plant. Bobbins for wire-guided TOW are wound with more than 3,000 meters of .005-inch steel wire in less than 15 minutes. The automatic machinery keeps the wire under precise tension and layering control. TOW is deployed in the U.S. and Europe as the primary antitank weapon at battalion level.

A laser cloth-cutting system -- described as "the first major advance in apparel manufacturing since the sewing machine" -- was demonstrated recently by Genesco, Inc., world's largest apparel company, and Hughes, the system's developer. It consists of a computer which stores programmed cutting instructions, a positioning device, the laser, and a conveyor.

The laser beam cuts garments one at a time from a single layer of cloth with amazing speed and much greater accuracy than the old method, which cuts them from many layers. The laser head is stationary; its beam is directed by a pentaprism arrangement of silicon mirrors along the outline of the pattern programmed by the computer.

An experimental radar system -- first of its kind to simultaneously track multiple targets flying close together -- has successfully completed research tests at Hughes. Such targets usually show up on a display screen as one signal, but ADAR (Advanced Design Array Radar) can distinguish them separately. ADAR was built and tested under a program sponsored by the U.S. Army Advanced Ballistic Missile Defense Agency and contracted through Rome Air Development Center.

The DC-10 multiplex passenger entertainment and service system, which will go into regular passenger service aboard the McDonnell Douglas jumbo jet later this year, is now in service in the first class sections of a Boeing 747 which American Airlines retrofitted in order to evaluate the Hughes-built system. It provides a choice of 12 stereo or monaural music programs and two movie sound tracks, plus control of reading lights and attendant call lights and chimes. Use of multiplexing techniques and Hughes' custom metal oxide semiconductors and hybrid devices results in a weight saving of over 400 pounds in aircraft wiring.

Creating a new world with electronics



# The B-1 Is a Must

By John F. Loosbrock

EDITOR, AIR FORCE MAGAZINE

ONE HOPES that the B-1 strategic bomber will never be tested against Soviet defenses. If it never is, then it will have done its job to perfection, just as did the B-36 and, up to now, the B-52. That is the nub of deterrence—not to have to fight, by virtue of being constantly prepared to do so.

Right now, the Soviet air defense system is not the problem. Long before the B-1 ever gets off the ground, indeed, almost three years before its first scheduled flight, it is running into flak. The flak is political, of course. Evasive action against it will not work and is not advised. Decoys or other diversionary penetration aids are not recommended. No, the best defense against the kind of opposition the B-1 currently faces is that peerless countermeasure known simply as the truth.

As noted elsewhere in this issue (see "Airpower in the News," page 14), an anti-B-1 paper has been circulated by a congressional group calling itself Members of Congress for Peace Through Law (MCPL). Among other assertions, the point is made at length that, if the country needs a new bomber at all, it does not need the B-1.

Instead of the B-1, the Committee for Peace Through Law wants to start basic research and development on a new and quite different aircraft. It would be subsonic and designed to stand off and launch a new air-to-ground missile that would not be ballistic. (Obviously, the latter requirement was stipulated so as to, in the words of the paper, "continue the mixed defenses problem confronting the adversary.")

So, right off the bat, the Members of Congress for Peace Through Law are seriously proposing that we terminate an on-going and thus far very successful program and start from scratch, not only on a new standoff bomber but on a new missile as well. This would be a dubious way to save money, an impossible way to meet the postulated threat timetable, and, worst of all, the deterrent job would not get done. The proposal would be bad fiscal policy, bad technological policy, and bad strategic policy.

In the jargon of the day, "No way!"

The members of the group obviously are forgetting, or choosing to ignore, the kind of laws that the Congress can neither make nor repeal, including the law of gravity, which obtains in any discussion of air-delivered weapons, whether ballistic missiles, cruise missiles, or bombs dropped from an aircraft. The B-1, with its SRAM missiles, which can be launched accurately at high altitude as far as 100 miles from a target or

from on the deck at thirty miles range, is designed to reduce to a minimum the adverse effects of gravity. The standoff-bomber system, with its sluggish, oversized cruise missile—inaccurate, easy to find, easy to shoot down with surface-to-air-missiles—would be fighting gravity every inch of the way to a target. And high-yield gravity bombs carried in the B-1, but unavailable in any standoff system, are still the only reliable way to sure-kill superhardened targets. This is an important plus for the B-1 that is simply not obtainable in any conceivable standoff system.

Suffice it to say at this juncture that the arguments in favor of the standoff bomber set forth in the paper of the Peace Through Law Committee are not persuasive. Indeed, they consist largely of a rehash of various proposals and concepts that were carefully considered in arriving at the B-1 concept and which were discarded long since by the Air Force and the Department of Defense. The B-1's attractive combination of characteristics—high prelaunch survivability, on-the-deck penetration capability, low radar cross section with efficient electronic countermeasures (the B-1's low radar cross section permits it to obtain the same ECM protection with 1,000 pounds of avionics gear that a B-52 could get with 100,000 pounds), its mixed load of SRAM missiles, penetration aids, and high-yield gravity bombs, its high-altitude supersonic capability—makes all other alternative proposals come off as shoddy Brand-X goods.

In fact, the Committee's proposed substitute system is so weak that one gets the uneasy feeling that the main thrust of the paper is against the triad concept itself—that a bomber is not needed at all. This ties in nicely with the known cordiality of many of the best-known and most vocal members of the group toward the concept of a single-mode, solely undersea-based deterrent force. Thus, we find the anomaly of such Senators as Proxmire and McGovern embracing this concept, whose vulnerabilities have never been subjected to the kind of critical and intensive analysis that has been applied to both bombers and land-based missiles, while loosely and irresponsibly criticizing the B-1, which has been through the analytical wringer. Apparently they choose to overlook the words of Dr. John S. Foster, Defense Director of Research and Engineering, that the Soviets "could today with their technology, make the sea transparent."

As transparent, that is, as the logic of the Committee for Peace Through Law. ■

**T**HE September issue of AIR FORCE Magazine is our annual Fall Briefings and Convention issue. We will distribute bonus copies at the event, and all advertisements will be prominently displayed in our "Industry Salutes the Air Force" Exhibit. Closing for advertising reservations is July 30. Why not join us? It's a good advertising buy!

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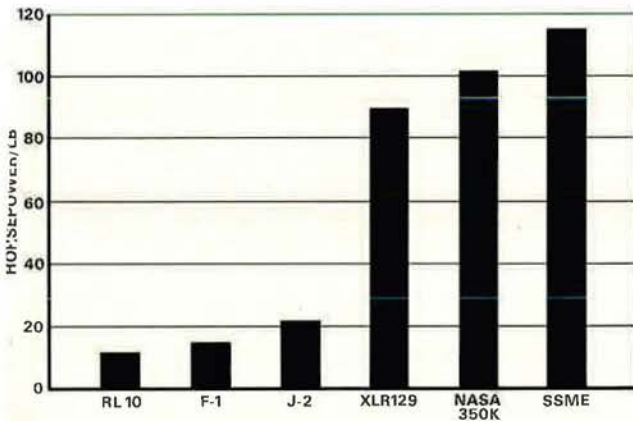
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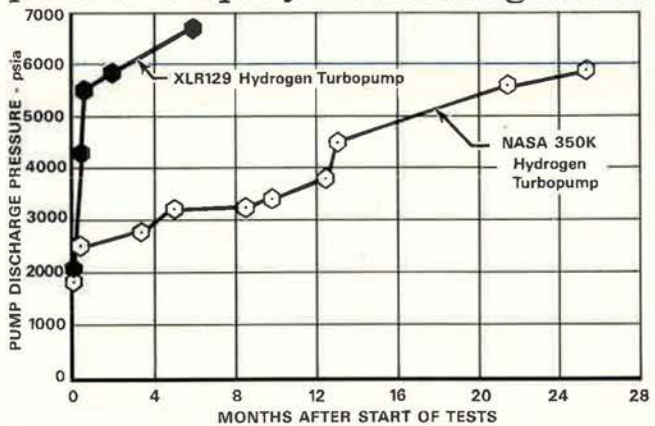
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# Airpower in the News

By Claude Witze

SENIOR EDITOR, AIR FORCE MAGAZINE

## Threats: At Home and Abroad

WASHINGTON, D. C., MAY 7

Senator George McGovern of South Dakota, who thinks he should be President of the United States, believes the Air Force wants a new supersonic bomber "to enhance the excitement for strategic bomber pilots and the glamor of Air Force recruiting programs." One of his confreres, Rep. John F. Seiberling of Ohio, says the USAF B-1 project is "utterly impractical." He describes the proposed new bomber as a "weapons system in search of a mission."

Against these learned viewpoints stands the opinion of Melvin R. Laird, the Secretary of Defense, himself a former member of Congress. He is worth quoting at greater length. A couple of weeks ago, Mr. Laird told a convention of the American Newspaper Publishers Association in New York that this country may be moving toward "a second-rate strategic position." He said, "Recent evidence confirms the sobering fact that the Soviet Union is involved in a new—and apparently extensive—ICBM construction program. This new ICBM construction effort, coupled with additional momentum in the strategic defensive area—all clearly planned months ago—must be of major concern. Moreover, while we have an advantage in submarine-based missiles today, the USSR is rapidly closing that gap with an energetic construction program that continues."

Mr. Laird has concluded that prudence dictates "accelerated development of a new strategic bomber, the B-1, and a new undersea-launched strategic missile system, the ULMS. We are proceeding at the optimum development rate consistent with sound management, but, of course, no procurement decisions have yet been made."



*Defense Secretary Melvin R. Laird, speaking here at a press conference, says he fears the United States will be in a second-rate strategic position by the mid-1970's. His reason: Russia has launched a new and extensive ICBM program.*

A few days later, at a press conference, the Defense Secretary expanded on this. He said he does not know whether the new Russian ICBM is a modified SS-9 or a new weapon. He added that Moscow is continuing development of its ABM system, with evidence of sophisticated tests and more construction. He reiterated that the B-1 and ULMS must be pushed as fast as the services can handle the programs, because of the Soviet momentum. If necessary, he will ask for supplementary funds to keep up the pressure. If Congress makes a blanket cut in the proposed Fiscal 1972 budget, leaving it up to the Pentagon to decide where the money will be saved, there will be a tremendous reduction in manpower "because that is the only way you can get your money rapidly." It would not come out of the B-1 and ULMS programs, "because really when you're in the development stage you do not have large expenditures."

Probably the only important reaction to Mr. Laird's disclosures has been from the few concerned observers who are demanding that the increased threat be defined more precisely. And illustrated, if you will. If Russia is intent on nuclear superiority, the Baltimore *Sun* editorializes, the fact must be faced. A couple of columnists call on the Nixon Administration to be more frank. What they have in mind, obviously, is the fact that our information comes from satellite reconnaissance, that these satellites transmit pictures, and that the pictures are not shown to the American public.

When the Kennedy Administration faced a similar credibility problem in the early days of the Cuban missile crisis, it bridged the gap by distributing photos taken from U-2 reconnaissance planes. When the White House made a firm demand on Moscow, in that case, the American people, including all the Senators and Congressmen, had no doubts or reservations about the nature of the threat. Questioned, Pentagon spokesmen will say only that the idea is under consideration.

Mr. Laird's reasoning, that it is manpower he will cut if Congress makes an across-the-board slash in his budget, will be fully understood by most of Congress, but not by all of it. The ones who do not hear are the men who favor unilateral disarmament and refuse to recognize there is a growing threat. In the forefront are the Members of Congress for Peace Through Law (MCPL). At latest count, there are 116 of them, led by Sen. Mark O. Hatfield as chairman. He says MCPL, first organized in 1966, aims to "coordinate congressional concern for world peace into specific actions in the Congress. Our goals include the development of international cooperation, strengthening the United Nations, and the pursuit of a disarmed world under enforceable world law."

To take a monster step toward disarmament in Fiscal 1972, MCPL will do what it can to destroy the B-1 bomber project, new fighter planes for the Navy and Air Force, the ABM system, MIRV missile heads, antisubmarine warfare, nuclear weaponry and testing, and US troop deployment in Europe. In all, it has a list of fourteen areas where it will carry out an attack. Studies, made





*Remember Pearl Harbor? This picture, taken on April 23, 1971, shows a Russian ballistic missile submarine surfacing 400 miles northeast of Honolulu. Pearl Harbor is at Honolulu.*

from the viewpoint of legislators who are in "pursuit of a disarmed world," will be released weekly between now and the first of July. The releases will be made at press conferences designed to get maximum publicity in the press and on the television tubes.

It was at the first of these sessions, early this week, that Presidential Candidate McGovern gave his evaluation of the new B-1 bomber project as a device designed not for deterrence, but for glamor. He and Mr. Seiberling claim joint authorship for a report on the new aircraft that, in effect, recommends the project be killed and new studies be undertaken, aimed at a flying platform for "a new air-to-ground missile with the range and flight characteristics required to penetrate from beyond enemy defenses in a fashion which achieves the greatest possible variation from the nature of SLBM and ICBM penetration."

This would be a cruise missile. It would have to be big, with a range of 1,500 miles or more, and a weight in the 2,000-pound class. It would have to be subsonic, non-ballistic, and jet-powered. This means it would be slow and carry no penetration aids. Being unmanned, it would lack flexibility, one of the things that makes a manned bomber practical in combat. It would be vulnerable to surface-to-air missiles (SAMs) because of its slow speed and the larger radar image its jet engine inlet would create for the defending forces. In addition to the danger such a missile faces over a target heavily defended by SAMs, the cost would not be cheap.

On top of this, the airplane that launches the cruise missiles is itself vulnerable. Certainly, the enemy will try to intercept it, and the technology for doing this is on hand. Eventually, the carrier aircraft would have to be fitted with longer-range missiles and its own penetration aids to get within range.

The McGovern-Seiberling paper on the B-1 is too long for detailed analysis on these pages. It contains a great number of careless statements of fact, such as the assertion that fifty percent of the B-1's anticipated cost will be spent to give it supersonic capability at altitude.

Asked for his authority for this figure, Mr. McGovern said he obtained it from a study by Congressman William Moorhead of Pennsylvania. The contractor estimates the

figure should be sixteen percent. There are other estimates; the highest of them is thirty percent. At another point, the report says nuclear warheads are delivered at far less cost by missiles than they are by airplanes. This is true, but only if you consider that each bomber flies only one sortie, the way a missile does. Bombers, of course, fly many sorties, a fact that Mr. McGovern should know. He piloted bombers in World War II.

The McGovern-Seiberling report says "enormous cost overruns" already have occurred in the B-1 project. This is not true. The latest B-1 program funding and expenditures chart, with figures up to April 1, 1971, show that the contractor, North American Rockwell, is achieving an *underrun* so far in the development. As of April 1, the actual cost of work performed was \$44.6 million. The budgeted cost of that work was \$48.52 million.

What the MCPL study intended to say is that costs have escalated since the first Air Force estimates. USAF acknowledges this. In a speech three days ago before the Aviation/Space Writers Association, Maj. Gen. Douglas T. Nelson, B-1 Systems Program Director, said the cost estimate went up \$1.3 billion "between the . . . preliminary estimate of total program costs and the time that the Request for Proposals was received from the aircraft industry. The increase was not "uncovered" by anyone, and it is not a cost overrun. The \$1.3 billion, General Nelson said, will pay for (1) inflation, (2) part of the AMSA program that preceded the B-1, and (3) testing support and SRAM interface not previously charged to the B-1.

Another item of easy dispute in the MCPL report is its apparent assumption that if the B-1 project is completed, a new tanker will be required as part of the system. The paper even includes one cost estimate that says \$16.7 billion should be added to the B-1 bill to pay for 255 new tankers and their maintenance for ten years. Well, a tanker is not a B-1 requirement; it is a USAF requirement that is used in support of several weapon systems in both the Strategic and Tactical Air Commands, in addition to some other operations. The existing KC-135 still has many useful years ahead. When it is worn out, USAF will need a new tanker. Eliminating the B-1 will not eliminate the tanker requirement. Mr. McGovern also declares that

## Airpower in the News

the KC-135, requiring longer runways than the B-1, will be restricted in its dispersal to the airports it now uses. This also is incorrect. The tanker, unlike the bomber, be it B-52 or B-1, has its choice of many more bases because it has no nuclear weapons aboard and poses no security problem comparable to that of a bomber.

Throughout the MCPL study there is constant reference to the B-1's capability to penetrate Soviet defenses, with the suggestion that it will not differ materially from that of the existing B-52. It does not appear that the authors are familiar with the potential of modern electronic countermeasures (ECM), despite the advances made even in the years of the war in Vietnam. Men working in the area, and themselves pressing the state of the art, are convinced that the B-1 will penetrate.

The McGovern-Seiberling document tosses arithmetic around with some abandon. It says the current USAF estimate of B-1 program costs is \$11.1 billion. Then it turns to Representative Moorhead for a figure and reports that he has two of them. They are \$20.27 billion and \$33.47 billion. From here, it goes to a professor at Princeton University, one Bruce W. McDonald, who makes a guess at \$75 billion.

From this, the conclusion is drawn that the cost, counting bombers and tankers, "is so staggering as to make the question of continuing any strategic bomber program one of great national concern."

The report then gets simplistic:

"The issue need not be decided, however, in order to deal with the Fiscal 1972 B-1 funding request. The B-52 useful life assures ample time to hold the project in abeyance while considering other alternatives." It suggests that the \$370 million sought for continued research and development be cut to \$20 million, and that money used to terminate the contracts and "preserve the advanced research and development option."

The Air Force, supported by Mr. Laird and his Defense Department staff, clearly is convinced that the time has passed for procrastination about the new bomber. The combination of land- and sea-based missiles and bombers—the triad—must be maintained in the face of the growing threat. The diversified force is considered essential, with or without a SALT agreement with Russia. Bombers are a critical portion of the mix. They also are convinced, in view of the state of the art, that the B-1 will have the required flexibility to meet the threats that are possible over the years ahead. The United States cannot save money by postponing this decision to develop a new bomber.

The MCPL, it is evident from this first report of fourteen scheduled, is a genuine threat to our security program. Mr. Hatfield, the MCPL chairman, scorns Administration claims that national priorities have been rearranged and says, "Federal spending consists largely of military spending," a statement that is not true and would not be meaningful if it were true, in view of the threat and the changes made in the past few years.

No one has argued that the nation's efforts at improving our society should not be pressed on every front. The picture of that problem is in every city and town. The pictures of the threat, taken from satellites, are classified. If they are given to the public, Mr. McGovern, an Air Force veteran, may remember it was not excitement and glamor he was seeking in the cockpit.

## The Wayward Press (cont.)

In the vanguard of Washington's recent antiwar demonstrations was an outfit called "Vietnam Veterans Against the War," portrayed generally as a collection of nice, honest young men who were disillusioned by their military experience. Among the media outlets made available for this cause was a half hour of highly prized Sunday afternoon time on the National Broadcasting Company's coast-to-coast feature called "Meet the Press." The date, in case you have forgotten, was April 18.

In the spotlight of Lawrence E. Spivak's popular broadcast that day were John Kerry and Al Hubbard. Mr. Kerry, a former Navy lieutenant (j.g.), is a highly articulate and intelligent spokesman, who later made an impressive appearance before the Senate Foreign Relations Committee. His fellow leader of the movement on the Spivak show was introduced as a veteran of the Air Force, who rose to the rank of captain, served twelve years in uniform, and fought as a combat pilot for two years in Vietnam. Both men were said to have been injured and decorated in Vietnam.

Now, in addition to Mr. Spivak, the inquisitorial panel that day included four sophisticated reporters, all with experience in the Vietnam theater and presumably endowed with the kind of professional skepticism that the news fraternity likes to believe is a requirement for this kind of work. They were Peter Lisagor of the Chicago *Daily News* and president of the White House Correspondents Association, Crosby Noyes of the Washington *Evening Star*, Neil Sheehan of the New York *Times*, and Robert Goralski of NBC News. It appears that none of them, including Mr. Spivak, asked the right questions.

It developed later in the week that the Al Hubbard of Vietnam Veterans Against the War and costar of the April 18 edition of "Meet the Press" was Alfred H. Hubbard, thirty-five, of New York City. USAF says he entered the Air Force in 1952, reenlisted twice, and was honorably discharged in 1966 as an instructor flight engineer on C-124 transport aircraft. At that time he was a staff sergeant, the highest grade he ever held. A USAF spokesman told United Press International that Hubbard had no combat decorations and no Vietnam service medals.

"This is not to say he has never been to Vietnam," the spokesman said. "He may have been flight engineer on several cargo missions that landed there, unloaded, perhaps spent one night, and then left."

It is to the credit of NBC that it acted promptly when the hoax was called to its attention. Mr. Hubbard was persuaded to make another television appearance, in which he said, according to UPI, that for three years he posed as a former officer and pilot to give himself "an image" in the antiwar movement.

"I allowed this lie to continue," he was quoted as saying, "because I realize that in this country it has been very important that one have an image. That is compounded if one is black and attempting to do something. I don't justify the lie. I'm trying to explain it. Those people on the Mall [in Washington] knew nothing about this discrepancy, and they'll be as shocked as anyone else. But they'll accept it because they're telling the truth and they'd expect it of me."

NBC ran the retraction on several of its news programs and on the "Today" show of Friday, April 23. Regular viewers of "Meet the Press" never were told that the program management and participants had been hoodwinked. Mr. Spivak told AIR FORCE Magazine he considered it more important to get the fact of the deception on the air as swiftly as possible. This was accomplished. By NBC. ■

# MIA/POW Action Report

By Maurice L. Lien

SPECIAL EDITOR FOR MIA/POW AFFAIRS

## Stalemate

As of this writing, the release of US POWs still is a major block to the Paris peace negotiations.

At an April 29 press conference, President Nixon discussed the Administration's refusal to set a specific date for withdrawal from South Vietnam, as opposed to the North Vietnamese position that the POW issue is not negotiable until a date is set. The President said "... a promise to discuss means nothing from the North Vietnamese. What we need is far more than that. We need action on their part and a commitment on their part with regard to the prisoners.

"Consequently, as far as any action on our part of ending American involvement completely—and that means a total withdrawal—is concerned, that will have to be delayed until we get not just the promise to discuss the release of our prisoners, but a commitment to release our prisoners. . . ."

US proposals for settling the Southeast Asian conflict include offers of a cease-fire, an exchange of prisoners, and a mutual withdrawal of forces.

The President said that the US and the South Vietnamese would unilaterally repatriate 540 North Vietnamese sick and wounded without regard to what the North Vietnamese do. An offer also was made to send to a neutral country, probably Sweden, 1,600 North Vietnamese prisoners who have been imprisoned for four years or longer. "We trust that the North Vietnamese will respond," the President said.

Present plans do not call for leaving American forces in South Vietnam, as we have done in Korea, President Nixon stated, but "... if the North Vietnamese are so barbaric that they continue to hold our POWs, regardless of what we do with regard to withdrawal, then we are going to keep a residual force no matter how long it takes."

Commenting on the Paris peace talks, the President said, "Ambassador Bruce puts the prisoner question, by my direct orders, at the highest priority. He is directed to discuss it separately, to discuss it with other issues, or to discuss it as a part of an overall

settlement. We are ready to settle it whenever they are ready to talk about it."

## Neutral-Country Internment

Speaking April 28 at a luncheon in his honor, sponsored by AFA's Nation's Capital Chapter, Secretary of Defense Melvin R. Laird said, "I want to take this opportunity to thank the Air Force Association for its dedicated efforts on behalf of our prisoners of war and missing in Southeast Asia, and I want to share with you today what to me is a hopeful development on this important issue.

"Not one of us in this room will rest until our prisoners of war have been returned to their homes and families. Until now, the appeals to Hanoi from all over the civilized world have not brought from the captors of these men any promise that they will be returned at any time. All that the representatives of North Vietnam have said is that return of the prisoners will be 'discussed' after the United States announces a date for total withdrawal of its forces. To those who ne-

gotiate for the enemy, discussion carries with it no implication of agreement and no promise of action beyond endless talk.

"No American should be deceived on this point: The North Vietnamese have so far refused in public and in private discourse to commit themselves to return American prisoners. No American should permit himself to be duped into believing that a promise only to discuss the release of prisoners of war has any value at all.

"However, a new proposal relating to the prisoners was offered by the Republic of Vietnam [the government of South Vietnam] and enthusiastically endorsed by President Nixon. This proposal calls for internment of prisoners in a neutral country. It would mean for them an end to the cruel and unjust treatment to which they are now subjected.

"I can tell you that I have been personally assured that ships flying the flags of neutral nations could be made available for the immediate release of POWs on all sides, or for their internment in a neutral country. Such sea transportation could be provided to



At the presentation of the National Air Force Association's Certificate of Honor to Lloyd Kilmer (center), President of the Omaha Forgotten Americans Committee, is Paul Gaillard (left), AFA National Director, and Lloyd Grimm (right), AFA Nebraska President. Also present is Mrs. Carolyn Cushman, whose husband is missing in SEA.

## MIA/POW Action Report

and from Haiphong, Saigon, or any other appropriate port.

"I know that the Air Force Association and all Americans concerned about the welfare of our prisoners and their families will lend their moral support and whatever additional support may be necessary to carry out this proposal. The next step to begin the movement of the prisoners to a neutral country is the concurrence of the other side."

### Religious Delegation Report

A delegation of American church leaders reported, on their return to the US after a three-week, round-the-world journey, that the conscience of the world has been touched by the plight of American POWs. The POW issue, they said, has become a source of serious embarrassment to the Communists in Indochina, and they might well be on the brink of a major policy change in this area.

The delegation was organized and headed by Dr. J. A. O. Preus, President of the Lutheran Church-Missouri Synod (see "MIA/POW Action Report," April '71), and represented more than 100,000,000 Christians. Other members were Archbishop Joseph Ryan, from Anchorage, Alaska; Dr. Nathan Bailey, of the Christian and Missionary Alliance, New York City; Dr. George Sweazey,



Max Packard (right), of Canon City, Colo., lost no time in installing a hook on his office wall to display his Certificate of Honor. Holding the certificate in anticipation is Richard E. Stanley, AFA's Colorado State President.

*Wives of two POWs present AFA Certificates of Honor to four Colusa County, Calif., high schools for work on behalf of POWs. From left: Mark Pieschke, Colusa High; Mrs. Sue Flesher; Mrs. Dana Brown; Kathy Spann, Williams High; and AFA Vice President Will H. Bergstrom.*



immediate past Moderator of the United Presbyterian Church-USA, from Princeton, N.J.; and Mr. William Hecht, special assistant to the group.

During their three-week trip, the delegation met for a total of more than seven hours with representatives of the government of North Vietnam in Stockholm and Laos. They also met with officials of the governments of Sweden, Italy, and India, and had a private audience with Pope Paul VI.

Of special interest to the religious delegation was the fate of five civilian missionaries held prisoner by the Viet Cong, three of them since 1962. This fact aroused a great deal of sympathy among officials of neutral governments and the Pope, they reported. No attempt was ever made by North Vietnamese officials to defend this action. These people, Dr. Preus said, were medical missionaries.

A break in negotiations on the POW issue may be imminent, the group concluded, because of the cordial and hospitable reception they received from the North Vietnamese representatives. They requested permission to travel to North Vietnam, but were refused on the grounds the Communists could not guarantee their safety.

"The North Vietnam officials seriously considered allowing us to go to Hanoi in view of the fact we represented so many people in America," Dr. Preus said, "but we were left only to conclude that they must have something to hide by their final refusal, as we explained to them in our last meeting in Vientiane." He believes, however, that they "will probably let some group into Hanoi in the near future besides the extremists they have let in in the past."

After they were refused permission to travel to Hanoi, the delegation asked for information on Americans listed as missing in action over the north. The North Vietnamese government representative said he knew nothing of them, and that his government was much too busy to accept a

list at that time because of the war, but when the war was over, such a list could be received.

When asked if the North Vietnamese government would consider having sick and wounded POWs on both sides detained in a neutral country, the official countered by saying they are well cared for. When it was pointed out that the delegation had no unbiased information to assure this, he did not respond. Neither was there a response when asked why the government of North Vietnam will not permit inspection of the POW camps in that country, by an impartial international body.

When the churchmen asked for word of the five missionaries held by the Viet Cong, the official responded that his government did not know all the Viet Cong did, but promised to communicate with local missionaries if any word was received.

In their report on the trip, the delegation observed that "conditions in the Communist POW camps have most likely been improved slightly, especially in North Vietnam, as a result of growing indignation throughout the world over their POW policies. All North Vietnamese government officials stressed the 'lenient and humane' treatment afforded the 'captured American pilots' by their government, pointing specifically to the increase of mail and insisting that their diet was the same as that of a North Vietnamese soldier."

While in Southeast Asia, the church leaders visited three POW camps operated by the South Vietnamese, to see the conditions under which captured Communists live. They were allowed to go where they wanted in the camps, and reported that, when US and South Vietnamese living standards are compared, their prisoners are superior to those in the US. Many formerly illiterate Viet Cong have changed their loyalties as a result of the treatment and schooling they have received in the POW camps. ■

By William P. Schlitz

NEWS EDITOR, AIR FORCE MAGAZINE

WASHINGTON, D. C., MAY 14

Aside from isolated incidents, many months have passed since US aircraft faced combat encounters with North Vietnamese MIGs in the skies over Southeast Asia.

Even at the height of the bombing in the North, enemy planes behaved cautiously and avoided showdowns with US aircraft.

Now, however, US pilots note increased activity by MIG-21 jets over Laos, presumably to harass our fighter-bombers, reconnaissance aircraft, and helicopters operating against the Ho Chi Minh Trail there.

(Late in April, for example, two Navy fighters pursued a MIG back across the North Vietnamese border, but gave up the chase on receiving anti-aircraft missile fire which damaged one aircraft slightly. Pentagon officials theorize that the MIG acted as bait to lure the US aircraft into missile range.)

A day prior to the pursuit of the MIG, a US recon aircraft came under missile fire as it was taking a look at a reported MIG base near the North Vietnamese city of Vinh, about 150 miles from the DMZ. US escort planes returned the fire and, in so doing, reportedly damaged two camouflaged MIGs on the ground near the missile site.

It is interesting to speculate what use North Vietnam will finally make

of the aircraft it has harbored these several years—once the US severely curtails its participation in the air war.



A major problem long associated with the use of helicopters in combat has been the noise factor.

Whether transporting troops or performing reconnaissance or ground-support missions, buzzing whirlybirds tend to attract enemy interest—and fire.

Among various projects to quiet the choppers, excellent results are reported in the Army's modification of its OH-6A light scout helicopter. Dubbed the "Quiet One," the modified four-place, turbine-powered craft can scarcely be heard even while flying directly overhead, the Army says.

Essentially, Army and NASA technicians, working with Hughes Tool Co. Aircraft Division personnel, substantially reduced engine and rotor speeds to cut sound, while adding a blade to the main rotor and two to the tail rotor to maintain lift. Additionally, sound-blanking material was utilized extensively to muffle engine exhaust and other noise.

Also, the rotor blades were shaped to lessen the severity of rotor-tip vortex, heretofore a major noise source.

Aside from the obvious military benefits of a quiet chopper, officials see commercial application of the



—Wide World Photos

During an unprecedented flight May 7, French President Georges Pompidou demonstrated his backing of the Anglo-French supersonic-transport development by his presence aboard the Concorde, which hit Mach 2 speed.

quieting techniques to civilian rotorcraft, especially with the current emphasis on the suppression of noise pollution in urban areas.

The Navy is also studying the tip-vortex phenomenon, but from another angle.

Tip vortex actually is a funnel-like whirl of air turbulence in the wake of rotor tips or wingtips (in the case of fixed-wing aircraft).

The problems it causes have been around a long time; it has been known to damage closely following aircraft or even cause such aircraft to roll suddenly or invert, especially on takeoff or landing.

Besides this, tip vortex is also responsible for the noise problem mentioned above, as well as for high stress on rotor blades.

Navy's concept—for which it has awarded a contract to Rochester Ap-



Standing beside the plaque commemorating the twenty-fifth anniversary of his Tokyo raid, Lt. Gen. James Doolittle, USAF (Ret.), holds a model of the B-25 he flew on that day in 1942. He presented the plaque to the Edward H. White Memorial Museum, Brooks AFB, Tex., in April, on the raid's twenty-ninth anniversary.

## Aerospace World

plied Science Associates, Rochester, N.Y.—is to inject a small jet of air into the tip vortex to contribute to its breakup, without affecting airfoil lift or drag.



There was plenty of nostalgia and tall tales aplenty in Washington, D.C., when the World War I Overseas Flyers met for a reunion in mid-April.

The group, which numbered 173, looked slim and fit enough to climb back into the cockpits of those wood

—the 403d Composite Wing, Selfridge AFB, Mich.—will be given a new, high-priority airlift mission.

In so doing, it will trade its interim forward air control training U-3A aircraft for the C-130 Hercules turbo-prop transport, currently the Air Force's tactical airlift workhorse.

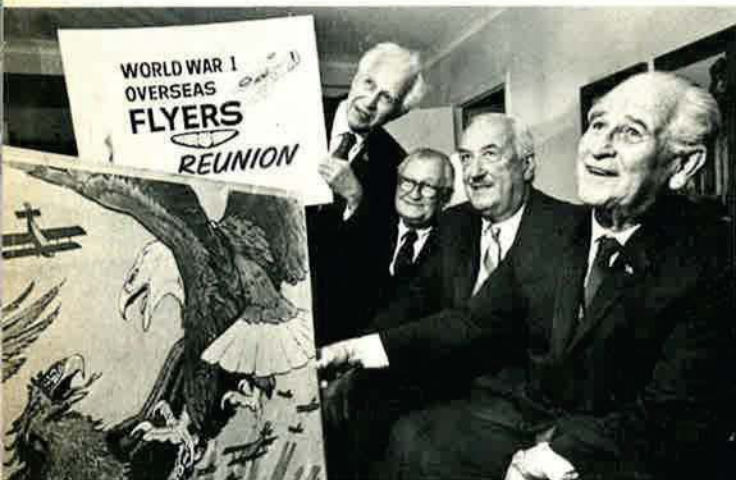
The wing also has been assigned a new commander, Brig. Gen. George H. Wilson, former Commander of the 512th Military Airlift Wing, Carswell AFB, Tex.

The newly reorganized 403d Tactical Airlift Wing is composed of the 927th Tactical Airlift Group, Selfridge AFB; 914th Tactical Airlift Group, Niagara Falls Municipal Airport, N.Y.; and the 913th Tactical Airlift Group, Willow Grove Naval Air Station, Pa.

In all, more than 2,000 Air Force



*In a unique program, France and Germany are developing the Alpha-Jet trainer, due to come into the inventories of both in the late 1970s. Besides shared development costs, economies realized by the two will include joint training, ground support, and maintenance.*



—Wide World Photos

*Hale and hearty, US flyers of World War I met in Washington, D.C., in mid-April for a reunion. Among the several hundred participating were, from the left, Ira Milton Jones, Chairman of the World War I Overseas Flyers group, and retired Generals Lucas V. Beau, Lawrence C. Ames, and Leigh Wade. Tall tales and heavy nostalgia marked the veterans' assembly.*

and canvas aeroplanes they flew over Europe in the Great War.

But rather than curses for the Red Baron—German ace Baron Manfred von Richthofen, who was officially credited with eighty kills before he himself was shot down in April 1918—the group was unanimous in praise:

“He was a hell of a flyer,” said one.

Besides reminiscing—“The stories seem to get better and better each year”—the group visited the Smithsonian Institution's Air and Space Museum, and heard reports on the status of the new Air Force Museum at Wright-Patterson AFB, Ohio.

Among other business, the flyers' group passed a resolution asking the North Vietnamese to identify captured American pilots and give assurance of their well-being.



Under Pentagon policy to upgrade Reserve forces, a USAF Reserve unit

Reservists and several hundred Air Reserve technicians and civilian employees will run the 403d's tactical airlift activities and training in the Michigan, New York, and Pennsylvania areas.



Also in the hopper, two USAF Reserve Associate units are scheduled in the future to fly Military Airlift Command C-5s.

The Reserve Associate Military Airlift Squadrons, the 330th headquartered at Charleston AFB, S.C., and the 301st at Travis AFB, Calif., will initiate training in the huge aircraft in 1972. The two currently fly C-141 StarLifter transports.

In addition, two new Reserve Associate C-141 squadrons, the 707th at Charleston and the 708th at Travis, are also being activated.

Under MAC's Reserve Associate Unit Program, begun at Norton AFB,

Calif., in May 1968, Reserve units are organized at bases and train at levels parallel to active-duty airlift units. The Reservists fly the same aircraft, man actual missions in the States and overseas, including SEA, and perform the same maintenance and support functions as the associated units. They are ready for immediate active-duty mobilization.



Double, double, toil and trouble: The US Senate space committee was recently presented with another gloomy forecast concerning rising unemployment in the aerospace industry.

Acting NASA Administrator George M. Low told the committee that by June 1972 the number of unemployed aerospace scientists and engineers—currently about 35,000—could more than double. “This means that as many as thirty percent” of the nation's aerospace technicians would be out of jobs, he said.

These discouraging figures were derived from a Battell Memorial Institute study which indicated that, of those permanent jobs the technicians have found, fifty percent were entirely unrelated to previous aerospace experience. And, of men over the age of fifty, forty-eight percent so far remain unemployed.

Recognizing the seriousness of the aerospace unemployment situation, the Nixon Administration has planned a \$42 million program to help the technicians in finding jobs in other fields.

Some \$25 million would go to re-



training scientists in related fields, and the rest for finding jobs utilizing similar technical experience. Some moving expenses would be paid for those displaced.



That old specter of the US aerospace industry—cost overruns—has created problems in yet another aircraft program: the US Navy's F-14 fighter.

The F-14 is currently being developed by Grumman Aircraft Corp. The company has blamed an unexpectedly high rate of inflation and a drop in other business areas for what may mean a price increase of \$1 million each for the some 700 F-14s

the Navy hopes to buy. The business decrease means that the F-14 program has had to absorb more costs of doing business.

Navy has received the first twenty-six F-14s on order at the agreed-on original cost, Grumman said. Whether Navy will cut back on its intended total buy of the aircraft or whether the cost overrun will be accepted by the Pentagon remains to be seen. Further complication could be congressional action; the Congress must vote annual funding for F-14 purchases. In any event, it seems certain that the original contract for the aircraft purchase will be revised.

Just what the situation will mean in terms of rescheduled target dates for procuring long-lead-time items for the F-14 has yet to be established.

The F-14 production timetable already had received what was estimated as a six-month setback when the first F-14 crashed on its second test flight last December (see April '71 issue, p. 15).



The folks at the USAF hospital, F. E. Warren AFB, Wyo., have devised a unique way of emphasizing the attractiveness of Air Force life: They bill their patients for medical services rendered.

In a graphic illustration of the dollars-and-cents benefits of free medical care in the armed forces, the billing extends from a simple appendectomy to obstetrical care for Air Force wives.

Of course, the bills—which approximate typical civilian medical costs—are clearly labeled as samples and

carry the notation: "Paid in full, courtesy of the United States Air Force." An explanatory letter also goes along to erase any doubt as to the point.

Other installations interested in higher retention, please note.



The Air Force has initiated a new policy regarding drug use. It has implemented "a limited privileged communication program between drug abusers and medical personnel."

The purpose of the new program is to encourage people on drugs to voluntarily seek help for their problem as a way toward possible rehabilitation and return to duty. Once a drug abuser contacts his commander or medical personnel to request treatment, information volunteered about himself will be kept confidential and not used against him in any action under the Uniform Code of Military Justice.

This is limited to those who seek help before they are apprehended, detected, or under investigation for use or possession of drugs.

The new policy of privileged communication, however, does not preclude the drug user from being removed from flying status, reassigned, or discharged. Also, if a person enters the program and subsequently is discharged solely for use or possession of narcotics, the discharge will not be under less than honorable conditions.



Probing deeply into environmental conditions, a new program is soon to



—Wide World Photos

USAF Sgt. Robert L. Jones gets a welcome hug from Paula Holt, 17, as he arrived in Austin, Tex., on April 12 from Vietnam. He brought a check for \$30,000 in donations from servicemen to fight a kidney disease afflicting her and her brother, Gary, 20, which has already claimed three of their sisters.



Secretary of the US Air Force and Mrs. Robert C. Seamans, Jr., regard with pleased expressions the portrait of the Secretary recently unveiled at NASA headquarters in Washington. From 1960 to 1968, Dr. Seamans served as NASA Associate Administrator and then as Deputy Administrator.

## Aerospace World

get under way to study the effects of human activities on weather and climate.

The aim is to determine how serious are man-induced climatic changes.

The climate is constantly changing, but up to now nature was the prime mover. It is feared that man has reached the point where he is playing a prominent—and perhaps dangerous—role in climatic changes. For example, is carbon dioxide in the atmosphere producing an increasing “greenhouse effect” upon the planet that causes an unnatural warming



Variable-geometry fuel tanks developed by Whittaker Corp. are shown on model configuration. Full tanks (outboard) “shrink” to missile-like slimness (inboard) as fuel is transferred. Empty tanks are designed for supersonic speeds.

of the earth? On the other hand, could particulate atmospheric pollutants bring about atmospheric cooling? Either effect projected to an extreme would be potentially catastrophic.

The study is to be sponsored by the Commerce Department’s National Oceanic and Atmospheric Administration.

An interesting sidelight will be the use of computer simulation to predict future climates.

The NOAA’s monitoring plan is part of the framework of international programs conducted by the UN and nongovernmental agencies from many nations to establish a worldwide environmental monitoring system.



Soon to be developed is an electronic system that will automatically



Full-scale mockup of the new Northrop P-530 Cobra advanced tactical fighter being developed for NATO and other free-world nations. It will compete with such designs as McDonnell Douglas’s F-4E(F) and Lockheed’s CL-1200-X-27 air-superiority fighters for a market in the ’70s and ’80s produced by the expected replacement of aging aircraft in Western air forces. The P-530’s first flight could come as early as mid 1973.

monitor the operating condition of the US’s worldwide military telephone network.

Sites in Germany, the United Kingdom, Italy, Spain, Greece, Hawaii, Guam, the Philippines, Japan, Okinawa, and Taiwan will be involved in the project, which will put in operation fifteen units to report on the status of the AUTOVON (Automatic Voice Network) systems.

Should a malfunction occur at a remote station, the new system will determine the specific problem and send electronically coded data to the appropriate master station, where it will be analyzed.

The Air Force Systems Command’s Electronic Systems Division will award a production contract this summer, with delivery of the monitoring system—called AUTOVON Centralized

Alarm System—expected at the end of next year.



Last year, US agriculture faced what could have become a disastrous situation: the destruction of much of the corn crop by infectious leaf blight.

The repercussions could have been tremendous since corn is a basic fodder crop used in the production of a major part of the country’s meat supply.

Indeed, the blight, combined with severe drought in some areas, did reduce the overall corn harvest by about fifteen percent, creating great dislocations in the nation’s grain markets.

Oddly enough, one organization that joined the effort to defeat the corn blight and will help guard against it this coming growing season is the US space agency—NASA.

NASA has teamed up with the Department of Agriculture and several universities to apply aerial sensing techniques to chart any recurrence of the plant disease. High-altitude aircraft will repeatedly photograph some 45,000 square miles of corn-belt area, using special infrared and natural color film.

Interpretation of the film will reveal signs of the blight’s presence or spread. Officials caution, however, that because of the experimental nature of the project no formal conclusions or forecasts would be possible concerning the blight’s virulence, rate of spread, or ultimate effect on the entire corn crop (presumably to head off speculation in the grain market). The aerial survey will take place in conjunction with a vigorous ground campaign.

The future hope is that sensing tech-

### ‘Air Reservist’ Now Available

The *Air Reservist* Magazine has gone public, beginning with its May/June ’71 issue. For the first time in its twenty-two-year history, copies of the sixteen-page official magazine of the Air National Guard and Air Force Reserve can be purchased from the Government Printing Office. Rates are 20¢ per copy, or \$1.50 for the ten issues per year (add 50¢ for foreign mailing). Requests should be sent to Superintendent of Documents, c/o Government Printing Office, Washington, D.C. 20402.





*Eisenhower and Normandy*



*Spaatz, Arnold, and the European Air War*

## Air Museum Medallions

On this page are pictured several in the series of handsome medallions currently on sale at the Air Force Museum Gift Shop, Wright-Patterson AFB, Ohio. The medallions commemorate major events of World War II.

The WW II medallions measure one and a half inches in diameter. Another series, on Apollo flights to the moon, measures two and a half inches.

A complete list of the war medallions available at the Museum can be obtained by sending a self-addressed stamped envelope to the Air Force Museum Gift Shop, Wright-Patterson AFB, Ohio 45433.

The World War II medallions will be shipped postpaid and with tax for \$5.53 each, and the Apollo medals sell for \$7.74 postpaid with tax included. ■



*Doolittle and the Tokyo Raid*



*LeMay and Hiroshima*



*Bradley and St. Lo*



*Chennault and the China-Burma Air War*



*Nimitz and Midway*

## Aerospace World

niques developed from the project may eventually be applied to aircraft and/or satellites for long-range guardianship of the world's crops.

This might prove vital in the future when a burgeoning population combined with the destruction of a major crop by unchecked disease could bring famine.

In a related matter, USAF has loaned NASA two U-2 aircraft for tests in the space agency's remote sensing program. The U-2s will be

equipped to record research information about earth resources while flying at altitudes of 68,000 feet above each of four test sites. This activity will simulate what an earth-resources satellite could be expected to accomplish.

The test sites have been picked for their unique geographical characteristics: the arid Arizona desert; two areas in California for agricultural and underground-water studies; and the Chesapeake Bay for the study of oceanology and ecology. Each area will be photographed every eighteen days.



Plans are shaping up for the annual Fighter Weapons meet to be held by NATO's Southern Region July 6-17.

To be staged at Eskisehir, Turkey, the event will involve pilots from the

air forces of Greece, Italy, and Turkey, plus a combined US Air Force/Navy guest team.

Last year's meet at Istrana Air Base, Italy, brought together Italian, Turkish, and US Air Force teams. Although 114 sorties were flown, no champion could be selected because inclement weather canceled some important events.

Eight awards, including the Commander's Trophy, are scheduled. This year's host is Gen. Muhsin Batur, Commander of the Turkish Air Force.



**NEWS NOTES**—Concluding that no hazard exists to earth's life forms, NASA will no longer require quarantine of men or materials returning from the moon.

The 82d Strategic Reconnaissance



Taking the Best Missile Wing and Best Minuteman Missile Wing honors, and the Blanchard Perpetual Trophy, in SAC's 1971 Missile Combat Competition, Vandenberg AFB, Calif., was the 351st Strategic Missile Wing, Whiteman AFB, Mo. The team includes, top row, from left, SSgt. James W. Saund-

ers, 1st Lt. David G. Ramagos, Sgt. Dave E. Swanson, 1st Lt. Victor D. Bras, Capt. John C. Spencer, 1st Lt. William A. Bonitz and Capt. Timothy A. Sinclair. Bottom row, from left: Sgt. Timothy J. Hager, Sgt. Billie J. Donaldson, SSgt. Edwin H. Morgan, SSgt. Dennis L. Nagel, Sgt. Peter R. Bordach.

—Wide World Photos



Alan B. Shepard, Jr., America's first man in space and the first astronaut to attain admiral rank, at Cape Kennedy to mark the tenth anniversary of his first flight. Over his right shoulder is a replica of his Redstone launch vehicle.



Also recently named admiral was Samuel L. Gravely, Jr. (see "News Notes"), the first black to be so promoted. USAF currently has one black general, Brig. Gen. Daniel "Chappie" James, Jr., serving a tour at the Pentagon.

Squadron, Kadena AB, Okinawa, was awarded the **Gen. Paul T. Cullen Award** for 1970, for the SAC recon unit contributing the most to the command's intelligence-gathering efforts.

The **USSR** has amended its **civil aviation code** to allow searches of airline passengers suspected of carrying weapons and/or explosives. Presumably, it is part of a tougher policy on **attempted skyjackings**.

A SAC B-52 crew, from the **410th Bomb Wing**, K. I. Sawyer AFB, Mich., won the **Blue Steel Trophy** in the RAF Strike Command's annual bombing and navigation meet held in April. It was the second consecutive year SAC has won the trophy.

**Capt. James R. Hickman, Jr.**, of the 33d TFW, Eglin AFB, Fla., won the **Malcolm C. Grow Award** as the USAF Flight Surgeon of the Year 1970, for the greatest contribution to a USAF flying organization.

**Dr. Albert F. Simpson**, 66, Air Force Historian from 1946 to 1969 and Senior Historian since 1969, died **April 21**. A Reserve colonel, Dr. Simpson served on the Air University staff since 1949. He held the Exceptional Civilian Service Award, AFA's Aerospace Award, and the Air University Award.

The first paratroopers—a two-man team—have jumped from a **C-5 transport**. The test series at Ft. Bragg, N.C., will end with a drop of seventy-three troopers and their equipment.

The Navy has named its first black admiral—**Capt. Samuel L. Gravely, Jr.**, presently commanding a guided-missile frigate. President Nixon selected another black, **James E. Johnson**, Vice Chairman of the Civil Service Commission, to serve as **Assistant Secretary of the Navy for Manpower and Reserve Affairs**. The US's first man in space, **Alan B. Shepard**, was also named admiral—the first Navy astronaut to achieve flag rank. ■

# Air Force F-15



## Sperry's there!

For this nation's newest air superiority fighter—being built by McDonnell Douglas—Sperry is developing the attitude and heading reference system, the digital air data computer, the multi-function display, and the flux valve.

 **SPERRY RAND**  
FLIGHT SYSTEMS  
PHOENIX, ARIZONA 85002

### Index to Advertisers

|   |           |
|---|-----------|
| Autonetics Div., North American Rockwell .....            | 4         |
| Goodyear Aerospace Corp. ....                             | 2 and 3   |
| Hughes Aircraft Co. ....                                  | 9         |
| McDonnell Douglas Corp. ....                              | Cover 4   |
| Motorola Inc., Government Electronics Div. ....           | Cover 2   |
| North American Rockwell Corp., Aviation Divs. ....        | 1         |
| Pratt & Whitney Aircraft Div., United Aircraft Corp. .... | 12 and 13 |
| Sperry Rand Corp., Sperry Flight Systems Div. ....        | 25        |
| Vought Aeronautics Div., LTV Aerospace Corp. ....         | Cover 3   |

One of the key components of the Air Force Systems Command is the Aeronautical Systems Division at Wright-Patterson AFB, Ohio. An AIR FORCE Magazine reporter recently interviewed ASD's Commander and several key program directors for a comprehensive report on the Division's management philosophies and, in the process, learned that in tomorrow's Air Force, which is being designed and planned today . . .

## The Accent Is on Flying

By Edgar Ulsamer

SENIOR EDITOR, AIR FORCE MAGAZINE

**D**AYTON, Ohio, home of the Wright brothers, proudly proclaims itself the birthplace of powered flight. Fittingly, it is the home of Air Force Systems Command's Aeronautical Systems Division (ASD), conceptual birthplace of new USAF aircraft. These days, visitors to ASD quickly discover that the accent here is on flying. After a decade dominated by space and missiles, the pendulum is swinging back to aeronautics.

Three major weapon system programs are being directed by ASD in the full hope and expectation that the necessary financial support will be forthcoming. (These programs are currently under stringently critical review by the Congress, with some of the same lawmakers who succeeded in terminating the US SST program earlier this year now avowing that they will do the same to USAF's aircraft development programs. See "Airpower in the News" p. 14.) In the management of these efforts, the

new Commander of ASD, Lt. Gen. James T. Stewart, and his staff are applying new, flexible techniques designed to spot problems in the technical, financial, or contractual and procurement areas and fix them while they are still small.

This management rationale borrows heavily from techniques evolved by AFSC's Space and Missile Systems Organization (SAMSO) and by NASA. Its key features are engagement and visibility, meaning, as General Stewart put it, "greater involvement by more Air Force people in any given program, coupled with more frequent, independent reviews, and several separate progress-monitoring systems, to make sure that at least one of them will flash a warning the minute trouble is brewing."

These techniques work in concert with Department of Defense management directives, which include the selective use of prototype development and even competitive flyoffs, as well as the so-called milestone approach. The latter, as its name implies, breaks down development and acquisition programs into small, individually manageable steps. Each milestone must be passed by meeting specific technical, financial, and other contractual targets. This system of checks and balances makes it possible to review and evaluate the program as it progresses from design into production at a series of "decision points" and to adjust each following step accordingly.

So far as ASD is concerned, these recent changes in management techniques must be accompanied by "changes in attitude." Primarily, this means conservative flexibility in technology and financial management.

Such flexibility, General Stewart pointed out,

*Lt. Gen. James T. Stewart assumed the post of Commander, Aeronautical Systems Division, Air Force Systems Command, in June of 1970. He served as a commander of a bombardment squadron in Europe during World War II. Subsequent assignments included tours of duty at the Air Proving Ground Command, Far East Air Forces Headquarters, and Hq. USAF. From 1969 to 1970, he served as Deputy Chief of Staff for Systems, Hq. AFSC.*



"means our willingness to give a little. In the transition from paper design to hardware, it is not uncommon to discover that accepting a relatively insignificant degradation in performance can save a significant amount of money and avoid technical problems. Conversely, often a small amount of extra money will buy important performance gains. We plan to be quite flexible in trading either up or down."

ASD's conservative management attitude fastidiously avoids risky, unproved technologies and overoptimistic cost forecasting, through frequent, independent reviews and cost estimates. To take on these expanded functions, General Stewart explained, the Division is building up its management muscle in three key in-house areas: technical competence, financial management, and contract and procurement management. This has necessitated reductions in peripheral activities and a selective balancing of the staff structure of various programs, such as the recent doubling of the staff assigned to the SRAM (Short-Range Attack Missile) program. In addition, ASD is recruiting a limited number—not more than thirty—top-level engineers and managers with extensive experience in aerospace industry. Typical of the caliber of the senior personnel is the newly appointed chief engineer of the B-1 program, Mr. R. J. Patton, who had previously served as General Dynamics Corp.'s FB-111 program director.

Many of these high-ranking civilian experts do not seek permanent government careers but are quite willing to work for the Air Force for several years and then return to industry. In ASD's view, this produces a mutually beneficial cross-fertilization. With the same objective in view, ASD plans to recruit about fifty talented young civilian scientists and engineers annually and assign several of them to appropriate industry jobs for a year. Others will be assigned to Air Force and other government laboratories.

Linked to these procedures is a new policy of assigning a greater percentage of the Divi-

sion's nearly 1,400 engineers to individual programs, reducing the number assigned to pools. Backing up this reallocation of the Division's internal manpower is a greater reliance on expertise outside of ASD. In the main, this means greater utilization of the Air Force Laboratories—already up by twenty-five percent over a year ago—closer collaboration with such other government agencies as NASA, and selective contractual ties with nongovernment institutions.

In the B-1 program, for instance, ASD recently contracted with Cornell Aeronautical Laboratory, Inc., to furnish systems engineering and technical assistance "simply because we can't assign any more of our own engineering staff without hurting other programs," General Stewart explained. (In the past, ASD's staff limitations have been chronic and led to assignment of fewer people and resources per program compared to other AFSC divisions, an intolerable condition in an era of "engaged" program management.)

For the moment, the Division prefers to augment its in-house capability on an *ad hoc*, program-by-program basis, in contrast to SAMSO and the Electronic Systems Division, which rely on Aerospace Corp. and MITRE Corp., respectively, for such services.

While some fundamental features are shared by all weapon system development programs managed by the Division, there are marked differences in contract structure, the makeup of the management teams, and techniques. Some of the differences are dictated by the nature of individual programs. Others reflect the particular management style of the SPD (System Program Director). This flexibility and wide latitude to introduce innovative management techniques are elementary to ASD's new policies and vital "if we want to prevent a repetition of the negative experiences of the total package procurement and other stereotype panaceas," General Stewart said.

## The F-15 Management Concept

For the first time in twenty years the Air Force is building its own air-superiority fighter, unencumbered by commonality or dual-role requirements. In the face of the Soviet Union's lead in air battle strength by a factor that may be as high as five, the F-15 air-superiority fighter program poses a paramount management challenge to the Air Force. But there is even more at stake. The F-15 follows hard on the heels of the trouble-plagued C-5 and F-111. For these reasons, "we think we will not only produce the *number-one* aircraft in the US inventory but can also help reestablish the Air Force's credibility as a manager of major weapon system programs and regain the con-

fidence and support of the Congress and the taxpayer. If the public is to support the needs of the defense establishment, the second point is almost as important as the first," F-15 Program Director Brig. Gen. Benjamin Bellis told this reporter.

As a result, one key instruction guides General Bellis: "Don't embarrass the Air Force financially." Now, a year and half after program go-ahead, "we are confident that we will meet all technical and financial objectives, and we look forward to buying some 700 F-15 fighters and possibly additional quantities of F-15 interceptors later on," General Stewart said. General Bellis elaborated, saying "the program is track-

ing on schedule, or ahead of schedule; it is meeting or exceeding performance, and meeting all key milestones. In short, we are meeting all the goals we told Congress we would meet, in terms of cost, schedule, and technical performance."

The System Program Director for the F-15, along with various advisory panels and the two prime contractors—McDonnell Douglas Corp., which builds the airframe, and Pratt & Whitney, which furnishes the engine—has just completed the so-called Critical Design Review, which marks the transition from design to hardware fabrication. As a result, the majority of the design's production drawings have been released ahead of schedule, a good sign.

So far as the financial management is concerned, the present development portion of the program is based on a cost-plus-incentive-fee contract, including a unique "limitation of government obligation clause." The latter requires the two prime contractors to submit to the SPO, each March, cost estimates for the fiscal year beginning some sixteen months later. For example, in March of this year, McDonnell Douglas and Pratt & Whitney submitted their cost proposals for FY 1973. These cost forecasts, involving such variables as inflation, labor rates, and overhead, then are negotiated and, once accepted, become a firm, fixed-price contract. McDonnell Douglas's FY '73 forecast, General Bellis explained, "came in under the target price, not just under ceiling, something we have never experienced before."

In its cost-plus-incentive-fee contracts combined with the limitation of government obligation clause, the Air Force provides a span between a higher (ceiling) and a lower (target) price. Pratt & Whitney, on the other hand, submitted cost estimates for FY '73 showing a rise of up to \$63 million higher than expected at the time of contract award. The principal reason for this increase, General Bellis said, is a smaller business base and, concomitantly, higher overhead and labor rates. Since the F-15 contract contains a 90/10 percent cost-

sharing clause in case of cost increase, Pratt & Whitney automatically will have to absorb ten percent, or about \$6 million. Because the F-15 engine is being developed under joint Air Force/Navy contract (the USAF aircraft shares the core engine with the Navy's F-14B fighter, but there are significant differences in the two engines so far as fan design and other features are concerned) the potential government share of the cost increase, if accepted, would be divided evenly between the two services, with the Air Force's share amounting to about \$29 million.

While this excess cost may not be accepted by the government, either in full or in part, General Bellis said, "our conservative budgeting approach made allowance for such cost increases and, even if we were to accept the Pratt & Whitney estimate in full, our own forecasts and budget would not be exceeded."

### F-15—The Best That's Possible

A number of industry executives and a recent congressional staff report have raised questions regarding the F-15's ability to cope with advanced Soviet aircraft such as the MIG-23 Foxbat, which is capable of speeds above Mach 3.2. The F-15's top speed is about Mach 2.5. In his discussion with AIR FORCE Magazine, General Bellis rejected this argument, stating categorically, "The F-15 is the best air-superiority fighter the United States can build at this time. Nothing has happened since contract go-ahead that justifies doubt. To the contrary, the great volume of wind-tunnel data accumulated so far indicates that the design does indeed represent the very best attainable for the air-superiority mission. But the F-15 can't do everything for everybody. It is not a strategic bomber, nor a competitor of the SR-71. It is an air-superiority fighter for the tactical environment. And for this role, it is the very best that present technology makes possible in terms of airframe, engines, and avionics.

"The Mach 2.5 capability is no handicap. In fact, excessive speed can handicap you in the air-superiority role. If you want to fly at Mach 3 plus, you have to go to altitudes where dogfighting is not possible. Secondly, every time you turn at such speeds, you swing around a territory nearly the size of Wyoming and fly completely out of the battle zone. In other words, at best you get one pass at your opponent and this makes no sense for an air-superiority fighter."

The Air Force completed more than 500 detailed design evaluations and computer studies prior to the F-15's contract definition. (See page 29 of the July '69 issue of AIR FORCE Magazine.) The conclusion was that a fixed-wing aircraft, with low wing loading and a thrust-to-weight ratio of better than one-to-one, was best suited for the typical air-superiority missions of fighter sweep, escort, and combat

*Brig. Gen. Benjamin N. Bellis was appointed Systems Program Director, Deputy for F-15, Aeronautical Systems Division, AFSC, in July 1969. Rated as one of the Air Force's most experienced R&D managers, General Bellis began his career at Sandia Base, N.M., with an Armed Forces Special Weapons Project in 1947. Subsequent assignments involved management tasks on USAF missile programs. Prior to his present post, he served as the SR-71 Program Director and Deputy for Electronic Warfare.*



air patrol. It was found that a Foxbat/SR-71-type vehicle operating at high altitude and speed—where it is deprived of any significant maneuver capability—would be quite vulnerable to missiles fired from a lower flying aircraft. By contrast, the F-15's high maneuverability—its ceiling is below the 90,000-foot ceiling of Foxbat—and sophisticated radar capabilities, should enable the F-15 to dodge any missiles fired at it from above.

Another design feature "traded out" was the swingwing, General Bellis said. (The Navy's F-14B does use a variable-sweep wing.) "We did so because of the substantial weight increase and higher complexity associated with the design and because it appears questionable that a swingwing can be adjusted rapidly enough to the constantly changing aerodynamic conditions of a dogfight," he said. To provide full aerodynamic efficiency, a swingwing must be positioned with regard to the speed at which the aircraft operates at any given moment as well as to the wing loading generated by turns.

Among the many technological advances incorporated into the F-15 design, General Bellis stressed "engine efficiency, which is increased in terms of thrust-to-weight and thrust-to-size ratios by 100 percent over the TF30 engine of the F-111."

In terms of computer technology, similar progress has been recorded. The F-15's single computer furnishes about the same capacity as would be provided by two computers of the F-111-type design, he said.

Another key technological benefit is the F-15's sophisticated attack radar system, being built by Hughes Aircraft Co. following a twenty-month competitive development program and flyoff. The Hughes system gives the F-15 its "look-down, shoot-down" capability, meaning its radarscope depicts aircraft operating at low altitudes, sorting out the so-called ground clutter. Ground clutter is the natural radiation of the earth's surface, which previously provided electronic cover for low-flying aircraft. The F-15's radar system, combined with the advanced yet simplified avionics and fire-control systems, enables the aircraft to operate with a single crew member.

### Room to Grow

How long a given aircraft design can serve in the inventory is largely determined by its ability to grow and meet new performance requirements not envisioned during its design phase. The growth capability of the F-15, General Bellis believes, is "unprecedented because we have designed into this aircraft fatigue-life characteristics and the ability to exceed G-loading limits as never before. If we have to load this baby down—to optimize it for some other mission—we can do so with room to spare."



*The F-15 air-superiority fighter is designed for growth and is well suited to serve as the Air Force's next interceptor, carrying nuclear missiles.*

He added that the aircraft's high maneuverability capability, owing to its low wing loading, high thrust-to-weight ratio (more than twice that of the F-111), sophisticated and responsive control system, and ability to look down over great distances by radar make it adaptable to a multitude of conditions with unique flexibility.

By its very nature, an air-superiority fighter is only as good as its armament. Three basic means of effecting a "kill" are being incorporated into the F-15: a gun, short-range missiles, and medium-range standoff missiles. Because the aircraft is primarily meant to fight in a visual dogfight environment, the Air Force is placing considerable emphasis on the gun. For the time being, the aircraft is equipped with an M-61 20-mm gun but, in a parallel program, a 25-mm GAU-7 (Gun Aircraft Unit), firing caseless ammunition, is under development. Conventional ammunition with casings makes it necessary to carry the casings twice, into battle and back home. In addition, hot casings cause hang-fire problems.

On the other hand, with caseless ammunition, wherein the projectile is encased in its own propellant, everything is consumed upon firing, and size and weight are reduced significantly. Two ammunition suppliers—Hercules Inc. and the Brunswick Corp.—are presently manufacturing caseless ammunition under Air Force contracts.

Augmenting the advantages of caseless ammunition is the proposed step-up to a 25-mm gun. "Today's aircraft are tougher and more maneuverable. If we want to improve our kill ratio, we need a gun that fires a larger projectile with greater muzzle velocity. We want this for two reasons. First, the shorter the flight time of the projectile, and the flatter its trajec-

tory, the greater its chance of hitting a rapidly maneuvering target. Second, the destructive impact of the projectile and the determination of whether it will glance off harmlessly, or effect a kill, is a function of  $MV^2$ , or mass times velocity squared. In other words, the more weight and speed, the better our chances," General Bellis explained.

Late this fall, an actual competitive "shoot-off" involving 10,000 rounds of caseless 25-mm ammunition will be held. The Air Force hopes to determine the efficiency of the GAU-7 and to select a contractor by this competitive firepower demonstration. Philco Ford and General Electric are developing the two competing guns under Air Force contract. Complementary ammunition storage and handling systems are being developed by Emerson Electric and Philco Ford, under government contract, and by General Electric under the company's own initiative. Progress to date has been excellent, prompting General Bellis to predict "with high probability that the early F-15 deliveries to TAC will be equipped with the GAU-7."

The F-15's short-range "dogfight" missile is the A-9L, a modern, improved version of the Sidewinder missile. It is being developed in a joint Air Force/Navy program at the Navy's China Lake facility in California. Its minimum effective range is substantially below that of the standard Sidewinder, which requires too much distance to be fully effective in dogfights.

The F-15's intermediate-range missile, the AIM-7F Sparrow, is currently under development by Raytheon under Navy management and is demonstrating significantly improved capabilities over existing missiles of this type. While the missile system's reliability and true effectiveness have not been demonstrated as yet, current efforts by the contractor and "the good progress of the development program so far support the assumption that this can be achieved in time for incorporation into the first F-15 models," General Bellis added.

### An F-15 Interceptor?

With no modern interceptor deployed, the United States' air defense capability at present is marginal at best. Together with the Aerospace Defense Command and NORAD, the F-15 SPO has conducted a tentative evaluation of the F-15's suitability for the interceptor role. It was found to have excellent potential. The changes required to turn the F-15 into a continental interceptor are relatively small and consist mainly of providing the aircraft with a nuclear-tipped missile for use against heavy bombers.

General Bellis, who earlier managed the development of the YF-12A/SR-71 family of high-performance aircraft, said, "The AIM-47 nuclear missile system, which we tested successfully in high-speed launch on the YF-12,

could be produced in a lighter, simpler version for the F-15." Another change, he said, would involve simpler ECM (electronic countermeasures) equipment, and other changes in avionics would be relatively minor. Compared with the F-14B, which had been considered as an alternate contender for the interceptor mission, "the F-15 performs better, is cheaper, and has lower maintenance and better reliability. The F-15's advanced radar has a better mean time between failure [reliability] than the Navy airplane's older Phoenix system. Our airplane also has better range and greater loiter capability than the F-14, which is half again as heavy and which, because of its variable-sweep wings, can't carry as much external fuel. In addition, having basically one airplane perform both missions would help in logistics and spare-parts support, reduce costs, and provide us the flexibility to augment, depending on need, one model with the other. We could assign, say, F-15A fighters to the interceptor role or the other way around," General Bellis stressed.

ADC and NORAD have indicated that they could retain the F-15's external tanks (which in the TAC mission are dropped to improve dogfight capability), because they represent no hindrance when the only combat action required is a missile launch.

### The F-15 Program Schedule

Early in 1973, the Air Force and the Department of Defense plan to request authorization from Congress for full production funding of the F-15. This is to be preceded—because the F-15 is to be procured on a fly-before-buy basis—by an extensive demonstration of flight worthiness of the design in an operational environment. McDonnell Douglas is producing twenty aircraft for test purposes. A number of them will be transferred to the operational inventory after completion of testing.

Based on a programmed buy of about 700 aircraft (this figure could increase if the Air Force decides later on to use the aircraft for additional missions), the F-15's so-called Unit Program Cost is just under \$10 million. This includes all RDT&E (research, development, test, and evaluation) costs, ground-support and training equipment, spares, depot tooling, and the cost of the aircraft. Another costing method, called the Unit Production Cost, deletes the RDT&E costs, and amounts to approximately \$7.6 million. The third cost-measurement standard is the Unit Flyaway Cost of the aircraft, which amounts to about \$6.2 million.

### Three Air-Superiority Fighters Are Enough

There has been public speculation that it would not be prudent to buy the F-15 in great quantities when many potential future conflicts



may not require as sophisticated or expensive an aircraft. General Bellis disagreed, stating: "We are well equipped to cope with conflicts at many levels of intensity. We have the F-4, which, with some armament modernization, can provide excellent service. In addition, we

have the F-5E [International Fighter], which is designed specifically for use by our allies and keyed to low levels of conflict. It is simply not realistic to talk about five or six different levels of fighters, because of cost and inventory management factors."

## The B-1 Strategic Bomber

When the Air Force awarded engineering development contracts for the B-1 strategic bomber last June, three factors set the pace and direction of the program. (See "The B-1: USAF's Most Versatile Bomber," April '70 issue of AIR FORCE Magazine.) First was the obvious need to get the test aircraft into the air as soon as possible; second, this had to be done at a minimum of cost; and third, the test aircraft had to be sufficiently developed to be reproducible as a production aircraft.

These requirements, General Stewart told this reporter, led the B-1 Program Director, Maj. Gen. Douglas T. Nelson, to use management techniques "comparable to the Skunk Works approach," meaning a very close working relationship between the Air Force and the contractors (North American Rockwell Corp. and General Electric) with maximum flexibility and reduced reporting requirements. [The Skunk Works is the nickname for Lockheed's high-security facility in California, where the YF-12A and SR-71 were developed in secret.]

General Nelson explained that "between fifty and sixty military and civilian Air Force personnel under Deputy Program Director Col. M. M. Bretting are being assigned on a permanent basis to the contractor's facility in Los Angeles, where they work side by side with North American Rockwell. A smaller contingent is in residence at the GE engine facility in Evendale [Ohio]."

This arrangement provides two major benefits. The Deputy Program Director in residence is empowered to make routine decisions on the spot, which avoids delay. At the same time, the Air Force finds out about problems the minute they surface, without having to wait days for a written report.

General Nelson has introduced other innovative management techniques, after a sweeping review of management procedures in cooperation with the contractors last August. Partly because the SPO staff is in residence at the contractor facility, "the individual reporting requirements were reduced from several hundred to forty, which is saving many millions of dollars. Previously, many functions performed by the contractor were duplicated or reformatted to meet Air Force standards. Layers of personnel accumulated on both sides, and the contractors had to assign large num-

bers of people merely to satisfy USAF's reporting requirements. What we are doing on this program—with the exception of the DoD's Cost Schedule Control System, which is fully implemented—is to adapt our way of doing business to the methods of the contractor."

### B-1 Payload and Tanker Compatibility

Recent criticism of the B-1 program by the Military Spending Committee of the "Members of Congress for Peace Through Law" (see also "Airpower in the News," p. 14) raised questions as to the B-1's SRAM payload and the new bomber's compatibility with the KC-135 tanker fleet.

It was insinuated that the Air Force recently acquiesced to a twenty-five percent drop in the number of Short-Range Attack Missiles (SRAMs) to be carried internally aboard the B-1. The facts are that the Air Force, well in advance of the release of the request for proposals in 1969, devoted considerable effort to establish the optimum payload capability of the B-1. Cost-effectiveness studies showed that, within certain limits, the number of offensive weapons and decoys required was relatively constant. This optimum payload configuration has not been changed since the RFPs were released to industry, and no change is now anticipated.

The committee also claims that the B-1 is incompatible with the existing fleet of USAF KC-135 tankers and requires a new tanker fleet. This is not so either.

Adequate basing in the north-central part of the US is available for both the bombers and the tankers, which need not be located at the same fields. The KC-135s, which do not carry nuclear weapons, can be dispersed to civilian fields (a large number of which have adequate runway lengths) during periods of increased tension and alert. The B-1's relatively short-runway takeoffs, as presently specified, provide for a wider choice of dispersal bases, both military and civilian. And the B-1 can still reach a considerable portion of the Soviet target system *unrefueled*, should the tanker for a particular sortie not survive.

Another alternative would be to reduce the full offload available from the KC-135s, to permit them to take off from shorter runways. This would also limit somewhat the B-1's penetration capability, but much less so than complete loss of tanker support.

In addition, the KC-135 can be modified to shorten reaction time and takeoff distances. These modifications could include replacing the present engines with existing airline-type turbofans, as well as simultaneous engine start, using cartridge-starter techniques.

Air Force studies show conclusively that adequate basing facilities are available for both the B-1s and the KC-135s, which meet all criteria of safe escape from the most serious ICBM or SLBM threats.

In a similar vein, the Air Force early this year decided to cut back the number of flight-test aircraft from five to three, and the number of complete ground-test airframes from two to one, and thereby save about \$300 million. "This involves an element of risk since loss of one of the three test aircraft would have considerable impact on the program. But on balance, I believe it is a good trade off. With good supervision we can live with the increased risk, and I think we will wind up doing a much more efficient job during the flight-test phase. We plan a combined Air Force-contractor flight-test program. Both parties will participate in all activities and receive and benefit from all test data. Previously, flight testing was done first by the contractor and then again by the Air Force, resulting in duplication of more than fifty percent of the effort," General Nelson said.

By changing the flight-test program to a "team effort," the Air Force not only assures "full engagement in all facets of the effort but is saving itself and the contractors a great deal of cost and effort," he explained. (Universally, ASD program managers view the "disengagement" policy, in effect in the late 1960s, which held contact between the government and the contractors to a minimum, as a prime factor in cost overruns and technical difficulties in recent weapon system procurement programs.)

### Frugal Management Techniques

Another innovative means for cutting cost during the B-1's RDT&E phase is the SPO's decision to use civilian airworthiness standards, in place of the more stringent military specifications, where reasonable.

"We are doing this to minimize the government's fiscal commitments prior to a production decision. By eliminating a high percentage of the formal military qualification testing of various system's components, we are running a small calculated risk. If and when a production decision is made, we will have had the advantage of actual flight-test experience instead of merely bench tests and analyses in the qualification testing on some key components. Still, I believe that about sixty percent of the components involved will not have to be requalified to military standards when we go into production," General Nelson said. However, because of their crucial importance, the Air Force is proceeding with standard military testing of the engines.

Another cost-cutting move during the RDT&E phase is the "deferment" of all design and development work on the B-1's ground-support and training equipment until a production decision is reached. A similar tack is being taken with the B-1's avionics. "While we have designed into the airframe provisions for extremely sophisticated defensive and offensive avionics, we will use only off-the-shelf systems

for the flight-test program. We will start the first production aircraft with perhaps no more than fifty percent of the full avionics potential. Over the years, we can add to our capabilities. While I don't want to commit myself categorically at this time, I think that the first SAC aircraft will have an offensive avionics system similar to that of the FB-111. On the other hand, it is quite probable that early models will require a new defensive avionics system, as well as a new computer installation to operate both the defensive and the offensive systems," the B-1 Program Director said.

### Performance Changes

In his no-holds-barred review of cost factors, General Nelson initiated a number of performance changes that have helped cut costs without impairing the aircraft's ability to perform its mission. Among them is a reduction of the airframe's titanium content. Titanium is a high-priced difficult-to-machine metal which combines high strength with the ability to resist high temperature. While the B-1's supersonic cruise speed is classified, it is known to be between Mach 2 and Mach 2.5 and, therefore, not subjected to the high temperatures that would require extensive use of titanium. The airframe, therefore, contains no more than twenty percent titanium. Titanium is being used to provide extra strength for components exposed to high aerodynamic loading and in this limited application is considered quite cost-effective.

Following extensive trade-off studies, the initial performance criteria for takeoff performance were relaxed by about 500 feet. The refueling altitude requirement was relaxed slightly and the supersonic penetration range reduced a little. In addition, the size and weight of the aircraft were reduced slightly, compared to the original contract specifications. The aircraft's exact weight is classified, but is slightly above 350,000 pounds.

According to present plans, General Nelson said, the B-1's engineering mockup is to be completed by October of this year, the engine is to be qualified for flight testing late in 1973, and the aircraft is to fly for the first time in the spring of 1974. At about the time of first flight, the government will request production funding from the Congress and begin actual production in Fiscal Year 1975.

The production "buy" the Air Force is expected to propose will involve about 240 aircraft. While no Initial Operating Capability (IOC) has been established, it is likely that the aircraft will begin to enter the SAC inventory by mid-1977.

The program's technical progress so far "has been very good, regarding both airframe and engine. We are already running scaled-down engine components, such as half-scale fans,



*Maj. Gen. Douglas T. Nelson was appointed System Program Director and Deputy for B-1 in May 1970. A veteran SAC aircraft commander, General Nelson's previous assignments included command of the Air Force's only SR-71 unit, the 9th Strategic Reconnaissance Wing.*

half-scale turbines, and a full-size prototype compressor. The engine is an afterburning turbofan akin to the TF30 engine of the F-111, but using significantly higher temperatures and pressure ratios. By using new, sophisticated materials, such as the newly developed nickel alloy Rene 120, and advanced cooling techniques, we attain substantial increases in temperatures and, therefore, in efficiency, over the best engines currently in operation. GE was able to come up with a single high-pressure turbine design—in place of the several needed previously. This eases the task of maintaining the aircraft in the field. The engine can be disassembled and reassembled easily and quickly [vital for a bomber which is to be dispersed widely],” according to General Nelson.

General Nelson termed the B-1's mode-stabilizing Softride system a breakthrough of considerable importance. Without it, the high rate of turbulence encountered at altitudes below 400 feet during the B-1's high-speed penetration runs could severely impair both crew and systems performance. North American Rockwell's Softride represents the first application of a new technology, called CCV (control configured vehicle), essentially an adaptation of missile control systems to aircraft. The B-1's Softride system suppresses up-and-down motion of the airframe with the help of a movable horizontal vane placed on each side of the aircraft's nose. These control surfaces are electronically activated by motion sensors in the fuselage.

### Getting Out in a Hurry

Within the framework of the US deterrent triad, the strategic bomber's ability to take off rapidly from dispersed fields, before it can be destroyed by sea-launched missiles, is critical. The B-1's ability to “flush on warning” is outstanding. “We expect to be off the ground within no more than four minutes from the time of warning. Allowing for depressed-trajectory SLBMs, this is not good enough if the

bomber is based in our coastal areas. It is, however, more than adequate if, as planned, we locate the aircraft and their supporting tankers about 300 miles or more inland. With the crews standing by in the cockpit or near the aircraft, and by starting all four engines simultaneously, we can gain additional, significant reductions in reaction time.

“Many detailed analyses and scenarios indicate that we can cope with the threat of depressed-trajectory sea-launched missiles by dispersing the fleet—say, two bombers and two tankers on alert per base—throughout the north-central part of the country. This can be done easily because the B-1 takes off from any runway that can accommodate medium- and long-range commercial aircraft,” General Nelson explained.

The B-1 can carry three times the internal payload of the aging B-52, in either nuclear bombs or SRAM missiles. It is designed to fight its way through the heaviest air defense concentrations and to deliver high-yield nuclear bombs with extreme accuracy. At present it is the only weapon system capable of dealing with superhardened targets.

If an enemy has small chance of destroying a significant number of B-1s on the ground and “because there is no technology in sight that can prevent it from penetrating to target, the B-1 represents a pivotal element of our national deterrence in the years ahead,” according to General Nelson.

The need for the B-1, reaffirmed by recent high-level defense studies, is not affected by a possible shift of part of the nation's ICBMs to a mobile-basing mode, be that either ground mobile or air mobile. “Whether you launch a ballistic missile from a silo, a submarine, a mobile ground launcher, or an aircraft on the ground or even in the air makes no significant difference to the enemy's ABM system. The basing does not change the penetration mode, and any Soviet breakthrough in ABM technology would jeopardize *all* ballistic missile systems. We tend to underestimate the ABM capabilities of the Soviet Union. For instance, does it make sense that the Tallinn system, involving thousands of interceptor missiles and ostensibly designed to defend against B-52s, would be made accurate to an altitude of 150,000 feet if there were no intent to use its missiles against our ICBMs and SLBMs?

“Our deterrence capability is only as good as the Soviets think it is. To maintain this credibility, we need an advanced strategic bomber that can provide us with various levels of deterrence. Also, only the bomber compensates for the fact that the Soviets don't expect this country to launch its missiles on warning but rather to absorb a first strike. They also know that we would launch our bomber force on warning, because it can be recalled,” General Nelson said.

See the following page for coverage of the A-X.

# The A-X Ground-Support Aircraft

Where the management approach of the F-15 program involves competitive development of some critical components, and the B-1 program is a classic example of the fly-before-buy concept, the concept underlying the A-X program, the Air Force's close-support aircraft, goes one step further. It is keyed to a competitive prototype flyoff. The flyoff, scheduled for late in 1972, will be the first of its kind involving US military aircraft since the early 1950s and is based on firm, fixed-price contracts with Fairchild Hiller Corp. and Northrop Corp.

The A-X's prototype flyoff phase is to be followed by full-scale development and production of the winning design. Low cost of the production aircraft, of which the Air Force hopes to buy between 600 and 700, is an overriding requirement. General Stewart stressed that "we are irrevocably committed to bring this aircraft in at a flyaway cost of about \$1.4 million. We have given the contractors considerable leeway in deviating—within reason, of course—from their original proposals whenever this helps keep the costs down."

While the Department of Defense apparently prefers to have three services provide close ground support with three different aircraft, there is little doubt that the Congress is determined to pare this figure to two, or perhaps only one type. (The other two contenders are the Army's rigid-rotor compound Lockheed CH-56A Cheyenne helicopter and the Marine Corps's British-developed Hawker Siddeley Harrier V/STOL fighter.)

The Air Force believes that its A-X—Northrop's design is known as the A-9A and Fairchild Hiller's as the A-10A—is the best and

most cost-effective close-air-support aircraft. "An airplane with STOL characteristics can carry more payload over more range than a V/STOL vehicle, and it costs less to buy and operate. By payload, I mean not just ordnance, but sturdy structure, armor, and redundancy of all vital systems to ensure survivability," General Stewart said.

Also favoring the airplane are speed and maneuver capability, neither of which can be attained to the same degree by a rotor vehicle. The maximum speed of the A-X will be more than 450 knots, compared to about 225 knots for a compound (employing a rudimentary wing) helicopter.

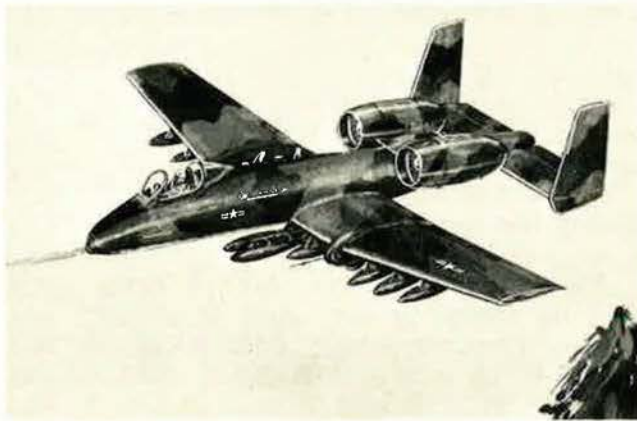
Further, the A-X is designed from the outset to be a highly stable weapons platform, especially when diving during bomb runs, and to combine this quality with high maneuverability, both in low-speed and high-speed flight.

Concerning the Harrier deflected-thrust V/STOL jet, in whose evaluation ASD was involved, General Stewart said, "While we are not looking down at this aircraft, we find its range and payload limited compared to the A-X. We recognize, of course, that the Harrier employs an engine technology that goes back almost fifteen years and that its performance with an advanced fanjet engine would improve substantially." He added, however, that compared to STOL design, a V/STOL "aircraft by necessity has to be overpowered because of the vertical-takeoff requirement."

Compared to the copter or the V/STOL jet, the A-X offers marked advantage in cost. The average flyaway cost of the Harrier, of which the Marine Corps wants to acquire a total of 104 aircraft, is \$3.4 million. Price of



Northrop Corp.'s A-X prototype is known as A-9A and could be powered by either GE or Avco Lycoming engines. Low cost and ruggedness characterize the two designs.



Fairchild Hiller's Republic Aviation Division is building another A-X prototype, known as the A-10A. A competitive flyoff is expected to be held next year to determine the winning design. USAF plans to buy from 600 to 700 A-X aircraft.

the Cheyenne is expected to be roughly the same.

At a flyaway price of \$1.4 million, the A-X costs about \$2 million less than either. Its development costs are also relatively modest, amounting to about \$175 million for both prototype flyoff and full-scale development of the winning design, according to General Stewart.

For the time being, the Air Force plans to equip the A-X with an austere avionics package. If, during the aircraft's early operational period, it becomes apparent that a night and all-weather capability is required, portions of the A-X force can be so equipped. On the basis of present estimates, an all-weather-equipped A-X would cost about \$2 million, General Stewart stated.

While there are undeniable advantages to the Cheyenne's vertical landing and takeoff capability, the Air Force view is that these are not decisive in view of the A-X's excellent STOL capabilities. Its takeoff run will be between 800 to 1,500 feet, depending on payload, and can be from unprepared pasture sites.

### The Well-Armed A-X

Key to the A-X's firepower is an internally mounted, rapid-fire 30-mm cannon, capable of piercing armored vehicles. Two weapons of this type are currently under development and employ different multibarrel Gatling gun prin-

ciples. General Electric, General American Transportation Corp., Hughes Tool Co., and Philco-Ford are involved in this competitive development effort. In addition, the aircraft will be able to carry laser- or infrared-guided bombs on the ten weapon stations under its wing. Eventually the A-X "will probably be equipped to fire Mavericks [475-pound, TV-guided aid-to-ground missiles currently deployed on the F-4 and A-7]," according to General Stewart. The 30-mm gun is likely to be converted to caseless ammunition if the F-15's gun proves the feasibility of this new concept.

The twin-turbofan, single-seat A-X is tailored to a mission radius of up to 300 miles, combined with good loiter capability. A typical mission profile might involve a mission radius of 150 miles, with the aircraft staying at an altitude of 10,000 feet for several hours, interspersed with a number of attack runs.

While the Air Force initially envisaged a turboprop design, "the advanced performance characteristics of GE's TF34 engine, developed for the Navy's new ASW aircraft, and similar engines now on the horizon, proved more advantageous," the ASD Commander said. Fairchild Hiller's A-10 is being designed to incorporate the 9,000-pound-plus-thrust TF34 engine, while Northrop's A-9 might use either Avco Lycoming's HLF-502A engine or the TF34.

## Downstream Developments

While the F-15, B-1, and A-X programs represent ASD's principal concerns at the moment, the Division is also deeply involved in advanced technologies whose application "appears to be more downstream but also revolutionary," General Stewart told AIR FORCE Magazine. Involving both guided drones and remotely piloted vehicles (RPVs) (*see page 40, October '70 issue*), these efforts seek to provide advanced, long-range defense-suppression and surveillance capabilities, and eventually may even lead to remotely piloted fighters.

While many project details are classified and some of the technologies are still at laboratory level, work to date by ASD indicates that air-to-ground strikes by RPVs over distances of several hundred miles appear possible. Guided by a pilot in a mother ship or other elevated position (because of line-of-sight restrictions imposed by the present state of technology), such a remotely piloted vehicle could feed data to a TV screen from an infrared searcher or electronic radar homer in its nose cone.

Two basic RPV techniques are currently being explored. One involves a "kamikaze" type crashing of the RPV on its target. The other is an RPV design that fires guided mis-

siles or drops bombs. The latter approach is technically more difficult. Either method appears capable, however, of "battling SAMs from a distance of fifty miles or more," in General Stewart's view. He predicted that defense-suppression RPVs "will come along much sooner than RPV air-to-air fighters."

Also on the horizon is the eventual development of a STOL intratheater transport, which might turn out to be either a new aircraft or a modification of an existing transport.

While the Air Force's purchase of new aircraft in the coming fiscal year is the lowest in numbers since 1935, the prospect of bringing some 700 F-15s, a roughly equal number of A-9s or A-10s, and more than 200 B-1s into USAF's inventory during the remainder of this decade is seen by General Stewart as proof "that we are working our way out of the valley." The "management changes that have been instituted and the progress we have made lately on our key programs make us quite confident about our ability to manage the Air Force's airplane programs on time, within the specified costs, and with the performance we have promised," the Commander of USAF's Aeronautical Systems Division concluded. ■

*A flight of Israel Air Force Dassault Mirage IIIs soars over the countryside. The French-built fighter-bomber/interceptors played a major role in the Six-Day War four years ago. Since that war, they've been augmented by US-built McDonnell Douglas F-4Es and Skyhawks.*



*Pilot proficiency, a tight but flexible command structure, technical excellence, motivation geared to national survival itself, and a continuing thrust toward self-sufficiency—these are some of the qualities that have put . . .*

## Israel's Air Force-

**By William Leavitt**

SENIOR EDITOR, AIR FORCE MAGAZINE

**I**F PROFESSIONAL skill, technical ingenuity, motivation geared to nothing less than national survival, and a continuing thrust toward self-sufficiency still count for something in human conflict, then Israel's Air Force may be in a class by itself.

A relatively small force in terms of what it has to be able to do, the Israel Air Force (IAF)—or Heyl Ha-Avir, as it is called in Hebrew—has an enormously difficult job. It must maintain air superiority over an area where flight times are measured in minutes, and it must defend, with aircraft and missilery, a tiny country where most of the population is vulnerably gathered in a few major cities and the rest is scattered in relatively small numbers in rural settlements.

At the same time, the IAF must be prepared to support Israel's mobile ground forces in the event of another shooting war in the Middle East. All this against the back-



*An important aircraft in the IAF inventory is the McDonnell Douglas A-4 Skyhawk attack craft, shown here with its load of armaments. The Israelis have shown great ingenuity in tactical use of their imported combat airplanes.*

ground of a continuing near-war situation in which Israel is surrounded by adversaries that outnumber her many times over in population and forces.

This tough, multifaceted mission is further complicated by the fact that, as a consequence of international power politics in which Israel finds herself an unwilling player, the Israel Air Force—with its fleet of French-supplied Dassault Mirage IIICs and US-supplied F-4E fighter-bombers and A-4H attack aircraft, plus its array of other, older aircraft of various origins and vintages—now faces, on the crucial Suez front that separates her from her most significant adversary, Egypt, a Soviet-created air defense system that Israeli airmen view as the thickest such barrier in the world.

That system, which has cost the Russians an enormous outlay, includes a large deployment of Soviet-manned surface-to-air missiles (SAMs), reported to include the very latest types, advanced radar and communication equipment, plus a



*Emblazoned with the Star of David insignia, an Israel Air Force combat-camouflaged F-4 takes off from an IAF base. Traveling about Israel, the visitor gets accustomed to the frequent overhead roar of supersonic aircraft.*

military decision-making to the Russians.

That Soviet pilots have arrived in some strength in Egypt has not gone unnoticed by the Israel Air Force or government. Aircraft of the IAF have already shot down a number of Soviet-manned MIG-21s

symbolic of Israel's determination not to be intimidated. The same spirit was voiced recently—after the news stories about the flow of MIG-23s into Egypt—by the former commander of the Israel Air Force, retired Maj. Gen. Ezer Weizman. He has been quoted as saying that

## In a Class by Itself

formidable collection of advanced Soviet aircraft including the MIG-23 Foxbat, claiming Mach-3 dash performance. The great inflow of Soviet equipment into Egypt since the 1967 Six-Day War is considered by most observers a bald Russian attempt to neutralize the Israel Air Force, which four years ago this month so easily outflanked Egyptian air defenses and destroyed most of Egypt's air force on the ground.

### Soviet Technicians

This time, however, the Soviets appear to be determined not to lose their investment by entrusting complex ground equipment and advanced aircraft to Egyptian manning. They have brought in a sizable cadre of Soviet technicians and pilots to man the hardware. And, as many Middle East watchers have pointed out, the Egyptians have, in exchange, largely handed over their

in the Middle East. And Israel's Prime Minister, Mrs. Golda Meir, has been quoted as saying that, while Israel is in no way anxious for a renewal of hostilities, if Soviet-manned aircraft show up in the gun-sights of Israeli pilots, they will have to be dealt with just as any other adversary in a shooting war.

Such a statement is not to be viewed as bravado. Rather, it is

“if war breaks out again, we shall down the MIG-23s as we downed the others.”

He added that he preferred the McDonnell Douglas F-4 any time to the MIG-23, which he described as having a top speed of Mach 2.4—rather than the claimed Mach 3—compared to the F-4's Mach 2.2. He saw the difference as insignificant in combat. The high ceiling of

*The Fouga Magister jet trainer is the mainstay of Israel Air Force pilot training. The aircraft is built in Israel under license from the French. At right, AIR FORCE's William Leavitt inspects the front cockpit of a Fouga on an IAF base.*



the MIG-23, more than 70,000 feet, General Weizman added, is more useful for reconnaissance than for air-to-air combat.

General Weizman's comments are in line with the operating philosophy of the Israel Air Force, a philosophy made quite evident to the relatively few foreign visitors to IAF installations. Not long ago, as a member of a Western press delegation inspecting Israeli aviation and technical facilities, this writer visited a spanking-new Israel Air Force desert base, and heard Israel Air Force people saying essentially the same thing. Simply stated, the Heyl Ha-Avir's operating philosophy is: "We'll find a way." In terms of the massive Soviet air defense shield in the Suez, the most that Israeli airmen will say is that an absolutely airtight Egyptian defense isn't possible. And there is little question that Israeli tacticians are presently studying everything from standoff missiles to drones and radar spoofing, in order to develop new approaches to that problem, should they be needed.

### Pilots: The Key

Translated into practical terms, "we'll find a way" means a way of doing things in the Israel Air Force that includes an extremely careful selection of pilots—many of whom will later be air planners—and intense training, geared to mating the man with his airplane, as well as instruction of the sort that stresses

individual initiative and flexibility in combat. This is based on the conviction that Israel cannot afford to lose aircraft, and even more important, cannot afford to lose pilots. The latter point is an article of faith in the Israel Air Force. Israeli airmen will tell you that they will go to enormous lengths to rescue a pilot in trouble, not only because they want him back, but because it is vital for everyone in the IAF to know that the Heyl Ha-Avir cares for its own.

As Israel Air Force people put it, if the country has a secret weapon, it is the IAF's pilot-training program. As a consequence, the IAF is acknowledged as the nation's elite—its shield and spear—and it has the cream of the nation's youth to choose from. Every prospective pilot is a volunteer, a volunteer in a country where everyone, male and female, must perform military service—and where virtually everyone except the very young, the old, and the sick, are in the national military reserve in some capacity.

Pilot selection and training, of which more later, is but one of the factors that distinguish the Israel Air Force as excellent. Flexibility in operations and doctrine, and an organization geared to highly centralized and rapid command and control, are also quite basic to the IAF's past success and present confidence, even in the face of increased challenge.

Israel, living as it does in the



The Israel Air Force's commander, Brig. Gen. Mordechai Hod, led the IAF during the Six-Day War. His philosophy: Keep it simple.

midst of a sea of hostility, has been likened to one great aircraft carrier, the nation's entire territory being the flight deck. Certainly, as you drive around the country, airpower is highly visible. High-performance aircraft streak through the air regularly, and you frequently have the impression that an airstrip is not far off.

### One Big Command

The Israel Air Force is one big command, with individual squadrons assigned to primary missions, but flexible enough to take on other missions on short notice. The structure is compact. The Heyl Ha-Avir has but one basic chain of command, from the operational squadrons on the bases to the chief of the Israel Air Force, Brig. Gen. Mordechai Hod. General Hod, who commanded the IAF during the Six-Day War, is, in turn, responsible to Lt. Gen. Haim Bar-Lev, Chief of Staff of the Israel Defense Force, in Hebrew called the Zahal. General Bar-Lev, in turn, reports to the celebrated Israeli Minister of Defense, Lt. Gen. Moshe Dayan.

At the same time, and this applies all the way up and down the line, each IAF commander has functional deputies for principal requirements such as intelligence, operations, manpower, and maintenance. Whatever job a member of the Israel Air Force may be doing, whether he's a mechanic or a medic or a pilot, he is responsible for his



The Hebrew sign over the blackboard reminds IAF pilots to "Look around! The one you don't see will get you." Israeli selection of pilots is extremely careful, and the training regime is rigorous, the idea being to create soldiers as well as highly resourceful pilots.



performance to the base commander—always an experienced pilot—who, in turn, is directly responsible to Israel Air Force headquarters. And the base commander is also the operational commander of the squadrons deployed at his facility.

Thus, at the major training base we visited, *the* boss was the young colonel who commanded the base. His various deputies all report to him, and he, in turn, reports to IAF headquarters. But at the same time, the people running various services or specialties on the base can get direct guidance in their specialties from headquarters. Also, they are perfectly free to relay suggestions directly to headquarters from the field.

This kind of direct contact between the field and headquarters is not viewed as end-running or going over people's heads. The idea is to have a tight, fast chain of command so that situations can be handled rapidly, while at the same time assuring flexibility and a minimum of bureaucracy and protocol. For example, if someone in a responsible position in the pilot-training business wants to suggest a curriculum change, he can pick up the phone and call IAF headquarters. Chances are he will get an answer within

minutes, or, at most, hours. The Air Force chief, General Hod himself, might make the decision. Lengthy staff studies and paper analyses are things the Israelis say they don't have time for. That kind of organization puts IAF research and development into the operations branch rather than in a separate structure.

In the overall Israel Defense Force organization chart, ground forces are grouped into Northern, Central, and Southern Commands—with IAF airstrips and bases located in all of them. In practice, the geographical commands do not affect the Air Force beyond a few housekeeping matters or such items as seasonal changes of uniform.

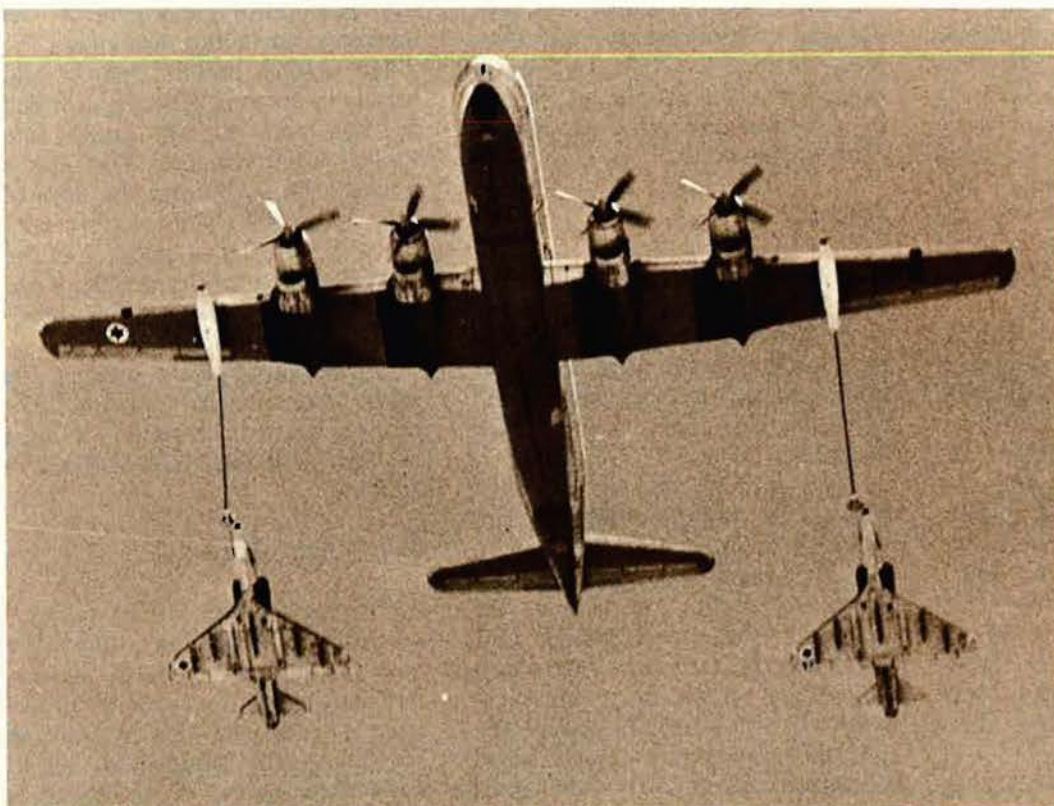
### Flexibility

Centralized control with built-in flexibility is the Israel Air Force's style. And, with the short distances involved in Middle East air opera-

tions, that kind of control can—and did during the Six-Day War—see combat units easily redeployed from one front to another, in moments.

No frills, but constant emphasis on doing whatever the mission requires with the highest competence possible. This is evident particularly in the pilot-selection and -training program previously mentioned. IAF selection and training are designed to create a cadre of pilots—and this applies to everything from high-performance fighters to helicopters—who know virtually everything there is to know about the operation and maximum performance of their aircraft, and themselves.

The emphasis is on individual capability, pilot in aircraft, rather than procedures per se. Many of the volunteers, fresh out of high school, are "kibbutzniks"—youngsters brought up in cooperative rural settlements where the group spirit is very strong. This spirit is considered a valuable asset to the Air Force. The cadets are usually around eighteen years old. From beginning to end, the selection and training program runs about twenty months and includes tough courses in subjects ranging from survival in the



*The Israelis have obtained Boeing C-97s which they are able to use for midair refueling operations to extend the combat range of their aircraft. At left, two Israel Air Force A-4 Skyhawks get a long gulp of fuel from the mother ship.*



*Helicopters play an important role in the Israel Air Force, in keeping with Israel's doctrine of military mobility. Above, at right, a French-built Super Frelon assault craft is lined up on the runway alongside a Sikorsky UH-34 utility helicopter.*

field to navigation, gunnery, and air-to-air combat.

It is divided into a number of stages. The first stage is crucial. Its purpose is to weed out those candidates who, for one reason or another, aren't likely to hack it. The cadets are exposed from the outset to flight in Piper Super Cubs. A hard judgment is made quite early as to whether or not to continue the investment in each cadet's training. The decision is crucial, not only in military terms but also in terms of cost—about \$150,000 to produce an IAF fighter pilot.

Yet the investment, even in first-stage candidates who cannot hack it, is not forfeited. Those who are released during the Super Cub stage are assigned either to other Air Force training or to other branches of the Israel Defense Force. In fact, the switch to other assignments can occur at any point in the pilot-training program. And in those other jobs, they do very well, having come from the cream of the country's youth, even though they were not quite up to combat-pilot standards.

The Israel Air Force will not say

exactly what the selection rate is, but the figure of one trained combat pilot out of 300 aspirants, which has been reported by some observers, is neither denied nor confirmed. Every graduate of pilot training is commissioned and must serve five years. Often, he has the chance, on active duty, to be sent to a civilian university at government expense.

### Training

There is more to the first stage than watching the candidates in the air. Intensive psychological screening on the ground goes on at the same time, as well as a busy round of academic training in aero-related disciplines.

Once through the rigorous first phase, the would-be fighter pilot embarks on several months of intensive ground training. This is a punishing regime in which the candidate must prove himself able to survive in a country where arid deserts and rugged mountains challenge any man's will. With the field-survival training goes another set of academic courses and psychological

observations of the pilot candidates.

Once through this second stage— at this point he has been in the program about eight months—the candidate finally gets a chance to fly the versatile French-designed Fouga Magister twinjet trainer, which the Israelis build under license. During the Six-Day War, Fougas were used quite effectively for close-support operations.

In the Fouga, the cadet really learns to fly and begins to learn how to fight. When he finishes the Fouga course and the concurrent academic program, he's ready for assignment to an operational squadron. Usually he goes to a squadron flying some of the IAF's transonic aircraft: Vautours, Ouragans, Mystères, Super Mystères, or A-4s. Only later might he be assigned to squadrons flying supersonic Mirages or Phantoms.

Clearly—and this is evident to the visitor to an IAF base—the Israel Air Force is run by young but seasoned commanders. To keep them fresh, the IAF rotates tours at about two years. That way, they get varied command experience. The IAF has pilots with ten and more MIGs to their credit, plus hundreds of sorties. The training base we visited was commanded by a thirty-six-year-old colonel who has been in the IAF since 1951 and who has flown everything in the inventory, including helicopters.

He briefed visitors politely and briskly in fluent English, from which he was able to slip easily into French when required. That was a heritage, he said, from the days of what he called "our romance with the French." His humor, as he greeted visitors to the striking stone building where he had his headquarters, was evident.

In the middle of the briefing, the phone rang, and he excused himself, saying with a smile, "I hope no war." He then took the call in Hebrew.

### Short Generations

"We have learned from others," he said, "but we don't copy. We adapt to our own needs. A 'generation' in our air force can be twelve months." He said this by way of illustrating the speed with which new weaponry, tactics, and concepts

can be introduced into the IAF. These range from ingenious spare-parts and maintenance operations to on-the-deck flight techniques to electronic countermeasures and evasion of surface-to-air missiles. Israeli airmen point out that, perforce, the IAF has, in a couple of decades, gone through changes in aircraft and flying style that other air forces took fifty years to pass through. Change is the IAF's way of life.

The colonel went on to describe how the Israel Air Force has had to write its own handbooks after extracting what was useful from existing military literature and adapting the data to Israeli conditions and needs. Since Israel's language, Hebrew, is a revived ancient tongue, it is understandably short of technical terms. And when new Hebrew words could not be invented, foreign words were incorporated into the IAF's operational language.

At the same time, interestingly enough, the one facility that we visited in Israel that did *not* have signs printed in both Hebrew and English was the IAF base. There, all signs on buildings and doors, so far as we could see, were in Hebrew only, although most of the senior personnel spoke enough English to make their points. The cadets themselves, while they learn some English in school and during their Air Force training, are most comfortable in Hebrew. They are preponderantly "sabras"—or native-born Israelis. And more than fifty percent of them come "off the land," that is, from rural settlements.

### Quick Reaction

The style of the Israel Air Force—featured by doctrinal and operational flexibility, intense training, unquestioned motivation—is geared to what they call Quick Reaction Capability, QRC for short. QRC is applied to the wide range of military endeavors that simply have to work if Israel is to survive. In the Air Force context, QRC can mean an aircraft modification put into effect air-force-wide in one day.

Other examples range from military intelligence, about which, for obvious reasons, the Israelis will say very little, to their adroitness in

the art of electronic warfare. One of the reasons the Russians are reported to be installing in Egypt one of their most advanced ground-to-air communication systems, one using digital displays rather than voice, is that the Israelis have been able to monitor enemy communications with relative ease.

QRC also has motivated the imaginative Israel Air Force research and development, performed in close cooperation with the Israeli aircraft industry, that has simplified and stretched the utility of their expensive combat aircraft. For example, the usually clear skies of the Middle East have made it possible to dispense with much of the expensive nav-aid gear that comes with a piece of machinery like the F-4. And, as the Israelis like to point out, guns are vital to combat aircraft, even in an age of air-to-air missiles, and they have added guns to their aircraft as needed.

But dedication, imagination, skill, and an effective command structure are not all the factors that have made the Israel Air Force the compact and competent organization that it is. There is another factor that has always been important, and which could become even more important as the Middle East cold war proceeds: Israel is frankly searching for maximum possible military self-sufficiency.

### Self-Sufficiency

As a result of their experience in the international arena, particularly their often frustrating efforts to buy combat aircraft and other equipment from friendly nations, they have created a strong aviation and technical industry on their own soil. This complex could, in the clinches, put together combat aircraft of the highest sophistication.

There have been reports, neither confirmed nor denied, that the Israelis have already developed and test-flown a prototype Israeli air-superiority fighter. On this point,

the most their aviation-industry people will say is that they most certainly know how to build such aircraft and that all they need are the orders. Of course, as is well known from open press reports, the Israelis now produce most of their own ordnance needs in Israel, from small-arms ammunition to airplane bombs. And they are marketing beyond their borders such diverse items as their Uzi submachine gun and their Gabriel sea-to-sea missile.

The idea of Israeli military self-sufficiency goes back a long way, to the days when Jews and Arabs were girding for the 1948 war that both sides expected after the departure of the British from the Holy Land. England had ruled there as League of Nations mandate power from the end of World War I until after World War II. (*For an excellent account of the history of the IAF, see "Israel's Little Air Force and How It Grew," AIR FORCE, January '68.*)

The Israel Air Force was at the outset a ragtag collection of obsolescent foreign airplanes, including, ironically enough, leftover German Messerschmitts airlifted into Israel from Czechoslovakia by Israelis and American sympathizers who flocked to the young state's defense in 1948.

Only recently has the story of that remarkable post-World War II period, when arms and aircraft were being smuggled from North America and Europe into Israel, been revealed in detail. It is a hair-raising tale. The cast of characters includes such diverse personalities as Israel's first Prime Minister, David Ben Gurion, American and Canadian businessmen, and members of the post-World War II Czech government, among many others.

Aviation, military and commercial, is clearly Israel's lifeline. Not only have they built a seasoned air force and sophisticated aerospace industry, but also a profitable flag international carrier, El Al, which brings in vitally needed foreign exchange and which is one of the few international airlines where it's hard



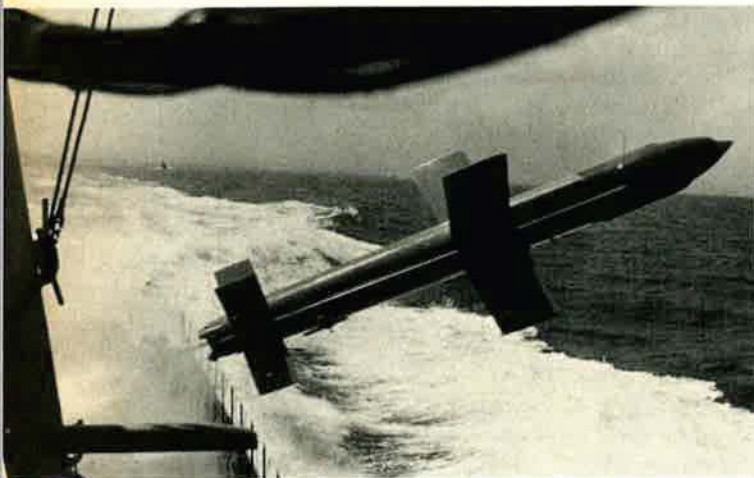
*The country's skilled labor force is a vital factor in the thrust toward self-sufficiency. At left, an Israeli girl at work in Israel Aircraft Industries plant.*



Israel Aircraft Industries' turboprop STOL, the Arava, in the air along Tel Aviv shore.



Israeli-built Commodore Jet executive aircraft makes a test flight over water.



Israel's sea-to-sea missile, the Gabriel, shown in test firing from a naval patrol vessel, was designed and produced by Israel Aircraft Industries. It has elicited interest from prospective buyers abroad.

### IAF Inventory

According to the most recent edition of "The Military Balance," published by the London-based Institute for Strategic Studies, the Israel Air Force inventory includes (beyond their F-4E and Mirage IIIC fighter-bomber/interceptors, and their A-4 Skyhawk attack aircraft) an array of French-built Vautour light bombers, Mystère IV-A fighter-bombers, Ouragan fighter-bombers, Super Mystère fighter-bombers, and Fouga Magister jet trainers also used in ground-attack and close-support roles.

The IAF is also reported to have French-built Noratlas transport craft, C-97 Stratocruisers that can be used for midair refueling, and C-47s.

Israel's helicopter force is said to include Sikorsky CH-53s and UH-34s, plus Bell AB-205s and French-built Alouettes and Super Frelons. They also operate Hawk surface-to-air missiles.

Israel some time ago ordered and paid for fifty Mirage Vs, but the French government has blocked delivery.

to book a reservation these days. The Israelis see aerospace technology as an ideal enterprise for a small country which, while it is pressed by huge defense costs, is also blessed with a highly skilled labor force made up of native-born Israelis and new and old immigrants who have brought solid technical experience to the country.

Knowing that they live in a threatened environment, they have decided to make their indispensable defense investment serve as the forced draft for their internal development. As is the case with the Israel Air Force, their aerospace industry style is eclectic. They acknowledge technical and management debts to the Americans, the French, the British, and others, but they emphasize that out of it all has emerged something quite uniquely Israeli.

Virtually a quarter of the population is involved in defense in one way or another. In the words of Yeshayahu Lavi, the Director General of the Defense Ministry, "for us to maintain this level for a long time is not good for our national identity." Yet, he adds, there are few

arguments about the necessity for defense and few polemics about the existence of an Israeli "military-industrial complex."

### World Markets

With the existence of a vigorous home-grown aerospace industry that, under the leadership of the eighteen-year-old Israel Aircraft Industries, Ltd., is entering world markets with its Arava turboprop STOL transport and its Commodore Jet executive aircraft—a descendant of the old Jet Commander, bought outright from Rockwell-Standard in 1967 and redesigned for manufacture in Israel—there seems little doubt that they mean what they say about technological self-sufficiency.

Along with commercial airplane building and a thriving aircraft maintenance and modification business that serves a number of prestige international carriers as well as the IAF, the Israelis are also building a sophisticated electronics industry that is already developing and manufacturing complex military systems as well as civilian goods.

The Defense Ministry's Mr. Lavi, along with many other Israeli officials, views the thrust toward self-sufficiency as vital to cutting the outward drain on the country's finances. "The size of [Israel's] defense needs are about the same as any major power," he notes, "[but] the difference is in the density of our forces."

Although analogies always have limited utility, there is a kind of rough parallel between the Israeli approach and that of Sweden, which has managed to put together a high-quality, indigenous aerospace industry geared to her own military needs. There are, of course, obvious differences between Sweden's and Israel's military situation. Sweden is not surrounded by adversaries.

But if Israel can manage the cost—building high-performance military aircraft is a costly business—she will probably do so, in order to make sure she is not totally dependent on outside supply. If she does, the Israel Air Force will fly them, Israeli style—to win. ■

*Beyond their sizable forces and improving weaponry, the political influence of Communist China's military establishment is of major and growing importance. The Communist dogma that "the gun must never be allowed to command the Party" has been severely strained since 1967. Even in a period of ping-pong diplomacy, this fact must be taken into account by the US . . .*

# China's Military: A Growing Political Force

By Ralph L. Powell and Helena F. Powell

**D**URING the past four years, in the midst of more spectacular changes, a quiet revolution has been going on in Communist China. This revolution has been little emphasized outside the small circle of professional China-watchers, but in the long term, it may be as significant as Peking's achievements in nuclear technology.

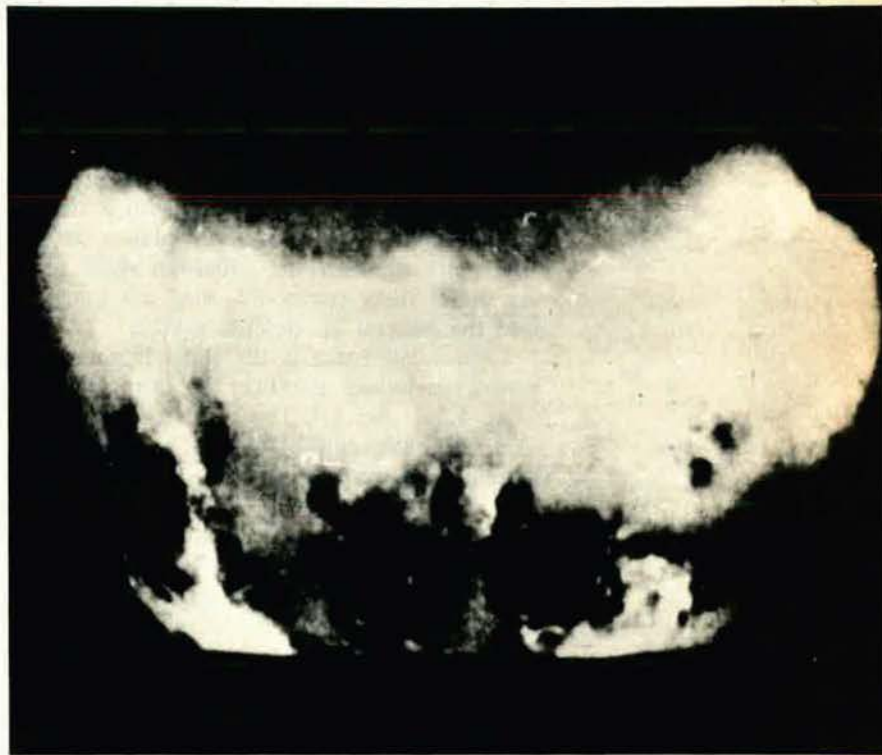
The revolution involves the military's role in China's internal affairs and the vastly increased influence that Chinese military men now exercise in both the Communist Party and in the machinery of government. Communist dogma has long decreed that "the Party commands the gun, and the gun must never be allowed to command the Party." That dogma has been severely strained since 1967. We may be witnessing a development unparalleled in the history of any major Communist Party—a development that could lead to domination of the Party and state by the military. Whether that would lead to greater or less bellicosity in words and deeds is an unresolved question that deserves intense study. It is clear that there are two kinds of military power in Communist China today: the combat potential of its armed forces, and the political potential of its military leaders. An assessment of China's future conduct in the world community must take into account both kinds of military power.

## The Armed Forces

China is a vast but still only semi-industrialized state whose industrial production is comparable to that of Italy. Yet China's authoritarian regime has demonstrated an ability to concentrate limited resources on high-prior-

ity military projects, especially on nuclear weapons for the armed forces.

China's massive, unified armed services are known as the "People's Liberation Army" (PLA). It consists of an army, a navy, and an air force, as well as specialized units. In-



—Wide World Photos

*This photo, released by New China News Agency, shows the awesome mushroom cloud of China's first H-bomb test, on June 17, 1967.*



*China is said to be building Soviet-type TU-16 medium jet bombers as delivery systems for nuclear weapons.*

cluding the divisions of the Public Security Forces, the armed services total well over 3,000,000 men. The army, with some 2,600,000 men, is the largest ground force in the world. Chinese troops are tough, well trained, and highly indoctrinated. During the decade 1950-60, the army was modernized and reequipped with extensive Soviet assistance. The ground forces have an expanding range of effective infantry weapons, artillery, and medium tanks manufactured in China. But some heavy equipment supplied by the Soviet Union prior to 1960 is still in use, while radar, electronic, and communications gear is somewhat less sophisticated than Western models.

The navy, primarily a coastal defense force, is the weakest of the three services. Its largest vessels are destroyers, but its fleet of more than forty submarines includes one Soviet G-class sub with outboard ballistic missile tubes. There are no reports of the Chinese yet having missiles for these submarines. The navy also includes a small marine corps and a fleet air arm of some 500 shore-based planes, most of which are obsolescent. Although these planes are under navy command, they are integrated into the general air defense system.

China's air force is the third largest in the world. Including the fleet air arm there are some 4,000 aircraft. The majority are obsolescent MIG-15s and MIG-17s, but there is an increasing number of MIG-19s and some MIG-21s. MIG-19s are being built in China, but it is debatable whether or not the Chinese are building MIG-21s. Since Peking has apparently opted for missile-delivery systems and has given a high priority to missile testing, it came as a surprise that the Chinese are now building Soviet-type TU-16 medium jet bombers, which Secretary of Defense Melvin R. Laird believes will be the "principal nuclear delivery system for the near future."

China's air defense system originally extended along the east coast as a defense against a possible Nationalist Chinese and/or US at-

tack, but with the increasing Soviet military threat the system has been greatly extended. It now includes numerous air bases, anti-aircraft artillery sites, a radar net, and some SA-2 surface-to-air missiles. This defense system has succeeded in tracking and shooting down several U-2s and other intruding modern aircraft.

All of the Chinese armed forces were damaged by the withdrawal of Soviet military aid in 1960, but the air force, the most technical of the services, was hurt most. The Sino-Soviet dispute, plus the collapse of the economic "Great Leap Forward," resulted in an actual decline in the Chinese Communist Air Force during the first half of the 1960s. China herself was then incapable of building high-performance aircraft, there was a shortage of petroleum products, and pilots received inadequate flight training.

During the power and policy conflict known as the Cultural Revolution (1966-69), the air force, like the other services, was overextended by new, nonmilitary roles and missions. It is only since the end of the Cultural Revolution that the air force, like the other armed services, has regained some of its combat effectiveness and renewed its modernization program.

Despite the massive Soviet buildup on China's northern frontier, all of the Chinese armed forces are still extensively engaged in political and economic functions arising from the Cultural Revolution. These activities still cut into operational training and must have some detrimental effect on combat readiness. But the situation cannot be fully remedied as long as the military leaders are politically ambitious and the armed forces are still needed to restore order and production.

### **Nuclear Weapons and Missile Programs**

The greatest strength and the greatest threat of Communist China lies in its top-priority development of nuclear weapons. Between October 1964 and October 1970, Peking carried out eleven nuclear tests, including four hydrogen-bomb tests. One warhead was delivered by a medium-range missile, and there has been one sophisticated underground test. China advanced from a first, crude, atomic-bomb explosion to a hydrogen-bomb test more rapidly than did either the US or the USSR. In April 1970, and again in March of this year, the Chinese gained added technical prestige and advanced another step toward an intercontinental ballistic missile (ICBM) by putting satellites into orbit.

China's nuclear objectives include as a primary aim the development of a deterrent against a possible nuclear attack by either of the superpowers, the United States or the Soviet Union. Peking also seeks technological prestige and great-power status. While adopting a low-risk strategy, Peking probably will exploit its nuclear capability to achieve politi-

cal and economic goals, including a dominant role in Asia. Communist China has claimed that its growing nuclear capability provides "great encouragement" to all revolutionaries, though it has never been explained how Chinese weapons would "greatly heighten the morale" of revolutionary peoples.

The Chinese have impressive nuclear and missile facilities. Secretary of Defense Laird has reported that a large ballistic missile production facility was begun by 1963. There is a big missile range in the northwest, and the major warhead testing center is in the far west. China's nuclear and missile specialists are limited in number, but some of them are outstanding. A number of the best were trained in the US or Western Europe. Others were educated in the Soviet Union and in China.

Communist China has extensively tested medium-range ballistic missiles (MRBMs) capable of striking targets in much of the USSR. Peking may already be deploying such missiles and could have eighty to 100 of them operational by the mid-1970s. Longer-range IRBMs are now being tested, and the US Defense Department estimates that Peking might achieve an initial ICBM capability against the US by 1973. The Chinese could have ten to twenty-five operational ICBMs by the mid-1970s, but more likely by 1977.

In the foreseeable future, Communist China cannot match the thermonuclear might of the US or the USSR, but even a limited nuclear capability could have both offensive and defensive advantages for Peking. It might permit Communist China's leaders to employ blackmail against their neighbors or in other areas not vital to the superpowers.

Since World War II, the United States has spread a credible nuclear umbrella over its allies and over areas vital to its security. For twenty-five years, no nuclear weapons have been used, and nuclear blackmail has not been effective against this country or its allies. If our deterrent ceases to be credible, both China and



*To assure success for his Cultural Revolution, Chairman Mao Tse-tung ordered the PLA to intervene massively. This added to the political influence of the Chinese military and has led to power struggles.*

—Wide World Photos

the USSR may feel more free to act in their own interests, and industrialized states such as Japan may consider it necessary to develop their own nuclear weapons.

A basic question for the next decade is whether or not the American people will preserve the determination to continue to maintain a credible nuclear deterrent that will protect not only the US, but also our allies and areas vital to our national interests.

### Political Power of the Military

In Communist China, another form of military power, the vastly increased political influence of the military establishment, is of major and growing importance. How the Chinese military accumulated its new political influence is one of the most fascinating chapters in the history of communism. The political elevation of military leaders was not part of a master plan, but rather an historical accident.

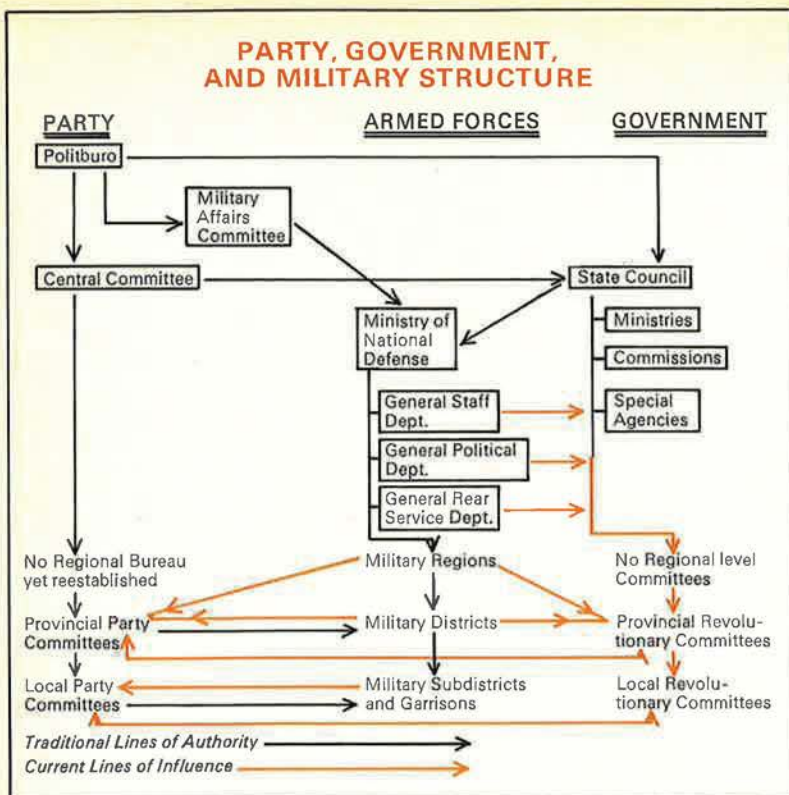
The Chinese Communists came to power through more than twenty years of almost constant revolutionary warfare. Most of the now-elderly leaders served as commanders or commissars in the Red Army, and the military has always played a more important role than has been true in the USSR or Eastern Europe. Nevertheless, until the mid-1960s it appeared that the PLA had been fairly effectively controlled by the Party. Officers were Party members—Party soldiers—who were meant to be loyal and obedient to the Party.

However, during the Cultural Revolution, Mao Tse-tung and his heir, Marshal Lin Biao, launched the non-Party Red Guards and Revolutionary Rebels against their opponents in the Party apparatus. These attacks shattered the Party machine and with it the related governmental and police structures. China was approaching internal chaos. Despite factionalism and considerable opposition within the armed



—Wide World Photos

*A meeting of Chinese and Soviet border guards. Despite Soviet buildups on the frontier, the authors believe China's military is still involved with internal politics to a degree that must reduce readiness.*



Power structure is illustrated in the old lines of authority and current lines of influence in China.

services to the radical Cultural Revolution, the only organization that still possessed sufficient power and discipline to prevent chaos was the armed forces. In January 1967 Mao ordered the PLA to intervene massively in the Cultural Revolution, in order to advance his political goals and to preserve essential order. The situation provided both the necessity and the opportunity for greatly expanded military influence; the generals became far more influential than Mao had intended. This has led to struggles for power and a balance of power game in China.

### The New Organs of Power

The new responsibilities of the PLA were sloganized as the "three supports and two military" tasks. These included support for the Maoist revolutionaries, for agriculture, and for industry, plus military control—or martial law—and military and political training. Under this expanded mission, the most important recent activities of the military have been in the political field.

By early 1967 many of the provinces were disrupted by violence and the collapse of local government. In most of these troubled areas the PLA regional and provincial commanders established military control committees, a form of usually temporary martial law. Then the Mao-Lin regime began the process of reorganizing the government structure by creating unique tripartite units known as revolutionary

committees. These "new organs of power" were to consist of Maoist revolutionaries, "revolutionary cadres" (bureaucrats), and military personnel. The fact that the armed forces already had military control committees in most of the provinces gave them a great political advantage. When all of the twenty-nine provincial-level committees were finally established in September 1968, nineteen of the chairmen were general officers, as were twenty of the first vice chairmen. Since then there have been a number of changes or purges, but the trend has continued to be in favor of military men, and especially of Marshal Lin Piao's old lieutenants.

Revolutionary committees also have been set up at subprovincial levels, in factories, mines, and agrarian communes. Extensive evidence indicates that, except at the grass roots, the regular military tends to dominate most of the committees at all levels. At the lowest levels, the militia plays an active role in the governing committees.

### The Military Party

It is not only in the new government structure that military officers have greatly increased their influence. Even more significantly, their influence has increased in the Party. Mao Tse-tung never had a serious intention of abolishing the Communist Party. What he sought during the Cultural Revolution was to purge it of his enemies and revitalize it. No sooner had the Party machine been shattered than the Maoists began to reorganize it. This has been a slow and painful process, with young revolutionaries, Party bureaucrats, and military officers contending for power in the new Party. In this struggle, the military—those who control the guns—have had great advantages. Party reorganization has been carried out primarily under the supervision of the revolutionary committees, which are largely controlled by the military and by the essentially intact Party structure within the PLA—the Commissariat.

The military demonstrated its greatly expanded political power when the Ninth Party Congress finally met, eight years late, in April 1969. The new Party Constitution "officially" named Mao's protégé, Marshal Lin Piao, to be Mao's successor. When the newly "elected" Central Committee was announced, Party soldiers accounted for almost forty-five percent of the total. Karl Marx would have called this situation Bonapartism, yet the new ruling Politburo was even more heavily weighted in favor of military men. Of the twenty-one regular members, four were marshals and seven were generals. Another was Marshal Lin's wife. One of four alternate members was also a general.

This situation represents a growth of militarism and of decentralization of power, but also an attempted balance of power. Some seventy Central Committee members held both



military and revolutionary committee posts in the provinces. All but one of the known regional commanders and commissars, and almost half of the provincial commanders and commissars were on the Central Committee; so were all of the chairmen of provincial revolutionary committees, most of whom are military men. Yet in general a balance of power was preserved. The powerful Politburo was heavily inclined in favor of central Party and government officials. The PLA headquarters and staff departments in Peking were all represented. Also, military men were partially counterbalanced by civil officials and "revolutionaries," but more by factionalism within the officers' corps itself. About half of the officers on the Politburo and the regular Central Committee are considered to be followers of Marshal Lin; the others belong to other factions. During the last two years, personnel changes and purges generally have favored Lin's men. The balance is shifting in favor of the Mao-Lin regime, but a balance still exists.

Since the disappearance of the regional bureaus of the Party in 1967, the only regional governmental bodies in China have been the increasingly influential regional headquarters of the PLA. The Party's regional bureaus still have not been reestablished, and even provincial Party committees have been reorganized very slowly. In those that have been reestablished, the percentage of senior PLA officers among the leadership is even higher than on the Central Committee. Furthermore, this trend means that a number of influential regional leaders now have concentrated in their hands command or political leadership of a military region or district, chairmanship of a provincial revolutionary committee, leadership of a provincial Party committee, and membership on the Politburo or Central Committee of the Party. Such powerful men in the provinces decrease the real authority of the central regime, even if the majority of these men are old allies of the Mao-Lin regime.

### **Soldiers in the Government**

During the Cultural Revolution, the military also deeply penetrated into the battered and thoroughly purged central government. Military control committees, or at least military representatives, were established in some and possibly all ministries of the State Council. Some of the newly appointed ministers are PLA officers. Furthermore, PLA teams, or the military leaders of revolutionary committees, still supervise numerous factories, mines, and even some agrarian communes. The military apparently still control the strategic railroads and the civil airline, and they are still partially involved in the Public Security Bureaus. These economic and police functions buttress the greatly expanded political power of the military.

If the aged Mao Tse-tung dies without reestablishing an effective civil Party and government—and it is doubtful that he can do that—then almost certainly we will be confronted by a new phenomenon, a Communist military dictatorship. The Party may again become the leading political institution in a more decentralized state, but the generals will probably control the Party. Mao's official heir is the senior Party-soldier, Lin Piao, and military men, especially those in the provinces, have their hands on many political and economic levers of power. Even if the not very robust Marshal Lin loses control because of ill health or in a power struggle, other military men are already in a position to dominate the Party and the government.

Such a regime would probably be more decentralized, and more militaristic than in the past, though not inevitably more warlike. Military officers, by their training, experience, and interests, could be expected to continue to place the highest priority on a nuclear weapons capability and to invest more capital in armed forces and munitions industries than would a civil government.

The Chinese Communists, whether civilians or military, are both Chinese and Communists. Their foreign policy objectives have been conditioned by their imperial Chinese heritage, modern nationalism, long revolutionary military experience, and by their ideology—the Maoist version of communism. Their basic objectives are, first, to be a great power and to be recognized as a great power; second, to gain the leadership of the fractured world Communist movement; third, to play a leading role among the underdeveloped nations; fourth, to "liberate" Taiwan; fifth, to force the United States out of Asia, and probably to dominate Asia, as the Chinese Empire did in earlier periods of great strength.

It seems likely that a military-dominated regime would pursue essentially the same objectives. It probably would continue to talk aggressively, but to act with caution—at least so long as the American "paper tiger" maintains its thermonuclear teeth in good repair. Table-tennis games indicate that Peking has changed its tactics, but this should not be accepted as a signal that Communist China has abandoned its long-range strategic goals. ■

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The pace of Vietnamization and of US withdrawal from SEA rests heavily on reducing the flow of enemy supplies along the Ho Chi Minh Trail. Truck convoys—moving at night, in bad weather, and beneath a jungle canopy—must be located before they can be hit. That was an almost impossible task before development of the system of air-delivered electronic ground sensors known as . . .

# IGLOO WHITE

By John L. Frisbee

SENIOR EDITOR, AIR FORCE MAGAZINE

**B**RIG. GEN. William J. Evans is a remarkably youthful-looking man. Or at least his youthful appearance is remarkable until you learn that most of his career has been in fighters. Any fighter jockey will tell you that there are no old fighter pilots.

General Evans has spent a considerable amount of time studying tactical targets in the most concentrated of modes—namely, through

a gunsight during more than 400 combat missions in Korea and Southeast Asia. He knows firsthand how hard it is to locate these fleeting targets—especially interdiction targets—at any time, but particularly at night, in bad weather, and in jungle country.

There is no doubt this experience bears heavily on his judgment that Igloo White ranks high among the technical developments to come out of the Vietnam War. Igloo White is the sophisticated, and until recently highly classified, system of electronic gear that has so effectively disturbed the privacy of North Vietnamese and Viet Cong operatives who travel the Ho Chi Minh Trail—now very frequently on one-way tickets.

Igloo White went operational in December 1967. Since that time, hardware and operational techniques have improved considerably. The latest box score, comparing truck kills during the dry seasons of November 1969–April 1970 and November 1970–April 1971, shows that the number of enemy trucks destroyed on the Trail almost tripled—from 5,950 to 14,000. In recent weeks, gunships have scored seventy-five to eighty percent of



*Brig. Gen. William J. Evans, one of the key figures in developing Igloo White, is now Director of Operational Requirements and Development Planning at Hq. USAF. A veteran of more than 400 fighter combat missions, General Evans has been selected for promotion to the rank of major general.*



*The AC-130 gunship, now the leading truck killer, has on-board equipment for locating trucks but also relies on Igloo White to help it find more targets and to attack them more quickly.*

these truck kills. The AC-130 with its computer-directed guns is the most deadly member of the gunship team, which also includes the AC-119.

But before a truck can be destroyed, it first must be detected, tracked, and located so accurately that it may be attacked at night or in weather. The job could be done only imperfectly—and often not at all—before Igloo White was developed under management of the Defense Communications Planning Group (DCPG), from an idea generated by scientists working for the Institute of Defense Analysis (IDA).

From June 1968 to February 1970, General Evans was a member of the DCPG, serving during the last seven months as Deputy to the Group's Director, then Air Force Lt. Gen. John D. Lavelle. General Evans then moved to the Air Staff as Special Assistant to the Chief of Staff for Sensor Exploitation, a position he held until April of this year, when he became Director of Operational Requirements and Development Plans in the Office of the Air Force Deputy Chief of Staff, Research and Development. He has been selected for promotion to major general.

In an AIR FORCE Magazine interview, General Evans explained why he rates Igloo White so high among the technical innovations associated with Vietnam. "A great many technical achievements represent extrapolations of already well established technology. Igloo White broke new ground technically, and its potential still is relatively untapped," he said.

Igloo White's immediate importance stems from its contribution to reaching interdiction objectives in Southeast Asia. This, in turn, affects

the progress of Vietnamization, the reduction of US casualties, and the pace of US withdrawal from Southeast Asia. All three of these can be accelerated satisfactorily only if the flow of supplies from North Vietnam to enemy forces in the South is held at a low level. Since the cessation of bombing in the North, US interdiction efforts have focused on trucks on the Ho Chi Minh Trail in Laos, the principal remaining supply route from the North. To paraphrase a current TV and radio commercial, if the enemy has it, it came by truck.

Igloo White's long-range importance lies in the greatly improved all-weather dimension it can add to Air Force interdiction operations—an area where airpower has been most criticized by its detractors—and the greater discrimination it may provide in other applications of tactical airpower. Based on SEA ex-

perience, its potential in this latter area also appears high.

As General Evans explains it, the totally air-supported Igloo White system is simple in concept. It consists of three principal elements: various kinds of sensors that are sowed by aircraft along the routes to be interdicted; an orbiting aircraft that receives radio signals from the sensors when they detect enemy vehicles or troops, and relays the sensor signals to the third element—an Infiltration Surveillance Center (ISC). The ISC is the nerve center of the system. Its computer processes and displays the sensor data, so assessment officers can develop target information from the sensor signals and other intelligence information and transmit it to the ground-based or airborne facilities that control strike aircraft. If the target is time-urgent, a strike can be called in immediately, with the



*The Infiltration Surveillance Center (ISC) is the nerve center of Igloo White. Its computer-assisted intelligence and operations staffs analyze data from air-delivered sensors and flash target information to airborne combat crews.*

## SPIKEBUOY

DIAMETER 5"  
LENGTH 66"  
WEIGHT 40 lbs



## ACOUBUOY

DIAMETER 4.75"  
LENGTH 36"  
WEIGHT 26 lbs



Two kinds of acoustic sensors shown here are air delivered by F-4 fighters along interdiction routes. SPIKEBUOY buries itself in the ground with only its antenna showing. ACOUBUOY parachutes into jungle foliage (right) where its camouflage makes it almost invisible. When activated, they transmit signals to ISC.

target position continuously updated by the sensors. Or the information compiled in the ISC may be used to generate targets such as truck parks for later, preplanned strikes.

caused by a heavy truck, for example. The sensor then transmits its information to the relay aircraft and hence to the ISC. ADSID is the preferred sensor since less power is re-

quired to transmit its signal than is needed for transmission of the sounds—voices, horns, engine noise, and so on—that are picked up by ACOUBUOY. Clearly, the less power

### The Sensors

Three kinds of sensors are now used in the Igloo White system. The first is an acoustic sensor derived from the Sonobuoy developed by the Navy to detect submarines. The hydrophone used in the Sonobuoy has been replaced with a microphone powered by long-life batteries. There are two types of acoustic sensors. One (SPIKEBUOY) free-falls from the delivery aircraft and buries itself in the ground with only its camouflaged antenna showing. A tree-hanging version, ACOUBUOY, is parachuted into the jungle foliage where it is extremely difficult to see. Among the principal uses of these sensors are confirming the location of suspected truck parks and monitoring activity in those parks.

The most widely used sensor is ADSID (Air Delivered Seismic Detection Sensor). It can be dropped from either low-performance or high-speed aircraft, penetrating foliage and burying itself in the ground with only its antenna protruding. The sensor is set to activate the transmitter when a specific signal is detected—the ground vibrations



ADSID, most widely used of the air-delivered sensors, detects ground vibrations caused by enemy troops or vehicles. Like SPIKEBUOY, it buries in the ground with only its camouflaged antenna showing (right). Sensor sensitivity can be set to activate the transmitter when triggered by a specific kind of vibration. Sensitivity can be adjusted remotely by radio commands.

needed, the longer the battery (and sensor) life, which means that fewer replacement sensors are required.

The third sensor, ACOUSID, transmits both sound and vibration signals. Its primary mode is seismic (vibration), but a small microphone at the antenna's base can be turned on remotely to confirm a detection. All three kinds of sensors can be controlled remotely by radio signals.

Detection range of the sensors has not been released, but their range is compatible with the delivery accuracy of the aircraft—mainly F-4s—that drop them. Drop-survivability is high. A few ADSIDs and ACOUSIDs will fail to implant properly after passing through the jungle canopy, but a high proportion of the sensors can be depended on to detect the indicators of enemy presence for which they were designed or programmed.

### Relay Aircraft

The original relay platform, still in use, is a specially equipped Lockheed EC-121R. A relay is required in Southeast Asia—and probably would be in other areas where Igloo White technology might be used—since the system can cover large areas and sensor transmission is line of sight, like TV signals.

The EC-121 has advantages and disadvantages. On the plus side, its relatively large capacity will accommodate equipment that enables the crew to immediately develop strike information and pass it directly to airborne strike aircraft, bypassing the ISC when necessary. On the minus side, it is expensive to operate and, because of its vulnerability in a high threat area, exposes a large crew and expensive equipment to antiaircraft fire.

A second relay platform that eventually may replace the EC-121 is a modification of the single-engine commercial Beech Debonaire. This aircraft, known as Pave Eagle, can operate either manned or as a drone, but is strictly a relay platform with no target-assessment capability.

### Igloo White at Work

From the outset, operational control of Igloo White has been the responsibility of the US Commander in Vietnam and his component com-

*The EC-211R has been the principal relay platform used in the Igloo White System. It is being replaced by a less expensive aircraft, better adapted to operations in a high threat environment.*



manders, principally the Commander of Seventh Air Force. Initially, the system was supported by the Defense Communications Planning Group; on January 1, 1971, that responsibility was turned over to the Air Force.

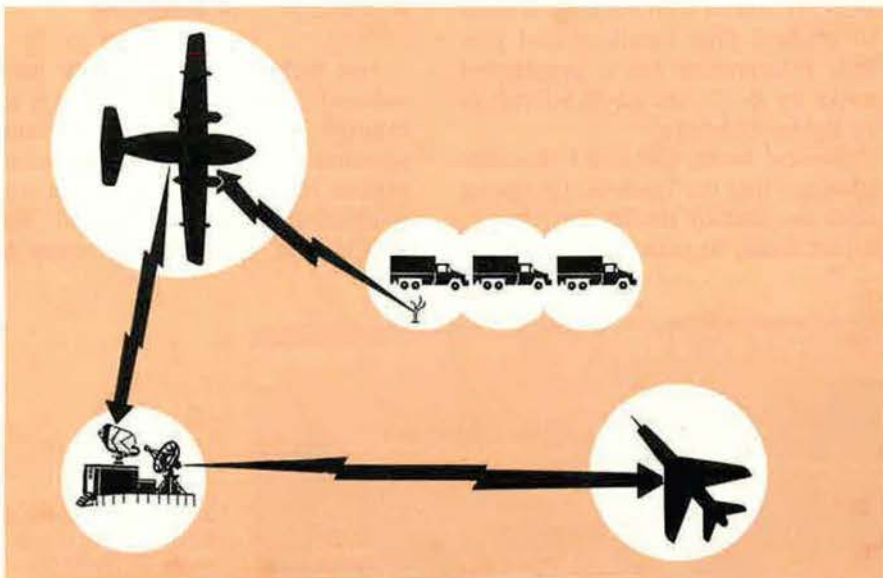
How does the system actually operate? General Evans traced a typical operational pattern.

Operational planning begins at the Infiltration Surveillance Center, a complex, jungle-concealed installation, which this reporter visited in 1968 while on active duty. Planners at the ISC determine, from photographs and other intelligence information, the best areas for implanting sensors. The size of that task has expanded exponentially. In late 1967 there were only a few kilometers of useful road in Laos. During the past three years, the enemy has expanded his logistics roadnet

to cover the entire eastern half of southern Laos.

Whenever possible, the air-delivered sensors are sowed in strings along straight sections of road, avoiding rocky or swampy areas. As enemy traffic moves along a seeded infiltration route, the sensors begin their detection work, sending signals via the relay aircraft to the ISC. There, real-time information from the sensors is coordinated with other intelligence data. The signals have to be analyzed by computer. The flow of signals from the extremely complex sensor fields is beyond the capacity of manual analysis.

The type of traffic and its speed can be computed accurately as enemy trucks pass successive sensors whose locations are precisely known. The time when the convoy will arrive at Point X and the exact location of that point are passed to F-4



*Diagram shows how elements of Igloo White are tied together and teamed with tac fighters and gunships to destroy trucks on the Ho Chi Minh Trail. Electronic sensors detect the presence of enemy forces and transmit target data through a relay aircraft to the Infiltration Surveillance Center (ISC). Sensor data are analyzed there and correlated with other information to pinpoint enemy trucks. Target information may be passed directly to strike aircraft or through air- or ground-based command centers.*

fighters, either directly or through a ground-based or airborne command center. F-4 pilots enter this data into their aircraft computers, which determine the right course to steer and automatically release area-type ordnance—perhaps wide-area fragmentation bombs—to arrive at Point X simultaneously with the trucks. A short string of sensors located just before the trucks reach this point provides a last-minute confirmation of the convoy's arrival. Accuracy of the F-4's navigation-bombing system in this kind of nonvisual attack has produced excellent results, according to General Evans.

Under visual conditions, target information may be passed from the ISC to a forward air controller (FAC), who directs the fighters in their attack on the convoy. The AC-130 gunships, which have equipment for locating targets, also use this information to find their targets more quickly. About ninety-eight percent of enemy truck traffic moves at night to avoid the constant daytime patrolling of the roadnet by FACs and strike aircraft, but now the enemy is losing his nighttime security blanket. (See Lt. Col. Mark Berent's, "A Group Called Wolf," in the February 1971 issue.)

If a convoy passes one of a string of sensors but fails to show up at the next one, it's a sure sign that somewhere between the sensors is a truck park off the road. Likely park areas then are sowed with acoustic sensors to confirm their locations and provide information for a preplanned strike by B-52 Arc Light aircraft or by fighter-bombers.

Several times, General Evans emphasized that the Igloo White system does not destroy trucks. Its job is to locate them, to compute target data

*Enemy trucks now move mostly at night. Air Force gunships, like this AC-119, account for about eighty percent of the trucks that are destroyed. Igloo White has made possible a revolution in Air Force interdiction.*



in near real time, and to pass this information to strike aircraft. The system is part of a team. Other team members are the Air Force FACs, gunships, F-4s, B-52s, and B-57s, and an impressive array of ordnance developed for the Vietnam War. The weapons used in this interdiction operation include area weapons, area-denial devices such as air-delivered antivehicle and antipersonnel mines, and extremely accurate bombs directed by laser and electro-optical methods. Together, this team has drastically reduced the number of enemy trucks that reach their destinations, and significantly slowed their movement, despite the enemy's fantastic expansion of the roadnet that makes up the Ho Chi Minh Trail. This has been done with no significant increase in the total number of tactical sorties.

#### A Management Milestone

Not only has Igloo White been successful operationally. It also is an example of successful program management by the Defense Communications Planning Group, which was established in September 1966. The DCPG was given direct access to

the Secretary of Defense; centralized authority for implementing the system; authority to direct the military departments to carry out R&D and other support activities; the highest defense industrial priority; and direct contact with commanders in Southeast Asia. Fifteen months later, in December 1967, Igloo White was put into operation. In General Evans's opinion, the breadth and depth of the US industrial base made this remarkable achievement possible.

Igloo White is one program where annual expenditures have consistently been below budget estimates. Each year, funds have been returned to the services to be used for other priority programs. Although General Evans would not call this unusual performance a cost "underrun," it certainly is a remarkable record for a program that involves new and untested technology.

To date, the total cost of the system has been about \$725 million. That figure includes more than the three main elements of Igloo White—sensors, relay platforms, and the Infiltration Surveillance Center. Also included are delivery aircraft modifications, munitions, operations and



*Two additions to Igloo White are DART (left), a Deployable Automatic Relay Terminal that backs up the ISC, and Pave Eagle (right), a relay platform that supplements the EC-121 and may replace it. Pave Eagle can also be operated as a drone.*



maintenance funds, and personnel costs.

As experience has piled up, the unit cost of specialized equipment has come down. For example, the first ADSIDs cost \$2,145 each in 1967. The cost now is down to \$975 each for a better, longer-life sensor. ADSID's cost per day of usable life has been trimmed from \$100 to about \$15.

### Future Development

General Evans believes that growth potential of the Igloo White system is almost unlimited. He mentioned some areas in which sensor research and development is continuing: longer-life batteries and power sources adapted to operation in cold climates; sensor casing designs that will blend into environments with different topography and vegetation; new types of detectors with better target discrimination; better frequency bands for worldwide use; and transmitters that are less vulnerable to jamming. Tests now are under way to determine the effectiveness of seismic sensors dropped on frozen terrain.

The accuracy of sensor delivery can be improved by different sensor configuration and by even more precise navigation systems for delivery aircraft. By implanting sensors closer to enemy trails and highways, less detection range is needed, which means lower battery power, a smaller, lighter, and probably cheaper, sensor.

In a combat environment that's

not as permissive as that of Southeast Asia, less vulnerable relay platforms would be needed—perhaps a platform entirely different from either manned or drone aircraft.

The entire system must be made compatible with the sensors and other equipment used by the Army in its Integrated Battlefield Control System. As General Evans pointed out, Army battlefield sensors could become interdiction sensors as the tide of battle ebbs and flows. The Air Force must then be able to make use of the information if the air-ground team is to operate in concert.

Finally, the huge permanent-type facility that houses Igloo White's Infiltration Surveillance Center is not compatible with tactical air mobility. A Deployable Automatic Relay Terminal (DART) has been developed as a backup to the ISC. It is air transportable, but has no computer capability, depending rather on real-time operator assessment of sensor signals.

A much more sophisticated Sensor Reporting Post, air transportable and computer equipped, is now at Eglin AFB, Fla., for integration with the Tactical Air Control System. Except for a smaller data-storage capability, it closely duplicates the functional capabilities of the ISC.

### The Most Difficult Task

Interdiction in Southeast Asia has been the most difficult task the Air Force has ever faced. From the start of US participation in Vietnam, the principal sources of enemy supplies

have been outside North Vietnam—in China and the USSR. Entry points for military materiel, mainly the port of Haiphong, have been off limits to attack. Since the cessation of bombing in the North during 1968, the vulnerable segment of the enemy's line of communications has been shortened to that part of the Ho Chi Minh Trail running through Laos. Road or bridge cuts could be easily bypassed as the Trail grew into a network of interconnected roads, covered for the most part by layers of **jungle canopy**. And in the kind of short-duration, small-unit engagement that has been most typical of the war, the enemy could sustain limited operations on a logistics shoestring.

Igloo White has brought an impossible task into the realm of the possible. The success of the Vietnamization program, and all that goes with it, rests heavily on checking the flow of men and materiel into the south. For that reason alone, Igloo White may be considered among the most important development programs of the war.

And, as General Evans observed, the potential of this new and growing system still is relatively untapped. The equipment and techniques developed for, and in support of, Igloo White already have reduced significantly a long-recognized deficiency of tactical airpower—its lack of a high-confidence, all-weather interdiction capability. That's a long stride forward in our search for a more effective deterrent to conventional war. ■

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## HAVEN'T YOU HEARD OF WOMEN'S LIB?

The famous—we thought—Gen. Rosie O'Donnell keeps busy these days running the USO. Not long ago, he graciously granted me an interview to discuss his relationship with General "Hap" Arnold.

The day before General O'Donnell was due to arrive at the Pentagon for our interview, I arranged—or thought I had arranged—for him to park at the River Entrance to the Pentagon. An hour before our noon appointment, I found that the space had not been cleared.

With some high-level assistance, the Pentagon Parking Control Office rapidly defrosted and cleared the space just minutes before the General drove up to the River Entrance. We had our lunch and the interview, and both went well.

The next morning, a secretary in the necessarily rank-conscious Parking Control Office called my secretary and asked: "This Gen. Rosie O'Donnell—does she really have four stars?"

—CONTRIBUTED BY DR. MURRAY GREEN, OFFICE OF AIR FORCE HISTORY

(AIR FORCE Magazine will pay \$10 for each anecdote published.)

Contrary to popular assumptions, the Soviets are not favoring unmanned space operations over manned. Indeed, the evidence suggests that their main effort in the 1970s will be to deploy a multimanned space-station system. Their overall space program is purposeful and well funded and they have not failed to notice the reductions in the American effort . . .

# The Soviet Space Effort — An Analysis

By Foy D. Kohler and Dodd L. Harvey

**A**UTHORITATIVE Soviet comment on space since the first US lunar landing has been relatively sparse. Yet what has been said lately tells much more about concrete Soviet purposes, plans, and expectations than the enormous outpourings of earlier years. While we can only conjecture what the Soviets may be doing in space for direct military purposes, their recent declarations reveal in some detail the future directions of their general space effort. Their statements over the past couple of years suggest that:

- The Russians will not join Americans on the moon before the late 1970s, if then. Moscow still intends to put men on the moon, but only after they have developed a new line of capabilities.

- The main effort in the 1970s will be to create a multimanned, orbiting space-station system. Their space-station activity is now well under way.

- They will continue their automated explorations of the moon and will press on with automated planetary and interplanetary probes, with prime emphasis on Venus. But their deep-space operations will be strictly secondary to near-earth efforts, with no spectacular new departures in deep space. There are no indications of plans for a planetary "grand tour" during the favorable 1976-79 period.

These policies are being developed against the background of new emphasis on practical benefits from space. The 1971-75 Five-Year Plan, issued in February 1971, focused main attention on spaceborne communications, meteorology, earth-resources survey, geographical research, and "the solution of other economic tasks." M. V. Keldysh, President of the USSR Academy of Sciences, told the April 1

session of the Twenty-fourth Soviet Party Congress that "we must to a larger extent apply [space activities] to the solution of practical problems." Until recently the Soviets had spoken mostly of furthering "scientific knowledge" as the basic aim of their space program. The new emphasis is tied closely to plans and expectations for the space-station system.

Also, the Soviets appear to be generating renewed and growing confidence that, despite the Apollo successes, they can regain space leadership over the United States. This confidence evidently derives not only from recent Soviet successes but also from the reduced scale of US efforts.

Moscow's answer to US lunar accomplishments is that the USSR is going its own way, in accord with its own concepts, based upon its own experiences as the "pioneering space power." It professes a high degree of assurance that, through a succession of precisely worked-out stages, the USSR will yet achieve long-term dominance in space.

But contrary to assumptions in the West, Moscow's "own way" does *not* favor automated activity over manned. While it is true that, since the US moon landing, Soviet spokesmen have focused heavily on Soviet unmanned space exploits, particularly Luna-16 and Luna-17, and have pictured these feats as more productive and less costly and risky than US manned efforts, they have carefully avoided any suggestion of a lack of interest or purpose in manned capabilities. Rather, their statements talk about a balanced program involving both manned and unmanned activities, with *greater* rather than lesser emphasis on the manned. The difference between the US program and the USSR program, as the Soviets describe it, is



not that one is man-oriented while the other is machine-oriented but that each is proceeding according to its own plan.

### Not Just Propaganda

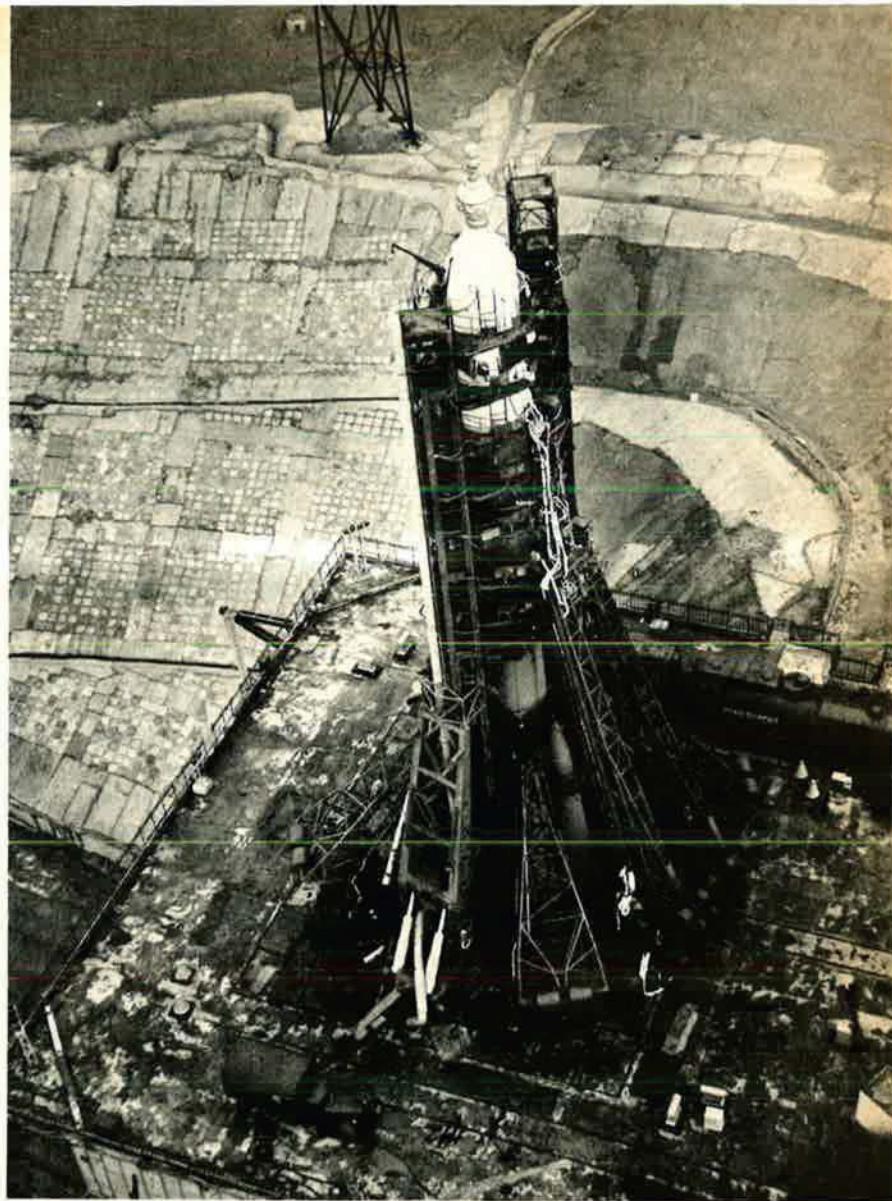
Although the Soviets obviously have tried to explain away their lack of a manned lunar landing, the way they have talked lately suggests that they are not just propagandizing. It is reasonably certain that the Soviets gave up, sometime around 1966, any plans they may have had to compete with the US for the laurels of a first manned moon landing, in favor of primary attention to the near-earth environment. Although they were unquestionably taken aback by the Apollo achievements, the Soviet authorities appear to retain real faith in the soundness of their own course.

A reasoned exposition of how the Soviets are proceeding, and to what ends, was provided in a 1969 year-end roundup of the Soviet situation in space, prepared by Academician Boris Petrov, one of the principal official spokesmen on Soviet space affairs. Writing in *Pravda* on December 30, 1969, Petrov noted that, initially, both the USSR and US "directed their efforts toward resolving the same sorts of tasks." However,

Having accumulated the necessary experience in resolving the phases of cosmonautics and having created powerful equipment, the leading space powers are going their own ways. This process is entirely natural and understandable. The range of space objectives accessible to research has widened appreciably. Both countries are faced with the problems of selecting their primary research aims. We know that scientists usually pose many more problems than it is possible or expedient to research at one time, and space research is not cheap. It is important, therefore, to define the strategic aim as well as the possible, and to choose what is to be concentrated on at a given stage and what must be given preference.

Petrov talked about current Soviet activities in space and future plans in terms that made it clear that manned efforts would continue unabated, but at this stage would be concentrated on circumterrestrial projects—in other words, orbiting-space-station projects. Lunar and circumlunar explorations would be left for the present to "automatic apparatuses." But these apparatuses, Petrov said, are not simply to serve ends in themselves—"they prepare the way for people." The Soviet program, Petrov emphasized, "by no means excludes manned flights to the moon." It is only that "in the present phase, primary significance is attached to investigating the moon with automatic stations."

While highly valuing automatic machines, one



—Novosti Press Agency Photo

This was the scene on the launch pad prior to launch of the Soviet Soyuz-10 manned spacecraft in April 1971.

### SOVIET STATION—ALMOST

In mid-April, the Soviet Union put into orbit an unmanned spacecraft—*Salute*—that many observers viewed as the immediate prelude to a linkup with one or more manned vehicles expected to follow *Salute* into space—to form the world's first working space station. Such a success would have beat the US *Skylab* manned station by two years. *Skylab* is now scheduled for 1973 deployment.

But the Soviet operation did not turn out as anticipated. While a Soviet manned craft—*Soyuz-10*—did go into orbit shortly after *Salute* and did dock successfully with *Salute* for five and a half hours, the crew of *Soyuz-10* unaccountably shortly afterward brought the craft back to earth. The possibility is that the cosmonauts may have had trouble with their operation, and that another try to link up one or more manned craft with an orbiting lab will be made in future months.

must not, however, absolutize their importance and possibilities. Our loyal automatic aids are far from capable of doing everything, and they cannot replace man in everything.

While Petrov sought to demonstrate that the Soviet course is scientifically and technologically sound, his overall pitch was low key when it came to comparisons with the US program.

By the end of 1970, however, the Soviets were striking a quite different note. A year-end review on space, published in *Pravda* on December 29, 1970, and signed by Professor A. Dmitriyev, suggested that the Soviet leadership is swinging full circle, back to the belief that the Soviet approach is not only sound in itself but distinctly superior to that of the US. He also pointedly noted the evident downgrading of space efforts in the United States.

Dmitriyev avoided any suggestion that the Soviets are centering their efforts mainly on automated explorations. While he asserted that automatic vehicles are much cheaper than manned craft, his overall picture was of a comprehensive Soviet effort encompassing across-the-board capabilities—manned as well as unmanned. He saw three main directions in the Soviet Union's conquest of space: The first and chief one is systematic research in near-earth space, using automatic vehicles and manned craft; the second is the moon and circumlunar space as a "testing ground" for Soviet cosmonautics; and the third is research of distant planets, primarily Venus, with the aid of automatic devices.

Recent Soviet accomplishments, Dmitriyev argued, have prepared the way for significant breakthroughs in all of these main directions.

### Space Stations

But the main focus of the Soviet space program remains on the establishment of a multi-manned orbiting-space-station system. As a Soviet radio commentator put it in a broadcast on May 3, 1970: "The total of Soviet space programs is keyed to achieving an orbiting station."

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The Soviets appear confident that the long-term effort toward a space-station system is at the payoff stage. Dmitriyev was categorical on this point: "In the near future, here, in near-earth space, long-term manned orbital stations will be assembled and will operate." Brezhnev has also spoken in terms of imminent success, and nearly all commentaries on space appearing in scientific and technical journals over the past eighteen months, as well as popular treatments, have placed major stress on the imminence of the space station.

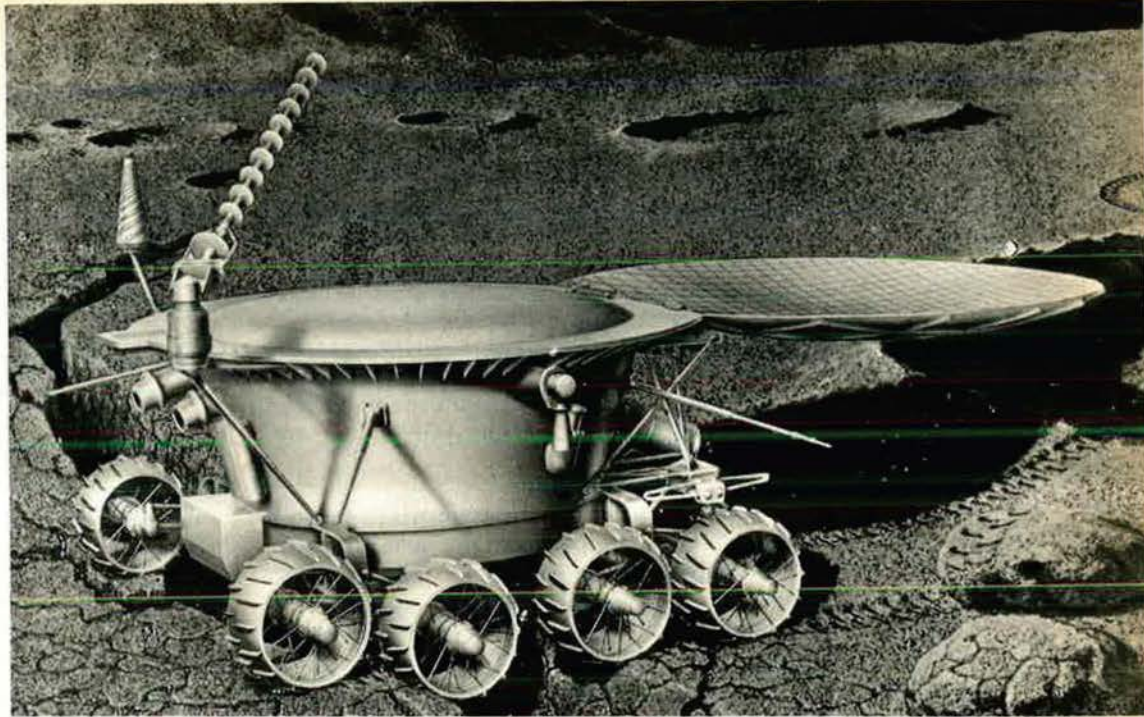
But it is important to note that in speaking of space stations in "near-future" terms, the Soviets are evidently looking, at the moment, toward a first-generation effort that would be primarily experimental and of limited purpose and duration. For the longer term, the Soviets are clearly aiming and working toward a far more elaborate undertaking, something on the order of a multipurpose, long-lasting "base-station," or "cosmodrome in space," as Brezhnev has called it. But they expect to achieve that only after a succession of "stages" extending over the decade of the 1970s.

How these stages are expected to develop, including what is in the more immediate offing, was described by Boris Petrov in an article in the October 1970 issue of *Vestnik Akademii Nauk SSSR*. He predicted:

First of all, small stations for a relatively narrow purpose, with a crew of three to twelve men, with a period of existence of from one month to a year or slightly longer will be put in circumterrestrial orbit. . . . Well elaborated and tested compartments of space vehicles and individual stages of carrier rockets will be used as the main units of those stations. This, of course, does not exclude . . . designs intended especially for orbital stations. Such stations can be put into orbit in an assembled state by means of powerful carrier rockets or in parts, with one or two dockings. The station crew can be delivered by a transport space vehicle, with which the crews also will be exchanged. The station and the vehicle must be equipped with docking units and systems. One of the main tasks of such stations will be medical and biological experiments, on the basis of which the requirements must be worked out for the design and the most important characteristics of long-term orbital stations. . . . [Next] . . . the creation of orbital stations of block design, assembled in a circumterrestrial orbit in parts, with a long life (up to ten years) and a crew of 12-20. And, finally, [we] can speak of the advisability of . . . plans of very large multipurpose orbital base stations designed for a crew of 50-70, with further increase to 100-120.

In discussing technical problems, Petrov and other Soviet space specialists talk in generic rather than specific terms. And they draw heavily on US sources. For example, Petrov took US proposals and projects as the point of

While they're pleased with results from their unmanned craft, the Soviets continue to work toward manned feats. This is an artist's sketch of the Lunokhod moon-rover.



—Novosti Press Agency Drawing

departure for his comments. This should not be taken to mean, however, that the USSR is behind the US or is necessarily paralleling US approaches. Rather, it reflects the secretiveness with which the USSR still surrounds all technical aspects of its space plans and activities.

### Who's Ahead?

Although Soviet authorities have avoided direct comparisons between Soviet and US approaches to orbiting stations, they assert that the USSR is far out front. They convey the conviction that the USSR is about to achieve a quantum jump in overall capabilities, allowing it to reassume unquestioned world space leadership.

M. V. Keldysh, President of the USSR Academy of Sciences, sees the orbiting stations as providing means to solve "cardinal issues of physics, geophysics, and astrophysics and promote the most rational use of the wealth of the earth and advance geology, meteorology, agriculture, forestry, fishing, and oceanology to new heights. . . ."

Boris Petrov goes into some detail in his article in *Vestnik Akademii Nauk SSSR*. He argues that "no other line in cosmonautics is capable of securing such an effect [in the way of advancing man's mastery of space] and such economic benefits."

Habitable orbital stations of long duration, in combination with automatic space laboratories and observatories, will permit raising space investigations to a new level and will assure the continuous and regular procurement of scientific information and practical data and the setting up of very complex scientific-tech-

nical and medical-biological experiments, and also will facilitate the equipping of expeditions for distant space travels.

The orbiting station "can be used as an enormous physics laboratory in cosmic space"; it can be "of exceptional importance" for studies of the earth's atmosphere and of "cosmic meteorology"; cosmic meteorology in its turn "will make it possible to substantially refine the forecasting of weather" and "will undoubtedly play a decisive role in the solution of a very difficult problem of the future—control of the weather." And with regard to earth resources, "completely new prospects are being opened up . . . in the study of our native planet."

Major advances will ensue in the field of communications, Petrov says:

Thanks to the system of television broadcasting by satellites and, in the near future, direct television transmission . . . to domestic television antennae, possibilities will emerge for spreading scientific, medical, and sanitary and agricultural knowledge on a wider scale. Space television will become accessible to the population in even the most remote corners of our planet and will play an important role in the development of education, improvement of qualifications, and advancement of the culture of peoples in developing countries. . . .

Finally, Petrov makes clear that the USSR has in view and is working toward not simply a space station, but a *system* of space stations.

Long-term orbital space stations undoubtedly will be multipurpose cosmic apparatuses, but that does not exclude their certain specializa-

tion. Stations intended for study of the earth's resources and investigations of the atmosphere must be put in relatively narrow orbits in which the greatest effectiveness of the work being done will be assured. Stations for astronomical and radio-astronomical purposes, on the other hand, should be built in orbits whose heights are measured in tens and even hundreds of thousands of kilometers. Also of great interest are lunar-orbital stations, revolving in a selenocentric orbit. With them it will be possible to conduct investigations of the moon and of circumlunar space and astrophysical observations, and also to make periodic landings on the lunar surface of expeditions in special expeditionary space vehicles attached to an orbital station.

Neither Petrov nor other Soviets mention the usefulness of space stations and space-station applications to the Soviet military establishment or to Soviet political strategy in "the competition between systems in the world arena." But that these aspects of the matter are central to Soviet thinking is implicit in nearly all commentaries.

### The Moon

Although the Soviets are concentrating most of their resources on the space-station effort and related activities aimed at mastering the near-earth environment, the Soviets are by no means leaving the moon and its environs to the US, even for an interim period. They are currently devoting major attention to automatic explorations of the lunar surface and evidently plan to step up activities in this respect, systematically and rapidly. Also, the number, variety, technical sophistication, and performance potential of "automatic apparatuses" to be employed in the near-term moon effort seem almost certain to increase.

Both Petrov and Dmitriyev in their respective year-end roundups for 1969 and 1970 singled out automated exploration and study of the moon as one of the main directions in which the Soviet space program is moving.

Significant details as to the nature, scope, and technical purposes of Soviet automated moon explorations have been provided by the extensive comment following the successful flights of Luna-16 in September 1970 and Lunokhod-1 in November 1970.

Outstanding is an article that appeared in the October 1970 *Vestnik Akademii Nauk SSSR*. Almost uniquely for the Soviets in such matters, the article provides comprehensive and fairly precise technical data as to the hardware flight program, and performance of the Luna-16 mission. Further, it gives clear indication that the mission represented the opening phase of a new, broad-gauged Soviet effort to master the moon environment pursuant to a settled "program of cosmic investigations," which is "characterized by its purposefulness and by a

planned systematic approach to the solution of new scientific and technical problems." Claiming that "a stage new in principle" had been opened with Luna-16, the article asserted:

Soviet scientists, designers, engineers, and workers have been posed the task of further improvement of cosmic automata and the development of new and very complex elements and units of automatic systems. The achievements of our science in the area of automatic control and experimental cadres in industry have permitted coping brilliantly with that task. Proof of that is the remarkable success of the Luna-16 station. . . . In the course of the flight, valuable data were obtained on the working capacity of the new design and its high reliability, which will help to create new types of cosmic apparatus of the near future.

The first of the forecasted "new types" of

### Rubles for Space

Viewed in overall terms, authoritative Soviet comment on space matters since the Apollo-11 lunar landing bears out Brezhnev's assertion that the USSR "has a space program drawn up for many years ahead." The evidence is that the Soviet leadership has long since finally decided that the conquest of space in the fullest meaning of the term is sufficiently important to the interests of the USSR to justify a continuing large-scale effort, and that it stands ready now and in the future to provide the resources necessary to sustain such an effort.

The Soviets evidently believe that space and space applications will yield great and increasingly direct benefits to the economic development and economic well-being of the USSR, as well as to Soviet prowess in a continuing struggle with the US. They also evidently believe that advancements in space will continue indefinitely as both spearhead and lever for the general advancement of Soviet capabilities in science and technology.

The "Draft Directives" for the 1971-75 Five-Year Plan, along with establishing new and broadly ranging goals in space as one of the main tasks for the nation during the plan period, singled out "outstanding new successes of Soviet cosmonautics" as "convincing proof of the high level of the development of science and technology in our country."

Also, in its budgetary allocations for 1971, the first year of the new plan, the regime has provided for the support of science, which includes most importantly support of science related to space, at a level eighteen percent above that planned for 1970 and 8.3 percent above the substantially larger level actually provided. The level for 1971 is more than three times that provided in 1960 and almost twice that provided in 1965.

apparatus turned out to be, of course, Lunokhod-1, which landed and began its plodding on the moon surface within six weeks of Luna-16. While comment on Lunokhod-1 has been in a more general vein than comment on Luna-16, some details have been given as to the design and potential of the vehicle and as to where the Soviets expect to go in its utilization. In an interview broadcast by Radio Moscow on November 19, 1970, Petrov described the Lunokhod as "a multipurpose mobile scientific laboratory." He stressed that the research program of the lunar vehicle is "evidence of the great possibilities of studying areas of space far distant from our planet by means of automatic devices."

Academician A. A. Blagonravov, in a broadcast of January 16, 1971, emphasized the importance of automatic vehicles and claimed that the Lunokhod's "safety margin and perfect design" have "surpassed all expectations." He stressed that at this stage of development of space technology a man could not have stayed on the moon for such a long period of time. He further argued that in the future it will be possible to assign to automatic devices such tasks as studying meteorites, exploring volcanoes, and studying radiation in near-moon space.

"What is most important," he stated, "is that we now have an almost ideal means of conveyance on the moon, a means independent of super-rigorous conditions of vacuum and sharp changes of temperature. We can load such a selenomobile with different scientific apparatus."

Engineer T. Borisov wrote in *Trud*, on January 22, 1971, that the present stage in the development of automatic craft opens up prospects for the "interaction of different types of automata." What is also important, he noted, is the length of the lunar vehicle's active life. "Two months of faultless performance by Lunokhod-1 is the highest appraisal of the machinery developed by Soviet designers. This experiment shows that it is possible in principle to develop moon vehicles that would be able to operate anywhere in space."

### Surpassing the US

While avoiding saying so in so many words, Soviet spokesmen consistently imply that through the systematic development and use of increasingly varied and increasingly complex and sophisticated automatic devices for moon exploration, the USSR is putting itself in a position to surpass the US both in the buildup of scientific knowledge about the moon and, ultimately, in manned activity on the moon and elsewhere in space. In this connection, they are drawing assurance from the decline in the scope of US space efforts, including particularly those related to the moon. They seem to be paying

close attention and attaching important weight to comparative evaluation of trends in the US and Soviet programs appearing abroad, as for example in *The Economist* of November 21, 1970:

If the Russians are going to land robots at the rate of one every month while the Americans are going to put a man on the moon perhaps only once a year, the difference will soon cease to look so impressive merely because in a very short space of time the Russians will know more about the moon and have explored more places on its surface than the Americans will have done. The tortoise will have won another race. . . . If they are not very careful, the Americans will find that within a few years the place that people know about the moon will not be Houston but Moscow.

In contrast to their moon-exploration efforts, Soviet plans for planetary and interplanetary explorations at this stage appear modest. The avowed intent is to lay scientific and technological foundations for a large-scale, new-dimensional, and continuing effort once the orbital-space-station system is operational. Primary emphasis is being placed on Venus, since "the launching of devices toward this planet provides extremely important information for understanding the origin of the planets of the solar system and our own earth."

According to Petrov, in *Sovietskiy Voin* of March 1970: "There will be further study of the Venusian atmosphere by automatic probes and the determination of the internal structure, nature, and relief of the surface of that mysterious planet." With respect to other planets and interplanetary space, Petrov suggests only remote plans.

Clearly, the Soviets intend, beginning with Venus, to use automatic devices and vehicles being developed and utilized for moon explorations. Dmitriyev asserts that one of the objectives of the moon explorations is the accumulation of the "necessary experience for creating new automatic vehicles intended for the future study of Venus and Mars, Saturn and Jupiter, and the other heavenly bodies. . . ." And in more specific terms he argued that "Luna-16 opens up the prospect of automatic vehicles making trips to other planets and subsequently delivering research results to earth."

All of this, however, is in the more distant future. The vision of a reach into all parts of the solar system is strongly held, but fulfillment is to come at a much later stage. Thus, it appears unlikely that within this decade the USSR will substantially increase the level of activities it has maintained in the past for translunar space. Planetary explorations are low on the scale of current Soviet priorities, falling well behind automated lunar efforts and far behind the orbiting-stations project. ■

White Paper on Defense

## The British Armed Forces . . .

# WHAT'S AHEAD?

*Two statements on British defense policy clarify how Britain plans to continue meeting her commitment to NATO while at the same time helping counter threats to world stability in other areas.*

**By Stefan Geisenheyner**

AIR FORCE MAGAZINE EDITOR FOR EUROPE

**D**EFENSE planning of the British government was made public this spring in the annual White Paper on Defense. This amplified a Supplementary White Paper published late in 1970. The documents stress the improvement of the nation's contribution to NATO. More than twenty-five percent of the British Army is now stationed in Germany, assigned to NATO. The

majority of about 700 available combat aircraft are committed to the pact. The nuclear submarine force, carrying Polaris missiles armed with British hydrogen warheads, is permanently assigned to the Western strategic deterrent mission.

But serious threats to world stability exist outside the NATO area, and Britain must do



*The British Army, man for man one of the best in the world, faces recruitment and retention problems that may make it difficult for Britain to meet her commitments both to NATO and to other overseas areas.*



*The Royal Navy will retain one flattop until the late 1970s, when VTOL aircraft may have made carriers unnecessary.*

its share to meet them. Consequently, it will honor its obligations to protect its territories overseas and those of the countries to which it is tied by treaty. It will back CENTO in the Middle East and SEATO in Asia, and will continue to support the United Nations.

The British government shares the interest of other Commonwealth nations in the stability of Southeast Asia and believes that a continuing British military presence in the region is needed. To this end, it has proposed to the governments of Malaysia, Singapore, Australia, and New Zealand that five-power defense plans should be formulated as soon as possible.

These are to be based on a political commitment of a consultative nature undertaken equally by all five powers. The agreements now being negotiated are slated to replace the old Anglo-Malaysian Defense Agreement and relate primarily to the defense of Singapore and Malaysia.

The White Paper proposes that the British military contribution should consist of combat units the regional forces are short of. Five destroyers or frigates are to go to stations east of Suez. British ground forces east of Suez would include one battalion-size combat group, including air support and artillery elements, plus a helicopter unit for air mobility. The RAF is to station a number of Nimrod ASW aircraft in Singapore and Australia. A submarine force will also be stationed in the region. The annual cost of deploying these forces is expected to be about \$24 million. These forces will have to be diverted from their original NATO commit-

ment, but no objections by the pact nations are expected.

The White Paper states that the complete phasing out of aircraft carriers in 1972 as planned by the Labour Government would have seriously compromised the combat effectiveness of the Royal Navy. To plug the gap, it is proposed to extend the service life of one carrier and to give all combat ships medium-range, ship-to-ship missile capability.

The carrier *HMS Ark Royal* will stay in service until the late 1970s. *HMS Eagle* will serve until 1972 and then be retired. It is obviously hoped that VTOL technology will have progressed so far by the end of the decade that carriers in the conventional sense will not be required.

Until the new generation of VTOL support aircraft becomes available to the Navy, the RAF must provide air support for the Navy from shore bases. Yet, most of the time the ships will be out of reach of land-based air support. So Royal Navy operations will have to be adjusted accordingly, considerably limiting the effectiveness of Britain's maritime defense efforts when out of home waters.

Strike capability for the fleet, once *Eagle* has been retired, will center on use of a medium-range, ship-to-ship missile. This missile, the Exocet, to be produced by the French firm SNIA Aérospatiale (see "Letter from Europe," *March '71 issue, p. 18*), is in advanced development, and an Anglo-French collaborative program, for continued development and joint production, is being negotiated. Assuming the

negotiations succeed, Exocet should be widely fitted in Royal Navy ships and submarines during the 1970s.

The missile cannot offset completely the loss of carrier-based airpower, but it will help to bridge the weapon-delivery gap between the retirement of the existing carriers and the eventual introduction of shipborne VTOL weapon systems.

The British Army, one of the best trained and equipped professional armies in the world, faces considerable manpower problems. Recruitment and reenlistment figures have been low, and the new government has taken steps to halt the rundown of major units. It decided to retain a brigade of Gurkhas that had been slated to be dissolved. The Gurkhas are Nepalese mercenaries and excellent fighters.

It was, furthermore, decided to expand and reequip both the Territorial forces (comparable to the US National Guard) and the Army Volunteer Reserve, to provide an uncommitted pool of former units of trained men.

The defense planning of the previous Labour Government has been modified significantly. One additional airborne armored battalion, one engineer squadron, six infantry companies, and eventually one artillery battery are to be formed. These new units are composed of the remnants of already dissolved regiments. They will be available for duties at home and abroad

since they are not committed to NATO. Also, they will provide a nucleus for potential future expansion.

The White Paper explains that the two most pressing problems of the RAF are in tactical strike and reconnaissance capability and a general shortage of modern front-line aircraft, both combat and support.

The RAF is currently equipped with obsolescent aircraft, of 1950 vintage, and small numbers of highly modern aircraft, of which the VTOL Harrier is the best example. The old aircraft have reached the end of their life-span, and the new aircraft are too expensive to be procured in the necessary numbers. Thus, the RAF will have to rely on its 160 Phantoms, ninety Harriers, and thirty-five Buccaneers for tactical strike until the MRCA—the European multirole combat aircraft—becomes available in the late 1970s. The RAF is slated to receive about 400 of these highly advanced fighters.

Since the presently available strike force of roughly 300 aircraft cannot possibly satisfy the worldwide needs of the RAF, it was decided to introduce a stopgap measure. The White Paper sets forth plans to use the Anglo-French Jaguar



*Until the European multirole combat aircraft is available in the late '70s, the RAF will use more operational versions of the Anglo-French Jaguar (left), a supersonic strike-trainer. Clockwise, other aircraft are: the Hawker Siddeley HS-1182, which may replace the Jaguar in Training Command; and the McDonnell Douglas F-4 (center), which, along with the Hawker Siddeley Buccaneer (upper right) and Hawker Siddeley's VTOL Harrier (right), is now filling RAF's tactical strike role.*



supersonic strike-trainer to increase the RAF's close-support force. This will be done by building more operational combat versions of the Jaguar within the total of 200 to be produced for Britain. Four squadrons are to be formed, representing a substantial increase in Britain's contribution to NATO's close-support forces. The Jaguar is well suited for this task, and, with the proper nav-attack systems installed, it can serve as an excellent all-round, low-level fighter-bomber.

The partial conversion of the Jaguar production run from the two-seat trainer to the one-seat combat variant opens another gap in RAF planning. The Training Command will need a new jet trainer, less sophisticated and, subsequently, cheaper than the Jaguar, to supplement the overage Gnat and Hunter aircraft, which at present are serving for advanced pilot training.

These revisions of defense programs have involved a thorough examination of spending plans. The government has set the following defense budget targets for the next four years: 1971-72: £2,327 million; 1972-73: £2,227 million; 1973-74: £2,290 million; and 1974-

75: £2,300 million. (These figures are based on 1970 prices.)

The target budgets represent considerable savings over previous planning. No major projects now on order were canceled, but a number of programs of lesser priority, mainly in the real-estate and equipment field, were cut or deferred. The government is confident that the budget reductions, if seen in the framework of the revised defense program as a whole, will not affect the forces' ability to meet planned commitments.

The statements about the budget cuts would seem to represent wishful thinking, as it appears impossible for Britain to meet the newly expanded commitments and cut its budget at the same time. For one thing, military pay will have to be increased. Otherwise, the forces will face a critical manpower shortage during the next few years. The steadily increasing sophistication of weapon systems and a proportional rise in their costs has to be taken into account, and it seems, therefore, overly optimistic to expect to operate with such a limited and relatively inflexible budget.

Certainly, the Conservatives should see a lesson in the mistakes in military planning made by their predecessors. The primary lesson is that a government that tries to buy defense on the cheap will end up spending much more money than it had bargained for and get much less security in return. ■



Gen. Sir John Winthrop Hackett, British Army, Retired, delivered the 1970 Harmon Memorial Lecture at the Air Force Academy, under sponsorship of the Department of History. He spoke on "The Military in the Service of the State," concluding that the military's greatest service may lie in the moral sphere. Sir John's concluding words, presented here, are a testimony to the sometimes unrecognized, sometimes maligned values of a great institution; they should stand as a beacon to light its steady course through these troubled times . . .

By Gen. Sir John  
Winthrop Hackett

## The Military: Repository of Moral Resource

I AM THE product of thirty-five years of military service—a person who, with strong inclinations to the academic, nonetheless became a professional soldier. Looking back now in later life, from a university, I can find nothing but satisfaction over the choice I made all those years ago as a student—a satisfaction tinged with surprise at the good sense I seem to have shown as a very young man in making it.

Knowing what I do now, given the chance all over again, I should do exactly the same. For the military life, whether for sailor, soldier, or airman, is a good life. The human qualities it demands include fortitude, integrity, self-restraint, personal loyalty to other persons, and the surrender of the advantage of the individual to a common good.

None of us can claim a total command of all these qualities. The military man sees round him others of his own kind also seeking to develop them, and perhaps doing it more successfully than he has done himself. This is good company. Anyone can spend his life in it with satisfaction.

In my own case, as a fighting man, I found that invitations after the World War to leave the service and move into business, for example, were unattractive, even in a time when anyone who had had what they called on our side "a good war" was being demoted and, of course, paid less. A pressing invitation to politics was also comparatively easy to resist. The possibility of going back to Oxford to teach Medieval History was more tempt-

ing. But I am glad that I stayed where I was, in the profession of arms, and I cannot believe I could have found a better or more rewarding life anywhere outside it.

Another thought arises here. The danger of excessive military influence within the state does not spring from incompetence, cynicism, or malice in the military, but in large part from the reverse. What is best for his service will always be sought by the serving officer, and, if he believes that in seeking the best for his service he is rendering the best service he can to his country, it is easy to see why. He may have to be restrained. He can scarcely be blamed.

The military profession is unique in one very important respect. It depends upon qualities such as those I have mentioned, not only for its attractiveness but for its very efficiency. Such qualities as these make of any group of men in which they are found an agreeable and attractive group in which to function. The military group, however, depends in very high degree upon these qualities for its functional efficiency.

A man can be selfish, cowardly, disloyal, false, fleeting, perjured, and morally corrupt in a wide variety of other ways and still be outstandingly good in pursuits in which other imperatives bear than those upon the fighting man. He can be a superb creative artist, for example, or a scientist in the very top flight, and still be a very bad man. What the bad man cannot be is a good sailor, or soldier, or airman. Military institutions thus form a repository of moral resource which should always be a source of strength within the state.

It is my conviction that the major service of the military institution to the community of men it serves may well lie neither within the political sphere nor the functional. It could easily lie within the moral. The military institution is a mirror of its parent society, reflecting strengths and weaknesses. It can also be a well from which to draw refreshment for a body politic in need of it. ■



*Gen. Sir John Winston Hackett was commissioned in the 8th King's Royal Irish Hussars in 1931, after taking degrees in Classics and History at Oxford. During World War II, he served in the Middle East as Commander of the 4th Parachute Brigade and of the Transjordan Frontier Force. He was wounded three times and thrice decorated for gallantry. After the war, General Hackett was Commandant of the Royal Military College of Science, Deputy Chief of the Imperial General Staff, and Commander in Chief of the British Army of the Rhine. A medieval scholar who also holds still a third Oxford degree in Literature, General Hackett is now Principal of King's College, London.*

# JANE'S

## ALL THE WORLD'S AIRCRAFT SUPPLEMENT



*Jaguar S-06, first prototype of the single-seat tactical support version for the RAF, with underwing drop-tanks*

### SEPECAT

*Address: BP 12, 78 Vélizy-Villacoublay, France (Breguet); 100 Pall Mall, London SW1, England (BAC)*

### SEPECAT JAGUAR

The Jaguar, which was evolved from the Breguet Br 121 project, was designed by Breguet and BAC to meet a common requirement of the French and British air forces laid down early in 1965. This requirement called for a dual-rôle aircraft, to be used as an advanced and operational trainer and as a tactical support aircraft of light weight and high performance, to enter French service in 1971 and RAF service in 1972-73. It is also being developed for naval operations from aircraft carriers.

The following versions of the Jaguar have been announced:

**Jaguar A.** French single-seat tactical support version. Prototypes (A-03 and A-04)

first flown on 29 March and 27 May 1969. The A-04 has been used for weapon trials.

**Jaguar B.** British two-seat operational trainer version. Prototype (B-08) due to fly in 1971. RAF designation will be Jaguar T. Mk 2.

**Jaguar E.** French two-seat advanced trainer version. Prototypes (E-01 and E-02) first flown on 8 September 1968 and 11 February 1969. The E-01 flew supersonically within five flying hours of its first flight. It was lost on 26 March 1970, the pilot ejecting safely. Deliveries to the Armée de l'Air due to begin in 1971.

**Jaguar M.** French single-seat naval tactical version. Prototype (M-05), first flown on 14 November 1969, completed initial deck landing and T-O trials at RAE Bedford in Spring 1970. Preliminary deck trials on board the French aircraft carrier *Clémenceau* completed 8-13 July 1970, when more than 12 catapult launchings and arrested landings were made.

**Jaguar S.** British single-seat tactical support version, basically similar to A but with more advanced electronics. Prototypes S-06 and S-07, of which the former (XW560) was first flown on 12 October 1969 and the latter (XW563) on 12 June 1970. The S-06 was subsequently fitted with a taller, larger-area fin, which is expected to become standard on all production models except Jaguar M. It is equipped with the Elliott modular air data computer, and the S-07 with the Elliott digital inertial navigation and weapon aiming system (incorporating an MCS 920M computer), projected map display and Specto head-up display and other equipment, which will be fitted to RAF versions of the aircraft. Deliveries, to squadrons of No 38 Group, RAF Air Support Command, are due to begin in late 1972 or early 1973. RAF designation will be Jaguar GR. Mk 1.

The Jaguar prototype manufacturing programme was divided into two phases.

Phase 1 called for the production of two trainer prototypes, two tactical prototypes and one airframe for static tests. Construction of the first of these, the E-01, began in the Summer of 1966. Phase 2 covered the production of a single prototype of the French naval version, two prototypes of the British strike version and one airframe for fatigue tests. The eighth prototype is representative of the British two-seat version.

By the end of February 1971 the prototypes had between them completed more than 850 flying hours. Remaining flight testing is being devoted mainly to weapon and navigation system trials.

Under the terms of a production agreement signed by the British and French Defence Ministers on 9 January 1968, an initial series of 400 Jaguars is to be built, 200 for the Royal Air Force and 200 for the Armée de l'Air and Aéronavale. The first formal production contract, placed in the Autumn of 1969, covered 50 Jaguars for France; the second was for 30 for the RAF. Authorisation has also been given for long-dated materials to be purchased to meet future production commitments.

Breguet factories at Toulouse and Biarritz are responsible for the front and centre fuselage, including the air intakes and landing gear. The Preston Division of BAC has responsibility for the rear fuselage, wings and tail unit. There will be final assembly lines for complete aircraft in both Britain and France.

Great emphasis has been placed on simple design and sturdy construction, for operation from unprepared airstrips. The Jaguar makes full use of research and development work performed on other BAC and Breguet tactical aircraft, notably the Lightning, TSR 2 and Taon.

Carrying tactical loads, the Jaguar will operate from strips less than 3,280 ft (1,000 m) long. Training versions will be able to operate from conventional runways only 6,560 ft (2,000 m) long, with full provision for safety in the event of an engine failure at the critical point of take-off.

The powered flying controls, developed and supplied by Fairey Hydraulics Ltd, are the most advanced yet designed for a European aircraft, with all functions contained within a single assembly. The Jaguar is fully power-controlled in all three axes and is automatically stabilised as a weapons plat-



The two prototypes of the Jaguar S single-seat tactical support aircraft for the RAF

form by gyros which sense disturbances and feed appropriate correcting data through a computer to the power control assemblies, in addition to the human pilot manoeuvre demands. The power controls are all of duplex tandem arrangement, with both mechanical and electrical servo-valves of the established Fairey platen design.

The performance data below refer to the Jaguar in its initial form.

**TYPE:** Single-seat tactical support aircraft (Jaguar A and S), carrier-based naval tactical aircraft (Jaguar M) and two-seat advanced and operational trainer (Jaguar B and E).

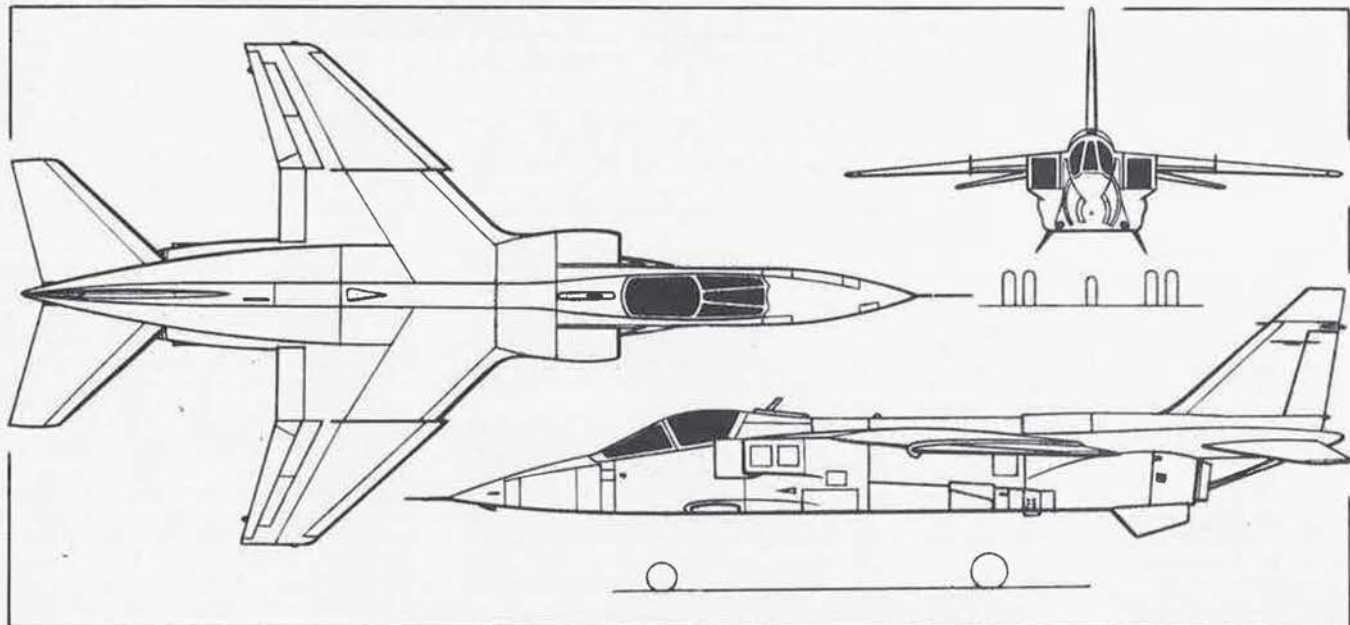
**WINGS:** Cantilever shoulder-wing monoplane. Anhedral 3°. Sweepback 40° at quarter-chord. All-metal two-spar torsion-box structure, the skin of which is machined from solid aluminium alloy, with integral stiffeners. Main portion built as single unit, with three-point attachment to each side of fuselage. Outer panels fitted with slat which also gives effect of extended-chord "dog-tooth" leading-edge. No conventional ailerons. Lateral control by two-section spoilers, forward of outer flap on each wing, in association (at low speeds) with differential tail-

plane. Hydraulically-operated full-span double-slotted trailing-edge flaps. Leading-edge slats, which can be used in combat. Entire wing unit is British-built.

**FUSELAGE:** All-metal structure, mainly aluminium, built in three main units and making use of sandwich panels and, around the cockpit(s), honeycomb panels. Local use of titanium alloy in engine bay area. Entire forward and centre fuselage, up to and including the main undercarriage bays, and including cockpit(s), air intakes, main systems installations, forward fuel tanks and landing gear, is of French construction. Entire fuselage aft of main-wheel bays, including engine installation, rear fuel tanks and complete tail assembly, is British-built. Two door-type air-brakes under rear fuselage, immediately aft of each main-wheel well. Structure and systems aft of cockpit(s) are identical for single-seat and two-seat versions.

**TAIL UNIT:** Cantilever all-metal two-spar structure, covered with aluminium alloy sandwich panels. Rudder and outer panels and trailing-edge of tailplane have honeycomb core. Sweepback at quarter-chord 40° on horizontal, 43° on vertical sur-

*SEPECAT Jaguar S single-seat tactical support aircraft*



faces. All-moving slab-type tailplane, with 10° of anhedral, the two halves of which can operate differentially to supplement the spoilers. No separate elevators. Auxiliary fins beneath the rear fuselage, aft of the jet-pipes. Entire tail unit is British-built.

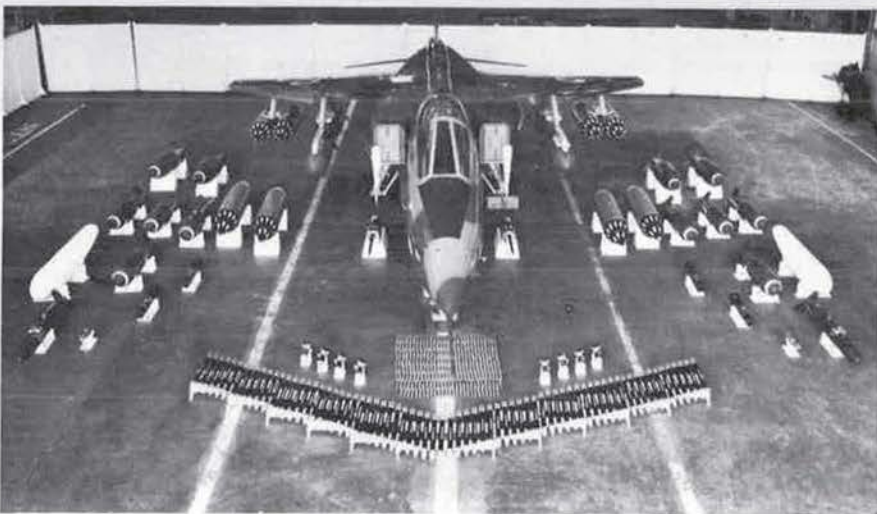
**LANDING GEAR:** Messier-designed retractable tricycle type, all units having Dunlop wheels and low-pressure tyres for rough-field operation. Hydraulic retraction, with oleo-pneumatic shock-absorbers. On land-based models, forward-retracting main units each have twin wheels, tyre size 615 x 225-10, tyre pressure 56 lb/sq in (3.94 kg/cm<sup>2</sup>). Wheels pivot during retraction to stow horizontally in bottom of fuselage. Single rearward-retracting nose-wheel, with tyre size 550 x 250-6 and pressure of 40 lb/sq in (2.81 kg/cm<sup>2</sup>). Twin landing lights in nose-wheel door. Dunlop hydraulic brakes. Anti-skid units and arrestor hook standard. Brake parachute housed in fuselage tail-cone. Jaguar M has strengthened undercarriage, with single main wheels and twin nose-wheels, a strengthened arrestor hook, and catapult gear for carrier operation.

**POWER PLANT:** Two Rolls-Royce/Turboméca Adour turbofan engines (each 4,620 lb = 2,100 kg st dry, and 6,950 lb = 3,150 kg st with afterburning). Lateral-type fixed-geometry air intakes, on each side of fuselage aft of cockpit. Fuel in eight tanks, one in each wing and six in fuselage. Armour protection will be provided for critical fuel system components. In the basic tactical sortie the loss of fuel from one tank at the half-way point would not prevent the aircraft from regaining its base. Provision for carrying three auxiliary drop-tanks, each of 264 Imp gallons (1,200 litres) capacity. Jaguar A, M and S will be equipped for in-flight refuelling, with a retractable probe forward of the cockpit on the starboard side.

**ACCOMMODATION (Jaguar B and E):** Crew of two in tandem on (according to version) Martin-Baker Mk 9 zero-zero ejection seats or Mk 4 seats giving zero-altitude ejection at speeds down to 90 knots (104 mph; 167 km/h). Individual rearward-hinged canopies. Rear seat is 15 in (38 cm) higher than front seat. Front of cockpit is armoured. Windscreens bullet-proof against 7.5-mm rifle fire.

**ACCOMMODATION (Jaguar A, M and S):** Enclosed cockpit for pilot, with rearward-hinged canopy and Martin-Baker Mk 9 or Mk 4 ejection seat as described above. Front and underside of cockpit are armoured against light ground fire. Bullet-proof windscreens, as in two-seat versions.

**SYSTEMS:** Air-conditioning and pressurisation systems maintain automatically, throughout the flight envelope, comfortable operating conditions for the crew, and also control the temperature in certain equipment bays. Two independent hydraulic systems, powered by two Vickers engine-driven pumps. Hydraulic pressure 3,000 lb/sq in (210 kg/cm<sup>2</sup>). First system (port engine) supplies one channel of each actuator for the flying controls, the hydraulic motors which actuate the flaps and slats, the landing gear retraction and extension system, the brakes and anti-skid units. The second system supplies the other half of each flying control actuator, two further hydraulic motors actuating the slats and flaps, the air-brake and landing gear extension jacks, nose-wheel steering system and the wheel brakes. Electrical power provided by two 15KVA AC generators, either of which can sustain functional and operational equipment without load-



Some of the alternative weapon loads that may be carried by the single-seat tactical support versions of the Jaguar

shedding. DC power provided by two 4kW transformer-rectifiers. Emergency AC power for essential instruments provided by 15Ah battery and static inverter. De-icing, rain clearance and demisting standard. Liquid oxygen system installed, which also pressurises the pilot's anti-g suit.

**ELECTRONICS AND OPERATIONAL EQUIPMENT (French versions):** Equipment of Jaguar E includes VHF/UHF radio, VOR/ILS and IFF; TACAN with Crouzet Type 90 navigation indicator; SFIM 153-6 twin-gyro inertial platform with two SFIM 810 all-attitude roll and pitch spherical indicators; SFIM 511 directional compass; Jaeger ELDIA air data system with Jaeger altitude indicator; CSF RL 50Pj incidence probe with angle of attack indicator; CSF 121 fire control sighting unit with weapon selector and adaptor for sighting head camera. Except for the use of a SFIM 250-1 twin-gyro platform, and the addition of a vector adder to the navigation indicator, this equipment is repeated in the Jaguar A, which has in addition a panoramic camera, Dassault-built Decca RDN 72 Doppler radar, Crouzet Type 90 navigation computer with target selector, CFTH passive radar warning (ECM) detector, a CSF 31 weapon aiming computer and a Dassault fire control computer for Martel anti-radar missiles. The Jaguar M has the same basic equipment as the A, plus radio altimeter and a CGE TA 101 laser rangefinder. Provision is made for the addition to these basic installations of such other items as terrain-following radar, air-to-air fire control radar or sighting equipment for low light level targets.

**ELECTRONICS AND OPERATIONAL EQUIPMENT (British versions):** Except for the installation of a panoramic camera in the single-seat version, the basic equipment of the Jaguar B and S is identical. It includes a Smiths radio altimeter indicator, slip indicator, E2B compass and autostabilising system; Plessey PTR 377 VHF/UHF radio and HF/UHF radio; Standard Telephones and Cables VOR/ILS system and radio altimeter; IFF; TACAN; Elliott MCS 920M digital air data computer and navigation and weapon aiming computer with E.3R three-gyro inertial platform, inertial velocity sensor, navigation control unit and moving-map display; Specto head-up display; Smiths SF6 horizontal situation indicator and standby compass; and Sperry gyro amplifier master unit, compass con-

troller and magnetic detector. Plessey weapon control unit.

**ARMAMENT (Jaguar A, M and S):** Two 30-mm cannon (DEFA 553 type in Jaguar A and M, Aden type in Jaguar S) in lower fuselage aft of cockpit. One stores attachment point on fuselage centre-line and two under each wing. Provision for wingtip attachments for air-to-air missiles. Centre-line and inboard wing points can each carry up to 2,000 lb (1,000 kg) of weapons, and the outboard underwing points up to 1,000 lb (500 kg) each. Typical alternative loads include two Martel AS.37 anti-radar missiles and a drop-tank; eight 1,000-lb (454-kg) bombs; various combinations of free-fall and retarded bombs, Sidewinder-type missiles and unguided air-to-air or air-to-surface rockets, including the 68-mm SNEB rocket; a reconnaissance-camera pack with two photo-flare pods; or two drop-tanks.

**ARMAMENT (Jaguar B and E):** Two 30-mm DEFA 553 cannon in Jaguar E; Jaguar B has single 30-mm Aden cannon on port side. The two-seat versions have similar weapons capability to the tactical models, and can be employed for operational missions as required.

**DIMENSIONS, EXTERNAL:**

|                    |                          |
|--------------------|--------------------------|
| Wing span          | 27 ft 10 1/4 in (8.49 m) |
| Wing chord at root | 11 ft 9 in (3.58 m)      |
| Wing chord at tip  | 3 ft 8 1/2 in (1.13 m)   |
| Wing aspect ratio  | 3                        |
| Length overall:    |                          |
| A, M and S         | 50 ft 11 in (15.52 m)    |
| B and E            | 52 ft 11 in (16.42 m)    |
| Height overall     | 16 ft 0 1/2 in (4.89 m)  |
| Tailplane span     | 14 ft 10 1/4 in (4.53 m) |
| Wheel track        | 7 ft 10 1/2 in (2.40 m)  |
| Wheelbase          | 18 ft 7 1/4 in (5.67 m)  |

**AREAS:**

|   |                                      |
|---|--------------------------------------|
| Wings, gross                                    | 258.33 sq ft (24.00 m <sup>2</sup> ) |
| Leading-edge slats (total)                      | 11.30 sq ft (1.05 m <sup>2</sup> )   |
| Trailing-edge flaps (total)                     | 44.35 sq ft (4.12 m <sup>2</sup> )   |
| Spoilers (total)                                | 11.09 sq ft (1.03 m <sup>2</sup> )   |
| Vertical tail surfaces (total, except Jaguar M) | 42.00 sq ft (3.90 m <sup>2</sup> )   |
| Horizontal tail surfaces (total)                | 83.96 sq ft (7.80 m <sup>2</sup> )   |

**WEIGHTS AND LOADINGS:**

|                   |   |
|-------------------|---|
| Normal T-O weight | 23,000 lb (10,430 kg)                     |
| Max T-O weight    | 29,762 lb (13,500 kg)                     |
| Max wing loading  | 115.3 lb/sq ft (562.5 kg/m <sup>2</sup> ) |
| Max power loading | 2.14 lb/lb st (2.14 kg/kg st)             |

**PERFORMANCE (estimated):**

|   |                                  |
|---|----------------------------------|
| Max level speed at S/L                                  | 729 knots                        |
| (840 mph; 1,350 km/h)                                   | (Mach 1.1)                       |
| Max level speed at 36,000 ft (11,000 m)                 | 917 knots                        |
| (1,056 mph; 1,700 km/h)                                 | (Mach 1.6)                       |
| Landing speed   | 115 knots (132 mph; 213 km/h)    |
| T-O run with typical tactical load                      | 1,900 ft (580 m)                 |
| T-O to 50 ft (15 m) with typical tactical load          | 2,900 ft (885 m)                 |
| Landing from 50 ft (15 m) with typical tactical load    | 2,825 ft (860 m)                 |
| Landing run with typical tactical load                  | 1,545 ft (470 m)                 |
| Typical attack radius, internal fuel only:              |                                  |
| hi-lo-hi  | 710 nm (818 miles; 1,315 km)     |
| low altitude throughout                                 | 310 nm (357 miles; 575 km)       |
| Typical attack radius with external fuel:               |                                  |
| hi-lo-hi  | 710 nm (818 miles; 1,315 km)     |
| low altitude throughout                                 | 450 nm (518 miles; 835 km)       |
| Ferry range with external fuel                          | 2,270 nm (2,614 miles; 4,210 km) |
| Max high-altitude endurance at subsonic speed (B and E) | 3 hr 0 min                       |

**DASSAULT**

*AVIONS MARCEL DASSAULT; Address: 46 Avenue Kléber, 75-Paris 16e, France*

**DASSAULT MYSTÈRE 20/FALCON 20**

By mid-March 1971 firm orders had been received for 274 examples of the 8/14-seat Mystère 20/Falcon 20 executive jet transport, as well as for 55 of the smaller 4/7-seat Falcon 10, the prototype of which was flown for the first time on 1 December 1970.

Dassault has now added a further model to the range, the **Falcon 20T**, which is an enlarged version of the Falcon 20 intended to serve the needs of third-level and commuter airlines.

The Falcon 20T is based on the Mystère 20/Falcon 20 Series F, with the same wing control devices and same power plant of two 4,300 lb (1,950 kg) st General Electric CF700-2D2 rear-mounted turbofan engines. It has, however, a fuselage of greater length and diameter which will seat up to 28 passengers (typically 24) in eight three-abreast rows, and carry a crew of three. The Falcon 20T will be certificated to FAR Pt 25 requirements, and will be operable from airfields with available runways of 5,413 ft (1,650 m) length or less. A prototype is scheduled to fly for the first time in July 1972.

Details of the Falcon 20T are generally similar to those of the Mystère 20/Falcon 20 Series F, except for the following:

**DIMENSIONS, EXTERNAL:**

|                        |                       |
|------------------------|-----------------------|
| Wing span              | 54 ft 3½ in (16.55 m) |
| Length overall         | 60 ft 0½ in (18.30 m) |
| Height overall         | 19 ft 0¼ in (5.80 m)  |
| Fuselage: Max diameter | 7 ft 9 in (2.36 m)    |

**AREA:**

|              |                         |
|--------------|-------------------------|
| Wings, gross | 454.24 sq ft (42.20 m²) |
|--------------|-------------------------|

**WEIGHTS AND LOADING:**

|                         |                           |
|-------------------------|---------------------------|
| Weight empty, equipped  | 17,637 lb (8,000 kg)      |
| Max T-O and ramp weight | 29,100 lb (13,200 kg)     |
| Max wing loading        | 64.2 lb/sq ft (313 kg/m²) |

**PERFORMANCE (estimated, at max T-O weight except where indicated):**

|  |                               |
|--|-------------------------------|
| Max level speed at 30,000 ft (9,145 m) at AUW of 24,250 lb (11,000 kg) | 437 knots (503 mph; 810 km/h) |
|  | (Mach 0.74)                   |
| Econ cruising speed at 35,000 ft (10,700 m)                            | 405 knots (466 mph; 750 km/h) |
|  | (Mach 0.70)                   |

|  |                                  |
|--|----------------------------------|
| Service ceiling  | 41,000 ft (12,500 m)             |
| T-O run (FAR Pt 25) at S/L, ISA + 15°C   | 5,500 ft (1,680 m)               |
| Landing run (FAR Pt 25) at AUW of 25,575 lb (11,600 kg)                                    | 3,940 ft (1,200 m)               |
| Range with 24 passengers, reserves for 150 nm (174 mile; 280 km) diversion and 45 min hold | 700 nm (810 miles; 1,300 km)     |
| Range as 8-passenger executive aircraft, reserves as above                                 | 1,275 nm (1,465 miles; 2,360 km) |

**SAAB-SCANIA**

*SAAB-SCANIA AKTIEBOLAG; Head Office: S-581 88 Linköping, Sweden*

**SAAB-MFI 15**

The Saab-MFI 15 is designed for pre-selection training and miscellaneous army aviation duties. It can be fitted with either a non-retractable tricycle landing gear or a tail-wheel landing gear.

Construction of a prototype (SE-301), with a 160 hp engine, began in 1968, and this aircraft flew for the first time on 11 July 1969. Subsequently, its original low-mounted horizontal tail surfaces were replaced by new ones, mounted at the top of the fin to prevent interference or damage by snow and debris when operating in winter from rough airfields. It was next re-engined with a 200 hp Lycoming, with which it flew for the first time on 26 February 1971; this engine will be standard on the production Saab-MFI 15, with the 160 hp engine and tail-wheel gear available optionally.

**TYPE:** Two/three-seat light aircraft, stressed for flight load factors of +4.4 g and -1.76 g (Utility cat) and +6.0 g and -3.0 g (Aerobatic cat).

**WINGS:** Braced shoulder-wing monoplane, with single bracing strut each side. Thickness/chord ratio 10%. Dihedral 1° 30'. All-metal structure, swept forward 5° from roots. Mass-balanced all-metal ailerons. Electrically-operated all-metal plain flaps.

**FUSELAGE:** All-metal box structure.

**TAIL UNIT:** Cantilever all-metal "T" tail comprising swept fin and rudder and one-piece mass-balanced horizontal "stabilator" with large anti-servo and trimming tab. Trim-tab in rudder.

**LANDING GEAR:** Non-retractable tricycle or tail-wheel type. Cantilever spring steel main legs on both versions. Cleveland 5.50 x 5 main wheels and 5.00 x 5 nose-wheel on nose-wheel version; Goodyear 6.00 x 5 main wheels and Scott 8-in tail-wheel on tail-wheel version. Cleveland

disc brakes on main units. Landes or Fluidine skis, or Edo floats, optional on both versions.

**POWER PLANT:** One 200 hp Lycoming IO-360-A1B engine, driving a Hartzell constant-speed metal propeller. Alternatively, the aircraft can be fitted with a 160 hp Lycoming IO-320-B20 four-cylinder horizontally-opposed air-cooled engine with fuel injection, driving a McCauley MGM 7660 two-blade fixed-pitch metal propeller. Fuel in two integral wing tanks, with total capacity of 45 US gallons (170 litres). Oil capacity 2 US gallons (7.6 litres).

**ACCOMMODATION:** Side-by-side adjustable seats, with provision for back-type parachutes, for two persons beneath fully-transparent rearward-sliding canopy. Space aft of front seats for 220 lb (100 kg) of baggage or, optionally, a third seat. Upward-hinged door on port side of cabin. Heated and ventilated. Dual controls standard.

**SYSTEMS:** 28V 50A electrical system.

**ELECTRONICS AND EQUIPMENT:** Provision for full blind-flying instrumentation and radio.

**DIMENSIONS, EXTERNAL:**

|                                     |                      |
|-------------------------------------|----------------------|
| Wing span                           | 28 ft 6½ in (8.70 m) |
| Wing chord (outer panels, constant) | 4 ft 5½ in (1.36 m)  |

|                 |                      |
|-----------------|----------------------|
| Length overall: |                      |
| nose-wheel      | 22 ft 1¾ in (6.75 m) |
| tail-wheel      | 22 ft 5¾ in (6.85 m) |

|                        |                     |
|------------------------|---------------------|
| Height overall:        |                     |
| nose-wheel             | 8 ft 6¼ in (2.60 m) |
| tail-wheel (tail down) | 6 ft 2¾ in (1.90 m) |

|                |                     |
|----------------|---------------------|
| Tailplane span | 8 ft 4½ in (2.55 m) |
|----------------|---------------------|

|              |                      |
|--------------|----------------------|
| Wheel track: |                      |
| nose-wheel   | 7 ft 1½ in (2.17 m)  |
| tail-wheel   | 6 ft 7¾ in (2.025 m) |

|            |                     |
|------------|---------------------|
| Wheelbase: |                     |
| nose-wheel | 5 ft 0½ in (1.54 m) |
| tail-wheel | 15 ft 7 in (4.75 m) |

|                    |                     |
|--------------------|---------------------|
| Cabin door (port): |                     |
| Height             | 2 ft 6¾ in (0.78 m) |
| Width              | 1 ft 8½ in (0.52 m) |

**DIMENSIONS, INTERNAL:**

|                              |                     |
|------------------------------|---------------------|
| Cabin:                       |                     |
| Max width                    | 3 ft 7¼ in (1.10 m) |
| Max height (from seat squab) | 3 ft 3¼ in (1.00 m) |

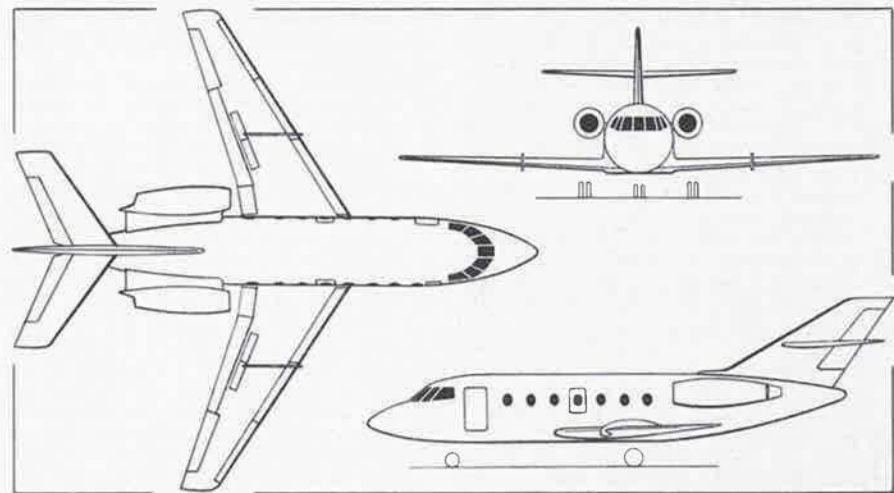
**AREAS:**

|                                  |                       |
|----------------------------------|-----------------------|
| Wings, gross                     | 127 sq ft (11.80 m²)  |
| Fin                              | 8.29 sq ft (0.77 m²)  |
| Rudder                           | 7.86 sq ft (0.73 m²)  |
| Horizontal tail surfaces (total) | 22.17 sq ft (2.06 m²) |

**WEIGHTS AND LOADINGS:**

|                             |                   |
|-----------------------------|-------------------|
| Weight empty, VFR equipped: |                   |
| 160 hp                      | 1,153 lb (523 kg) |
| 200 hp                      | 1,210 lb (550 kg) |

*The Falcon 20T, a 24/28-passenger transport version of the Dassault Mystère 20/Falcon 20*





Saab-MFI 15 in production configuration, with 200 hp Lycoming IO-360-A1B engine and tricycle landing gear

Time to 6,560 ft (2,000 m) 4 min 48 sec  
 Cruise ceiling 23,600 ft (7,200 m)  
 T-O to 50 ft (15 m) 780 ft (240 m)  
 Landing from 50 ft (15 m) 1,150 ft (350 m)  
 Endurance (both versions) 4 hr 30 min

#### AERITALIA (FIAT)

SOCIETÀ PER AZIONI FIAT; Address: Corso Giovanni Agnelli 200 (C.P. 202), 10100 Turin, Italy

#### FIAT G222

The G222 was originally conceived in four separate configurations, as described in the 1969/70 edition of *Jane's*. Three of these—the V/STOL medium-range transport, the civil transport and the anti-submarine version—have been halted at the research project stage, but Aeritalia (Fiat) has an Italian Defence Ministry contract to complete two prototypes of the military transport version, designated G222 TCM, to which the following description applies. The first of these prototypes flew for the first time on 18 July 1970 and the second was nearing completion in March 1971. An additional airframe is being completed for static and fatigue testing.

Most of the major Italian airframe companies are sharing in the construction of the aircraft, including Aeritalia (Aerfer), Aermacchi, Piaggio and Siai-Marchetti.

**TYPE:** Twin-engined general-purpose transport aircraft.

**WINGS:** Cantilever high-wing monoplane. Thickness/chord ratio 15%. Light alloy three-spar fail-safe structure in three portions, the outer panels having taper on the leading- and trailing-edges and slight dihedral. One-piece centre-section fits in recess in top of fuselage and is secured by bolts at six main points. All-metal ailerons and double-slotted flaps, the latter extending over 60% of the trailing-edge. Spoilers ahead of each outboard flap section. Servo-tabs on each aileron. Controls are hydraulically-powered.

**FUSELAGE:** Stressed-skin aluminium alloy fail-safe structure of circular cross-section.

**TAIL UNIT:** Cantilever aluminium alloy two-spar structure, with sweptback vertical surfaces. Variable-incidence tailplane. Elevators hydraulically-powered. Tabs on each elevator. No rudder tabs.

**LANDING GEAR:** Hydraulically-retractable tricycle type, suitable for use from pre-

|                    |   |  |                               |
|--------------------|---|--|-------------------------------|
| Max T-O weight:    |   | Utility, 200 hp  |                               |
| Normal, 160 hp     | 1,929 lb (875 kg)                       | Aerobic, 160 hp  | 8.82 lb/hp (4.00 kg/hp)       |
| Normal, 200 hp     | 1,980 lb (900 kg)                       |  | 10.69 lb/hp (4.85 kg/hp)      |
| Utility            | 1,763 lb (800 kg)                       | Aerobic, 200 hp  | 8.54 lb/hp (3.88 kg/hp)       |
| Aerobic            | 1,708 lb (775 kg)                       |  |                               |
| Max wing loading:  |   | <b>PERFORMANCE</b> (at max T-O weight, Utility category, 200 hp IO-360, nose-wheel version): |                               |
| Normal, 160 hp     | 15.3 lb/sq ft (74.6 kg/m <sup>2</sup> ) | Max level speed at S/L   | 144 knots (165 mph; 266 km/h) |
| Normal, 200 hp     | 15.6 lb/sq ft (76.3 kg/m <sup>2</sup> ) | Max permissible diving speed (both versions)   | 197 knots (227 mph; 365 km/h) |
| Utility            | 14.0 lb/sq ft (68.3 kg/m <sup>2</sup> ) | Cruising speed   | 130 knots (148 mph; 239 km/h) |
| Aerobic            | 13.6 lb/sq ft (66.2 kg/m <sup>2</sup> ) | Stalling speed, flaps down   | 80 knots (92 mph; 150 km/h)   |
| Max power loading: |   | Max rate of climb at S/L   | 1,640 ft (500 m)/min          |
| Normal, 160 hp     | 12.06 lb/hp (5.47 kg/hp)                |  |                               |
| Normal, 200 hp     | 9.90 lb/hp (4.50 kg/hp)                 |  |                               |
| Utility, 160 hp    | 11.02 lb/hp (5.00 kg/hp)                |  |                               |

Fiat G222 general-purpose military transport (two 3,400 shp General Electric T64-P-4D turboprop engines)



pared runways or grass fields. Twin-wheel nose unit retracts forward, tandem-wheel main units rearward into fairings on sides of fuselage. Oleo-pneumatic shock-absorbers. Gear can be lowered by gravity in emergency, the nose unit being aided by aerodynamic action and the main units by the shock-absorbers, which remain compressed in the retracted position. Oleo pressure in shock-absorbers is adjustable to permit variation in height of the cabin floor from the ground. Low-pressure tubeless tyres on all units, pressure 50-57 lb/sq in (3.5-4 kg/cm<sup>2</sup>). Hydraulic multi-disc brakes. No anti-skid units.

**POWER PLANT:** Two 3,400 shp General Electric T64-P-4D turboprop engines, each driving a Hamilton Standard 63E60 three-blade variable-pitch metal propeller, diameter 14 ft 6 in (4.42 m). Provision to install in fuselage eight Aerojet JATO rockets to provide a total additional thrust of 7,937 lb (3,600 kg) for T-O with extra-heavy loads.

**ACCOMMODATION:** Crew of three (two pilots and wireless operator/flight engineer) or four on flight deck. Standard seating for 44 fully-equipped troops or 32 paratroops. Alternative payloads include 36 stretcher patients and eight medical attendants or sitting casualties; or up to 20,945 lb (9,500 kg) of military equipment or freight. Typical Italian military equipment loads can include two CL-52 light trucks, one CL-52 with a 105 mm howitzer or one-ton trailer, Fiat AR-59 Campagnola reconnaissance vehicle with 106-mm recoilless gun or 550 lb (250 kg) trailer, or five standard A-22 freight containers. In the ambulance role a second toilet can be installed, and provision can be made to increase the water supply and to install supplementary electrical points and hooks for medical treatment bottles. In the freight rôle a 3,307 lb (1,500 kg) capacity cargo hoist can be installed, and there is provision for up to 135 tie-down points. Crew entry door forward of cabin on port side. Doors at front and rear of main cabin on starboard side and at rear on port side. Underside of upswept rear fuselage lowers to form loading ramp, which can be opened in flight for air-drop operations. Provision is made for pressurisation of cabin in production aircraft, but prototypes have air-conditioning only.

**SYSTEMS:** Starboard main landing gear fairing houses a 152 hp Garrett AiResearch APU for engine starting, hydraulic pump and alternator actuation. Two hydraulic systems, the primary system actuating the flying controls and the secondary system the landing gear, brakes, part of the flying control system and the auxiliaries. Emergency system fed by APU can take over from secondary system in flight. Standby hand pump for emergency use to lower landing gear and, on the ground, for propellers and parking brakes.

**ELECTRONICS AND EQUIPMENT:** Navigation equipment includes inertial PHI system with 12 pre-selectable stations, Doppler, two-axis gyro platform, VOR/ILS, TACAN, radio direction finder, DME, marker beacon, weather radar with secondary navigation capability, radar altimeter and ATC/IFF. Provision for installing head-up display. Communications equipment includes a 3,500-channel UHF/AM radio, a three-channel emergency UHF/AM radio with 1,630 channels, a 930-channel VHF/FM set usable as a direction finder, a 28,000-channel HF/AM SSB CW set, and an intercom acting as mixer and amplifier for all other systems.

#### DIMENSIONS, EXTERNAL:

|                                    |                       |
|------------------------------------|-----------------------|
| Wing span                          | 94 ft 6 in (28.80 m)  |
| Wing aspect ratio                  | 9.15                  |
| Length overall                     | 74 ft 5½ in (22.70 m) |
| Height overall                     | 32 ft 1¾ in (9.80 m)  |
| Fuselage, max diameter             | 11 ft 7¾ in (3.55 m)  |
| Tailplane span                     | 40 ft 8¼ in (12.40 m) |
| Wheel track                        | 12 ft 0½ in (3.67 m)  |
| Wheelbase (to c/l of main units)   | 20 ft 5½ in (6.235 m) |
| Distance between propeller centres | 31 ft 2 in (9.50 m)   |

#### DIMENSIONS, INTERNAL:

|             |                                    |
|-------------|------------------------------------|
| Main cabin: |                                    |
| Length      | 28 ft 1¾ in (8.58 m)               |
| Width       | 8 ft 0½ in (2.45 m)                |
| Height      | 7 ft 4½ in (2.25 m)                |
| Volume      | 1,660 cu ft (47.0 m <sup>3</sup> ) |

#### AREA:

|              |                                     |
|--------------|-------------------------------------|
| Wings, gross | 968.75 sq ft (90.0 m <sup>2</sup> ) |
|--------------|-------------------------------------|

#### WEIGHTS AND LOADINGS:

|                         |   |
|-------------------------|---|
| Weight empty            | 29,321 lb (13,300 kg)                   |
| Weight empty, equipped  | 32,408 lb (14,700 kg)                   |
| Max payload             | 20,943 lb (9,500 kg)                    |
| Normal T-O weight       | 54,000 lb (24,500 kg)                   |
| Max T-O weight          | 57,320 lb (26,000 kg)                   |
| Max zero-fuel weight    | 53,351 lb (24,200 kg)                   |
| Max landing weight      | 56,217 lb (25,500 kg)                   |
| Max wing loading        | 59.2 lb/sq ft (289 kg/m <sup>2</sup> )  |
| Max cargo floor loading | 153.6 lb/sq ft (750 kg/m <sup>2</sup> ) |
| Max power loading       | 2.9 lb/shp (1.3 kg/shp)                 |

#### PERFORMANCE (estimated, at max T-O weight):

|   |                                  |
|---|----------------------------------|
| Max level speed at 15,000 ft (4,575 m)                | 286 knots (329 mph; 530 km/h)    |
| Cruising speed at 14,750 ft (4,500 m)                 | 237 knots (273 mph; 440 km/h)    |
| Minimum speed   | 78.5 knots (90 mph; 145 km/h)    |
| Time to 14,750 ft (4,500 m)                           | 10 min 30 sec                    |
| Max rate of climb at S/L                              | 1,890 ft (576 m)/min             |
| Rate of climb at S/L, one engine out                  | 433 ft (132 m)/min               |
| Service ceiling                                       | 25,000 ft (7,620 m)              |
| T-O run   | 1,936 ft (590 m)                 |
| T-O to 50 ft (15 m)                                   | 3,018 ft (920 m)                 |
| Landing from 50 ft (15 m)                             | 2,000 ft (610 m)                 |
| Landing run at max landing weight                     | 1,214 ft (370 m)                 |
| Accelerate-stop distance                              | 3,396 ft (1,035 m)               |
| Min ground turning radius                             | 68 ft 3 in (20.80 m)             |
| Basic mission range with 11,025 lb (5,000 kg) payload | 1,753 nm (2,019 miles; 3,250 km) |
| Ferry range with max fuel                             | 2,832 nm (3,262 miles; 5,250 km) |

#### CESSNA

CESSNA AIRCRAFT COMPANY; Head Office and Works: Wichita, Kansas 67201, USA

#### CESSNA CARDINAL RG

On 3 December 1970 Cessna announced this new version of their Cardinal single-engined four-seat cabin monoplane which introduces retractable tricycle-type landing gear, a more powerful fuel-injection engine and a number of new standard and optional items.

The landing gear is retracted by a simplified self-contained hydraulic system, which has an electrically-powered hydraulic pump that provides a maximum system pressure of 1,500 lb/sq in (105 kg/cm<sup>2</sup>). A safety hand pump, for emergency retraction or extension of the gear, is designed to eliminate the need for complex sequencing valves in the hydraulic power pack. When the landing gear is retracted, the nose unit is faired by wheel doors; the main gear is retained flush with the fuselage, needing no doors.

Flight instruments are mounted directly in front of the pilot in the conventional "T" arrangement; engine instruments are placed adjacent to their respective controls. The instrument panel has a non-glare grey finish, and black-faced instruments make it easier for the pilot to monitor them.

Safety features include inertial seat harness for both pilot and co-pilot, available optionally for passenger seats, as well as padding of front seat backs, door posts and upper and lower instrument panel areas.

The interior is fully carpeted and there is a choice of eight standard three-colour interior finishes. Standard seating has fore and aft adjustment, but fully-adjustable seating is available optionally. A choice of eight three-colour styling combinations is available for the external finish, the colours being electrostatically bonded to the aircraft's metallic surface.

All available details follow:

**TYPE:** Four-seat cabin monoplane.

**WINGS:** Cantilever high-wing monoplane.

Wing section NACA 64A215 at root, NACA 64A412 at tip. Dihedral 1° 30'. Incidence 4° 7.2' at root, 0° 43.2' at tip.

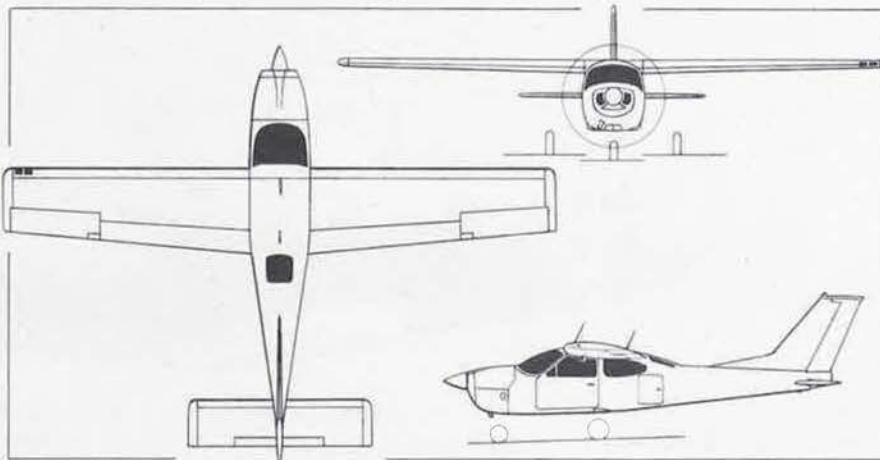
All-metal structure except for glass-fibre wingtips. All-metal ailerons. Electrically-operated all-metal trailing-edge flaps.

**FUSELAGE:** All-metal semi-monocoque structure of low profile.

**TAIL UNIT:** Cantilever all-metal structure with swept vertical surfaces. All-moving tailplane with large controllable trim-tab.

**LANDING GEAR:** Hydraulically-retractable tricycle type. Tubular spring-steel main gear

Cessna Cardinal RG four-seat cabin monoplane with retractable landing gear







Cessna Cardinal RG (200 hp Lycoming AIO-360-A1A engine)

struts, retracting rearward into fuselage. Nose-wheel, which retracts rearward into fuselage nose, is carried on a short-stroke oleo-pneumatic shock-strut with hydraulic damper, and is steerable. Nose-wheel faired by wheel-doors when retracted. Hydraulic brakes. Parking brake.

**POWER PLANT:** One 200 hp Lycoming AIO-360-A1A four-cylinder horizontally-opposed air-cooled engine, driving a two-blade constant-speed metal propeller, diameter 6 ft 6 in (1.98 m). Pointed metal spinner. Fuel is carried in a 25.5 US gallon (96.5 litres) integral tank in each wing. Total fuel capacity 51 US gallons (193 litres) of which 50 US gallons (189 litres) are usable. Refuelling point in top of each wing. Oil capacity 2 US gallons (7.6 litres).

**ACCOMMODATION:** Cabin seats four in two pairs. Baggage compartment in rear fuselage, capacity 120 lb (54 kg), with large forward-hinged external access door on port side of fuselage. Forward-hinged door on each side of cabin, forward of main landing gear. Cabin heated and ventilated.

**SYSTEMS:** Electrical supply for power to wing flaps, hydraulic motor, avionics and lighting. Hydraulic system for landing gear retraction and brakes.

**ELECTRONICS AND EQUIPMENT:** Wide range of optional electronics includes Cessna Series 300 or 400 nav/com radios and a choice of three Cessna autopilots. Standard equipment includes inertial safety belts for pilot and co-pilot, landing lights in port wing and omni-flash beacon at tip of fin.

**DIMENSIONS, EXTERNAL:**

Wing span 35 ft 6 in (10.82 m)  
 Wing chord at root 5 ft 6 in (1.68 m)  
 Wing chord at tip 4 ft 0 in (1.22 m)  
 Length overall 27 ft 3 in (8.31 m)  
 Height overall 8 ft 7 in (2.62 m)  
 Tailplane span 11 ft 10 in (3.61 m)  
 Wheel track 7 ft 10 in (2.39 m)  
 Passenger doors (each):  
 Width 4 ft 0 in (1.22 m)

**AREA:**

Wings, gross 174.0 sq ft (16.2 m<sup>2</sup>)

**WEIGHTS AND LOADINGS:**

Weight empty (approx) 1,630 lb (739 kg)  
 Max T-O weight 2,800 lb (1,270 kg)  
 Max wing loading 16.1 lb/sq ft (78.6 kg/m<sup>2</sup>)  
 Max power loading 14.0 lb/hp (6.4 kg/hp)

**PERFORMANCE (at max T-O weight):**

Max level speed at S/L 153 knots (176 mph; 283 km/h)  
 Max cruising speed (75% power) at 7,000 ft (2,135 m) 144 knots (166 mph; 267 km/h)  
 Econ cruising speed at 10,000 ft (3,050 m) 117 knots (135 mph; 217 km/h)  
 Stalling speed, flaps up, power off 57 knots (66 mph; 106 km/h)  
 Stalling speed, flaps down, power off 50 knots (57 mph; 92 km/h)  
 Max rate of climb at S/L 860 ft (262 m)/min

Service ceiling 16,900 ft (5,150 m)  
 T-O run 890 ft (271 m)  
 T-O to 50 ft (15 m) 1,585 ft (483 m)  
 Landing from 50 ft (15 m) 1,350 ft (411 m)  
 Landing run 730 ft (223 m)  
 Range at max cruising speed, no reserve 664 nm (765 miles; 1,231 km)  
 Range at econ cruising speed, no reserve 777 nm (895 miles; 1,440 km)

**SHIN MEIWA**

SHIN MEIWA INDUSTRY CO LTD;  
 Head Office: 1-5-25, Kosone-Cho, Nishino-miya City, Hyogo Prefecture, Japan

**SHIN MEIWA SS-2 and SS-2A**

JMSDF designation: PS-1  
 After seven years of basic study and re-

Another view of the Cessna Cardinal RG (200 hp Lycoming AIO-360-A1A engine)





Model of the projected Shin Meiwa SS-2A multi-purpose amphibian

search, Shin Meiwa was awarded a contract in January 1966 to develop, under the designation PX-S, a new STOL anti-submarine flying-boat for the Japan Maritime Self-Defence Force.

As part of the development programme for this aircraft, the company first rebuilt a Grumman UF-1 Albatross as a dynamically-similar flying scale model of the new design, under the designation UF-XS. This aircraft was described and illustrated in the 1964-65 *Jane's*.

The first PX-S prototype (5801), designed by a team under Dr Shizuo Kikuhara, was completed in August 1967 and flew for the first time on 5 October 1967. It was delivered to the JMSDF on 31 July 1968 after completing manufacturer's flight testing. The second prototype, which flew on 14 June 1968, was handed over on 30 November 1968. These two aircraft were delivered to the 415th Flight Test Squadron of the JMSDF.

A third and fourth aircraft were ordered by the JMSDF on 29 March 1969. These are pre-series aircraft: they are designated PS-1 by the JMSDF and SS-2 by Shin Meiwa. Deliveries are scheduled for September 1971 and January 1972 respectively. In the meantime, production contracts are to be negotiated for the remaining 10 aircraft required by the JMSDF, with delivery of all 14 to be completed by March 1974. Purchase of a further 20 by 1976 is planned.

Shin Meiwa has also announced details of an amphibious version, the SS-2A, for multi-purpose application as an air/sea rescue aircraft, cargo transport and pressurised STOL transport. Design of the SS-2A was begun in June 1970; major differences from the PS-1 are a reduction of 1 ft 1/2 in (0.34 m) in overall wing span, installation of more powerful T64 turboprop engines and the fitting of a fully-retractable tricycle landing gear.

The basic structural description of the PS-1, as given in the 1970/71 *Jane's*, is generally applicable to the SS-2A, except as indicated below.

**TYPE:** Four-turboprop STOL anti-submarine flying-boat (PS-1) or multi-purpose amphibian (SS-2A).

**LANDING GEAR (SS-2A):** Hull, as PS-1, plus hydraulically-retractable tricycle landing gear with rearward-retracting twin wheels on all units. Oleo-pneumatic shock-absorbers. Main units, housed in bulged fairings on hull sides, have 40 in (103 cm) diameter tyres; nose-wheels have 25 in (63.5 cm) diameter tyres. Tyre pressure (all units) 113 lb/sq in (7.95 kg/cm<sup>2</sup>). No anti-skid units.

**POWER PLANT (SS-2A):** Four 3,400 shp General Electric T64-P4C turboprop engines, each driving a Hamilton Standard 63E60 three-blade constant-speed reversible-pitch fully-feathering metal propeller of 14 ft 6 in (4.42 m) diameter. Additionally, one 1,400 shp General Electric T58-GE-10 gas turbine, driving an IHI compressor, to provide BLC power for control surfaces. Fuel in wing tanks (2,117 Imp gallons; 9,624 litres) and fuselage tanks (2,439 Imp gallons; 11,088 litres); total capacity 4,556 Imp gallons (20,712 litres). Refuelling point near bow hatch.

**ACCOMMODATION (SS-2A):** Air/sea rescue version has accommodation for crew of 12 and 20 survivors, with 18 casualty litters, 2 auxiliary seats and 5 observers' seats. Rescue hatch on port side of fuselage, aft of wing. Cabin air-conditioning standard.

**SYSTEMS (SS-2A):** Bootstrap-type air-conditioning system. Two independent hydraulic systems, each 3,000 lb/sq in (210 kg/cm<sup>2</sup>). Pneumatic and electrical systems as PS-1. Air/sea rescue version has oxygen system for all crew and litter stations. AirResearch GTCP85-131J APU.

**ELECTRONICS AND EQUIPMENT (SS-2A):** MHF, HF, VHF, UHF transmitter-receivers, ICS and search radar. Nav/com equipment includes inertial navigation system, LORAN, ADF, marker beacon, TACAN, IFF transponder. Other equipment includes Doppler and wave-height meter.

**DIMENSIONS, EXTERNAL:**

**Wing span:**  
 PS-1 108 ft 8 3/4 in (33.14 m)  
 SS-2A 107 ft 7 1/4 in (32.80 m)

**Wing aspect ratio (SS-2A)** 8  
**Length overall** 109 ft 11 in (33.50 m)  
**Height overall:**  
 PS-1 31 ft 10 1/2 in (9.715 m)  
 SS-2A 32 ft 3 1/2 in (9.84 m)  
**Tailplane span** 40 ft 6 1/2 in (12.36 m)  
**Wheel track:**  
 PS-1 (beaching gear) 10 ft 2 in (3.10 m)  
 SS-2A 11 ft 8 1/4 in (3.56 m)  
**Wheelbase:**  
 PS-1 (beaching gear)  
 SS-2A 26 ft 10 3/4 in (8.20 m)  
 SS-2A 27 ft 4 1/4 in (8.34 m)  
**Rescue hatch, SS-2A** (port side, rear fuselage):  
**Height** 5 ft 7 in (1.70 m)  
**Width** 4 ft 7 in (1.40 m)

**AREAS:**  
**Wings, gross:**  
 PS-1 1,462 sq ft (135.8 m<sup>2</sup>)  
 SS-2A 1,453 sq ft (135.0 m<sup>2</sup>)

**WEIGHTS AND LOADINGS (SS-2A, search and rescue):**

**Weight empty, equipped** 54,235 lb (24,600 kg)  
**Max oversea operating weight** 82,895 lb (37,600 kg)  
**Max T-O weight** 94,800 lb (43,000 kg)  
**Max wing loading** 65.3 lb/sq ft (319 kg/m<sup>2</sup>)  
**Max power loading** 6.97 lb/shp (3.15 kg/shp)

**PERFORMANCE (SS-2A, air/sea rescue role, estimated, at max T-O weight except where indicated):**

**Max level speed** 300 knots (345 mph; 556 km/h)  
**Max cruising speed at 10,000 ft (3,050 m)** 250 knots (288 mph; 464 km/h)  
**T-O and landing run on water at AUW of 82,895 lb (37,600 kg)** 300 ft (91.5 m)

**Landing field length on land at AUW of 88,000 lb (39,920 kg)** 5,000 ft (1,525 m)

**Runway LCN requirement at max T-O weight** 37

**Minimum ground turning radius** 68 ft 4 1/4 in (20.835 m)

**Radius of search operation at AUW of 94,800 lb (43,000 kg)** 1,000 nm (1,150 miles; 1,850 km)

# Airman's Bookshelf

## A Balanced Critique

*The Military Establishment: Its Impacts on American Society*, by Adam Yarmolinsky. Harper & Row, New York, N.Y., 1971. 420 pages plus index. \$10.

If Pentagon veterans sense that this book does not read like the Adam Yarmolinsky they knew, they will be right. Although it carries his byline, it was written by a team of about thirty persons, financed by the Twentieth Century Fund, and put together under Mr. Yarmolinsky's leadership as research director for the study. There is no evidence of abrasiveness or arrogance in its scholarly pages. And M. J. Rossant, Director of the Twentieth Century Fund, says in a foreword that the book "cannot be considered an antimilitary document, nor was it intended as such."

The book achieves this goal so successfully that the shriller Pentagon critics are disappointed. At the same time, Mr. Yarmolinsky is critical, and makes no bones about it. He suspects our military operations are "politically self-destructive and morally repugnant to vast and increasing numbers of Americans." But even against this backdrop, he says in the preface, "it is impermissible to allow emotion to cloud analysis." There is one chapter on the "Ideological Education of the Military and the Public." It should have been studied closely by the Columbia Broadcasting System before their emotional script writers turned out the recent controversial documentary called "The Selling of the Pentagon." The Yarmolinsky treatment is critical, but accurate and dispassionate. Being that, it would not make exciting TV fare.

With so many authors contributing, it is natural that the book is marred by some inconsistency. There is, for example, a chapter on the military-industrial complex, called an "alliance" in this case. Defense contractors will call it unfair. It cites A. E. Fitzgerald, a disenchanted Air Force employee, as an authority on the reasons why USAF turned to industry instead of an arsenal concept at the outset of the missile age. The reasons and timing given are wrong and lead the author, in this case, to conclude that private companies now make major public decisions. If they have, in the past decade or so, they were poor ones that have depreci-

ated almost all defense-industry stock. There is a later, and better, chapter on weapons acquisition. It shows evidence of more sophistication.

Gripping about the budget also has to be part of the book, but Mr. Yarmolinsky's experience for several years as a high-ranking aide to Defense Secretary Robert S. McNamara provides unexpected discretion on this subject as well. He acknowledges, for example, that the companies most dependent on military orders are not the industrial giants. He also acknowledges that our military establishment is shrinking, not growing. Because of the nature of his study, and not because of neglect, there is minimal reference to the size and nature of the threats to our national security.

—Reviewed by Claude Witze,  
Senior Editor, AIR FORCE  
Magazine.

## Soviet-Israeli Relations

*Moscow and Jerusalem: Twenty Years of Relations Between Israel and the Soviet Union*, by Avigdor Dagan. Abelard-Schuman, New York, N.Y., 1970. 247 pages with bibliography and index. \$6.95.

It would be a mercy to researchers if other diplomatic histories were as lucidly written and as much to the point as this short and informative study of the rocky relations between the Soviet Union and Israel. The author of *Moscow and Jerusalem* is a veteran Israeli diplomat who twice headed the Israeli Foreign Ministry's East European Department and has served as Israeli Ambassador to Poland and Yugoslavia. Czech-born, he is a one-time colleague of the late Jan Masaryk in the Czech Foreign Ministry, and is currently Israeli Ambassador to Norway.

Dr. Dagan's thesis is simple and he documents it skillfully: Soviet policy vis-à-vis Israel, a policy that started with strong advocacy of the Jewish state, and evolved by the mid-1950s into increasingly anti-Israeli positions, accompanied by inflammation of the Arab-Israeli conflict, reflects the Soviet will to reduce Western influence in the Middle East while at the same time enlarging the Russian presence and power in this strategic area. The shift from Soviet support of Israel in the early days to the onslaught of the past decade and a half is, in Dr. Dagan's

view, in line with classic Russian policy in an area viewed by Moscow as a Russian sphere of influence.

Dr. Dagan explains the early, strong Soviet support of Israel as the Russian way of driving the British and French out of the Middle East and keeping US influence at a minimum.

Dr. Dagan makes clear that Israel, conscious of its delicate position between East and West blocs, tried, from the start, to assume a nonaligned stance. The Russians wanted more: Israeli neutrality in favor of the Soviets. Israel's general support of United Nations actions in Korea undoubtedly irritated the Soviets and was an important but not the single factor that, by the mid-1950s, led the Soviets to a new policy of strong support—and finally the arming—of the Arabs who now seemed a more pliable and useful set of partners to the Russians than did the Israelis.

The 1956 war gave new impetus to Soviet support of the Arabs, and Dr. Dagan leaves little doubt that it was the Soviets, with their unfounded charges of Israeli troops massing on the Syrian border in 1967, who poured fuel on the fire prior to the outbreak of the Six-Day War.

Dr. Dagan's richly documented analysis is coolly presented. In the end, viewing the future of the presently ruptured relations between the two states, he suggests that if the Soviet Union sees advantage, as it once did, in supporting Israel, or at least ending its one-sided support of the Arabs, it will not find it hard to shift its line. He recalls Jan Masaryk's remark: "Soviet policy is ninety percent tactics and only ten percent ideology."

—Reviewed by William Leavitt,  
Senior Editor, AIR FORCE  
Magazine. Mr. Leavitt recently visited Israel.

## Filling an Information Gap

*The Middle East in Revolution*, by Sir Humphrey Trevelyan. Gambit, Boston, Mass., 1971. 275 pages. \$5.95.

Students of Middle Eastern politics usually speculate that the Western governments have not always been as astute and evenhanded in conducting official business with Arab countries as governmental documents might imply. With the publication of this work, the speculation is in part realized; how-

## Airman's Bookshelf

ever, due to the author's combination of literary talent and political insight, the reader develops an empathetic realization that those actually carrying out governmental policies in these countries have been faced with unique problems that could, in fact, have been handled with much less success.

This book, while not intended for the novice Middle East observer, fills an information gap for those who wish to look behind the headlines to gain some appreciation for the subtleties of conducting sensitive international diplomacy in the Arab Middle East during periods of extreme tension and intrigue.

Sir Humphrey served as British Ambassador to Cairo during the period immediately before, and throughout, the Suez Crisis of 1956. His next post in the Middle East was Baghdad during the troubled aftermath of the 1958 Iraqi revolution. He was there until 1961. Then, in 1967, he returned to the diplomatic corps from retirement, to serve as the last High Commissioner of Aden. One's initial impression could be that Sir Humphrey's foreign-service career was oriented around the dissolution of the British Empire in the Middle East. On reflection, however, it is a meaningful measure of the man's skill and stature that he alone was given the responsibilities of these sensitive posts. It would be a valid extrapolation to say that his unique vantage points have made his memoirs an interesting and entertaining, though not unbiased, account of events and personalities associated with these important periods in Middle East politics.

Sir Humphrey has organized his book into three segments, dealing with the three periods of his service. He gives the most complete treatment to the events in Cairo during 1955-56, and it is from this portion that the reader catches glimpses of President Nasser that reveal facets of the man's personality and philosophy not generally reported in Western accounts of Nasser's political career. Sir Humphrey's sympathetic recounting of the motivations and goals of the late Egyptian leader is undoubtedly the highlight of the book.

His not-so-sympathetic treatment of Iraqi Premier Qasim offers to the reader a curious study in contrasting styles and personalities of former Arab leaders. The author's account of events in Aden is less oriented around personalities, more given to examination of the

complicated considerations surrounding the British withdrawal. It is in this latter portion of the book that aspiring diplomats will wish to reflect on the dangers inherent in such an undertaking as reported by the author.

This book is not light reading for the casual student, nor is it mere repetition of the rhetoric of others who have written without benefit of position or privileged information. Rather, it is a factual account of significant and unique happenings chronicled by the single man qualified to offer such firsthand insights. It offers valuable material to historians and political scientists alike.

—Reviewed by Capt. James F. Wheeler, Assistant Professor of Political Science, USAF Academy.

### Aviation's Most Colorful Decade

*Oceans, Poles and Airmen*, by Richard Montague. Random House, New York, N.Y., 1971. 278 pages plus appendices and index. \$6.95.

This book is a painstaking and workmanlike summarization of the sensational flights that marked the so-called "Lindbergh era" of aviation. It was written by a former newspaper reporter who covered several of the spectacular air adventures that ushered in this decade of frenetic transoceanic and polar flying—and who colorfully describes both its successes and its disasters.

The book's highlight unquestionably is its blunt portrayal of the late Rear Adm. Richard Evelyn Byrd as the all-time phony in the history of human flight. It concedes that he performed at least one heroic act at the risk of his own life, but maintains, convincingly, that his greatest claim to fame—that of being the first explorer to fly over the North Pole—was a fraud, "which persisted for nearly half a century."

This has been hinted at by foreign geographical experts and others from the time Byrd and his Navy pilot, Floyd Bennett, returned from their now-challenged flight in 1926. But his claim (and the meager aerial observations he submitted to substantiate it) was accepted without question by the National Geographic Society, which, incidentally, was one of the flight's sponsors. Now, ironically, Mr. Montague supports his accusation with the quoted words of the long-dead pilot, Bennett, and of his wife, Cora, shortly after her husband's death.

In essence, Bennett's story was that, following his takeoff with Byrd from King's Bay, Spitzbergen, an oil leak developed in one of their plane's

engines, and Byrd ordered him to turn back fifteen or twenty miles to the north coast of Spitzbergen. There, out of sight of King's Bay or any other human habitation, they "flew back and forth" along the coastline "for a while and the leak stopped." On Byrd's orders, he said, they continued this coastal patrol "for fourteen hours," then returned to King's Bay fifteen and one-half hours after their takeoff, and Byrd announced that they had reached and circled the Pole.

Bennett's version of the flight is supported by lengthy technical and scientific passages in the book, which indicate that the known cruising speed of Byrd's plane and the hourly fuel consumption rate of its engines made it impossible for the craft to have completed a polar round trip during the period it was aloft.

Of the men and women flyers about whom he writes, Mr. Montague says his book "is an effort to keep their memories bright a little longer" and to portray them "not just as romantic figures but as human beings" in a time of international hysteria over sensational feats of flying. In the main, he has done the job superbly and sympathetically, although he applies the acid brush of sarcasm to the few he deems nonheroes of this hectic era of derring-do in aviation—notably to Admiral Byrd and Charles A. Levine. The latter, who had made millions reprocessing World War I military junk, owned the airplane that Clarence D. Chamberlin flew from New York to Germany. Levine rode with him as the first passenger to fly this route. His antics before, during, and after that flight, and his subsequent police record cover page after page of Mr. Montague's book, and help make it a volume well worth reading.

—Reviewed by C. B. Allen. For many years, Mr. Allen was Aviation Editor of the New York Herald Tribune.

### Growth of a General

*Dear General: Eisenhower's Wartime Letters to Marshall*, Joseph P. Hobbs (ed.). The Johns Hopkins Press, Baltimore, Md., 1971. 255 pages with index, glossary, and bibliography. \$10.

This collection is the raw material of history refined by an able historian. Here are seventy-five significant letters sent by Eisenhower to his chief supporter and mentor, General of the Army George C. Marshall, from the time of Torch (the invasion of North Africa) to victory in Europe. Hobbs provides concise and informative introductions to each body of letters, out-

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## Airman's Bookshelf

lining the preparations for and execution of Torch, Husky (the invasion of Sicily), and Overlord (the 1944 invasion of Europe).

The editor has done a superior job of cross-referencing the letters to other source documents and to published material. It is his help in digesting the letters that makes the book valuable. No one will be able to write of Eisenhower or of his era without consulting this, or the much larger collection from which it comes.

One clearly sees the growth of Eisenhower as a man and general. Without doubt, the trickiest problem discussed in the letters was unity of command. Ike, who did not want to see the coalition command problems of World War I repeated, shared Marshall's distaste for command by committee. Throughout all his battles with the Germans, he had to fight the British on this issue. He won, with Marshall's help in Washington on the Combined Chiefs of Staff, and by dint of his own tact and warmth.

Eisenhower's role as a strategist and tactician is highlighted. Out of loyalty to Marshall, he executed Torch and prepared for Sledgehammer (a minor cross-Channel attack, scheduled for the fall of 1942) in accord with Marshall's strategy—even when he disagreed. But by the time of Overlord, he was making, and not simply implementing, strategy.

Eisenhower's problems with subordinates form a major portion of the letters. We learn which generals let him down and which ones never failed him. Ike prized personal loyalty above everything else.

Eisenhower's political difficulties with British and French officials are well illustrated, as are his problems with weather, shortages of landing craft, and other tools of war. His belief in airpower and the cooperation he received from Spaatz and Harris are well defined.

Without doubt, Eisenhower's reputation as a man and a leader will be enhanced by this fine work.

—Reviewed by Maj. Alan L. Gropman, Department of History, USAF Academy.

### From Stonehenge to Tranquility

*Moon: Man's Greatest Adventure*, Davis Thomas (ed.), with text by Silvio A. Bedini, Wernher von Braun, and Fred L. Whipple.

Harry N. Abrams, New York, N.Y., 1970. 265 pages with 278 illustrations (143 in full color). \$45.

Davis Thomas, in collaboration with Silvio Bedini of the Smithsonian Institution; Wernher von Braun, Deputy Associate Administrator of NASA; and Fred L. Whipple, Harvard astronomer and Director of the Smithsonian Astrophysical Laboratory, has produced a huge, magnificently illustrated book on the history of man's relations with the moon. The pages are twelve by fifteen inches. Many of the color illustrations—charts, maps, and photographs—may be removed for framing. The book covers a period of forty centuries, beginning with Stonehenge and culminating in the lunar landings of Apollo-11 and -12.

Mr. Bedini, in the best of the essays, traces the history of man's fascination with, religious beliefs in, and scientific observations of the moon. From this background, *Moon* proceeds with a concise account of the space age, beginning with the launch of Sputnik-1 by the USSR on October 4, 1957, and ending with the lunar landings.

The Apollo-11 mission, and what it means to the human race, is described in detail by Dr. von Braun. Included in this section are large photographs of the Apollo astronauts on the moon and one of the most comprehensive foldout diagrams of the Apollo-11 mission that this reviewer has seen.

Fred Whipple describes the scientific theories of the moon's origin and discusses its surface composition and possible geologic structure. He evaluates the impact of the latest findings on current theories about the moon and explains how future space exploration may lead to the solution of that great mystery, the origin and evolution of the solar system.

This book is one object that truly "must be seen to be appreciated." It is worth having both for its literary and artistic merit, and as a collector's item.

—Reviewed by Robert C. Smith.  
Mr. Smith is an aerospace and urban systems analyst.

### New Books in Brief

*Communism and the New Left*. This *US News & World Report* paperback gives an overall view of the diverse elements of the far left, their philosophies, tactics, targets, objectives, and probable future importance. An appendix contains documents in which leading groups describe their plans to destroy the present system in the US. Books by US News and

World Report, Washington, D.C., 1970. 223 pages with index. \$2.95.

*The Debden Eagles*, by Garry L. Fry. A copiously illustrated history of the 4th Fighter Group of World War II, in large paperback format. The Group's activities are covered from RAF Eagle Squadron beginnings to November 1945. Most of the hundreds of pictures come from personal albums of Group members. Walker-Smith, Inc., Box 104, Whittier, Calif. 90608, 1971. 102 pages with index. \$6.50.

*Sky Battle: 1914-1918*, by David C. Cooke. A veteran aviation writer traces the development of aviation during World War I in a highly readable account of the planes, their developers, and the men who flew them. Illustrations include some relatively unknown aircraft of the period. Appendices list all aces of both sides and technical data on the leading aircraft. W. W. Norton, New York, N.Y., 1970. 304 pages with appendices and index. \$5.95.

*To Build a Nation*, by Park Chung Hee. About half of this book by the President of the Republic of Korea recounts highlights of Korea's 4,000-year history. The latter half covers in considerably more detail the undeniable economic, social, and political achievements during Park's decade in office. The book has a chronology of Korean history and many illustrations, some in color. Acropolis Books, Washington, D.C., 1971. 214 pages with index. \$10.

*USS Houston: Ghost of the Java Coast*, by Capt. Walter G. Winslow, USN (Ret.). One of the cruiser *Houston's* few survivors tells the story of her sinking on February 29, 1942, by a Japanese fleet in the Java Sea. The mystery of her disappearance was not resolved until the war ended and survivors were repatriated from Japanese POW camps throughout Southeast Asia. Fighting Ships, Box 34429, Bethesda, Md. 20034, 1971. 24 pages plus large foldout of the *Houston*. \$2.

Recently published titles in Ballantine's Illustrated History of the Violent Century series, produced in cooperation with the Imperial War Museum, London, are: *Hitler*, by Alan Wykes; *The Conspirators—20th July 1944*, by Roger Manvell; *MacArthur*, by Sydney L. Mayer; *New Guinea—The Tide Is Stemmed*, by John Vader; *Barbarossa—Invasion of Russia 1941*, by John Keegan; and *Battle of the Ruhr Pocket*, by Charles Whiting. Ballantine Books, New York, N.Y. All titles are paperback, 160 pages. \$1 each. ■

# The Bulletin Board

By Patricia R. Muncy

ASSISTANT FOR MILITARY RELATIONS

## Retirement, Survivor Benefits

*In late April, the following letter from AFA President George D. Hardy was sent to the Hon. Roger T. Kelley, Assistant Secretary of Defense (Manpower and Reserve Affairs), in response to queries from his Inter-agency Committee to Study Uniformed Services Retirement and Survivor Benefits (see also "Aerospace World," May '71 issue, p. 33):*

Dear Mr. Secretary:

On behalf of our National Officers and Directors and our more than 100,000 members, I am honored to respond to your letter of April 2, and to express our Association's views on the subjects of military retirement and survivor benefits.

The Air Force Association has long endorsed, through formal resolutions by our National Delegates in Convention, the principle of recomputation of retired pay, early retirement on a reduced annuity basis for active members of the National Guard and Reserve, and equalization of survivor benefits.

Listed below are brief comments which sum up our position on those questions presently under consideration by your Committee and which you submitted to us. Our rationale for these positions is covered in greater detail in an attachment to this letter.

The Air Force Association recommends that:

1. Military retirement benefits be initially computed in accordance with existing procedures. Benefits should be subsequently adjusted as required to keep them in accord with those of the active-duty forces.

2. Disability retirement benefits be administered by the Veterans Administration, and be the same for all individuals possessing the same degree of disability. If, in addition, a military member qualifies for length-of-service retirement, his eligibility for this should be separate and distinct from his disability. This retirement benefit should be administered by the Department of Defense in the same manner as all other earned retirement benefits.

3. Payments to survivors of active duty and Reserve personnel should be calculated and administered by the Veterans Administration, in accor-

dance with existing procedures. Administration of payments and related benefits to survivors of military retirees should be handled by the respective service or the Department of Defense. This Association concurs in principle with the provisions of legislation now under consideration to amend Chapter 73 of Title 10, U.S. Code (S. 235 and H.R. 984), to establish a survivor benefit plan. We take exception, however, to that portion of the legislation which links survivor benefits to Social Security benefits, believing that survivor benefits were earned and paid for separately, and thus should remain separate.

4. Equal compensation should be paid for equal rank and equal years of service by basing military retired pay upon prevailing active-duty pay scales.

Our Association also asks that your Committee consider Reserve retirement at an age earlier than sixty years but not less than fifty-five years, based on an actuarially sound reduced annuity which would not increase the overall cost of the retirement program.

We have continually worked in support of the men and women in service to our country. The opportunity to present our convictions on these subjects is deeply appreciated.

With best wishes to you and the members of your Committee, I am

Respectfully,

GEORGE D. HARDY

President  
Air Force Association

## Reserve/Guard Realignment

The Department of the Air Force recently announced realignment involving the Air National Guard and Air Force Reserve forces at twenty-nine locations throughout the United States.

These actions, which include unit reorganizations and conversions to more modern aircraft, resulted from recent changes in the composition of active forces both at overseas locations and in the continental US. Aircraft currently assigned to these active units



*A National Aviation Club mural depicting the Wright brothers' historic first flight is a fitting backdrop for AFA's top NCO advisers as they pose with Chief Master Sergeant of the Air Force Donald L. Harlow, fourth from right, during a recent Airmen Council meeting in Washington, D.C. From left to right: CMSgts. Jimmie L. Collins, Jesus Morado (Chairman), Richard E. Vincent, Freddie J. Walton, Sergeant Harlow, Paul J. D. Barton, Victor P. Tron, Jr., and SMSgt. William M. Goyer.*





SMSgt. Thomas J. Brenner receives the Honor Student Award from AFA President George D. Hardy during recent graduation ceremonies at the Headquarters Command NCO Academy. At the head table are Mrs. Hardy and MSgt. Anthony J. Doppa, Jr., Superintendent of the Academy. Mr. Hardy was guest speaker (see "AFA News," p. 88).

and not required by other Air Guard or Air Reserve organizations will be retired from the Air Force inventory.

Activation of civil engineering heavy repair (Red Horse) units will be the first of this type unit allocated to the Guard/Reserve forces. Individuals assigned to these units will be trained to operate heavy construction equipment on a worldwide basis.

Changes in Air Force Reserve manning will result in a gain of 812 Reserve manpower authorizations and 348 Air Reserve technicians and other

civilian personnel. Realignment actions involving the Air National Guard will effect an increase of 2,009 Guard manpower authorizations and 383 air technician positions.

#### Airmen Council Meets

At its early April meeting in Washington, D. C., the Association's Airmen Council heard Air Force officials outline plans to prepare for the achievement of an all-volunteer military force. The Council also was



Col. Vere Short is the only active-duty pilot to have chalked up 25,000 accident-free flying hours. He is Deputy Commander for Operations of the 443d Military Airlift Wing, Altus AFB, Okla. His flying spans twenty-six years.

briefed on Air Force plans to consolidate existing NCO academies, first on a regional basis, and, eventually, into a major educational facility on a par with the Squadron Officer School.

In addition to a briefing on the current legislative program, Council members were brought up to date on proposed changes in the WAPS Program, and the latest Air Force uniform innovations.

Following is a summary of the Council's recommendations:

- That the AFA Constitution be amended to allow active-duty members the option to vote and hold elective office up to Chapter President level, a proposal previously advanced by the Junior Officer Advisory Council.

- That AFA urge the Defense Department to seek amendment to the Joint Travel Regulations, authorizing reimbursement for the entire cost of moving mobile homes, and, further, to pay dislocation allowances to eligible military members moving such homes. (At present, reimbursement for moving house trailers covers only a portion of the total cost. Mobile-home dwellers do not receive dislocation allowances even though they often must stay in commercial facilities for many days



Maj. Gen. H. Lee Hogan, III, USAF Director of Information, congratulates Lt. Col. George F. Henrikus, Jr., on receiving the Legion of Merit. Formerly with SAC Hq., Colonel Henrikus now heads the New York Office of USAF Information.

## The Bulletin Board

awaiting the arrival of their homes.)

- That AFA urge the establishment of a Financial Advisory Office on Air Force bases to serve all personnel, but more particularly lower-grade airmen, in all areas of financial planning and assistance.

- That AFA urge the Air Force to amend its regulations to indicate the term of address for Chief Master Sergeants as "Chief," rather than "Sergeant."

- That AFA recommend the use of available educational funds to support



*Lt. Gen. William D. Eckert, USAF (Ret.), died on April 16 while vacationing in the Bahamas. A graduate of the US Military Academy at West Point, he spent thirty-three years on active duty. The former Commissioner of Baseball served for three years as Chairman of AFA's Retired Personnel Council (now the Military Manpower Council).*

on-duty programs of management training for first-line supervisors, both military and civilian, in order to increase their individual awareness and lead to more effective communications and better understanding of their subordinates.

- That AFA request the Air Force to upgrade the Outstanding Airman Ribbon by changing the order of precedence to place it before the Air Force Good Conduct Medal.

- That AFA call upon the Air Force Aid Society to include the Chief Master Sergeant of the Air Force as a permanent member of its Board of Directors.

- That AFA urge the Air Force to change the existing policy of charging weekends and holidays as leave time when such periods coincide with regular leave or vacation time.

### CMSAF

The Air Force has begun its search for a successor to Chief Master Sergeant of the Air Force Donald L. Harlow. Sergeant Harlow, second to fill the position as personal adviser to the Air Force Chief of Staff, will end his Pentagon tour September 30.

Records of more than 2,000 chief



*Brig. Gen. Joel B. Paris, III, has been appointed Assistant Adjutant General for the State of Georgia. General Paris, a WW II fighter ace, retired after twenty years' active duty last September and returned to the Georgia ANG immediately thereafter. General Paris's last active-duty assignment was in the Office of the DCS/Plans and Operations, Hq. USAF.*

master sergeants, each with at least twenty-two years' service and two years in grade as of September 30, are being considered for the top AF enlisted position. Of these, a possible twenty-seven nominees will be interviewed by a central board, to narrow the selection down to three. Final choice, by the Air Force Chief of Staff, will be announced July 30.

Normal term of service for CMSAF is two years, with not more than one

extension at the pleasure of the Chief of Staff.

Nominees must possess the highest standards of personal integrity, duty performance, and financial responsibility. The individual selected must be poised, and articulate. The duties of the CMSAF bring him in frequent contact with the highest levels of military, government, and civic officials and activities.

The new CMSAF will have his work cut out for him if he hopes to equal the high standards and professional écart achieved by Sergeant Harlow and his predecessor, CMSgt. Paul W. Airey, now retired. Both proved to be competent and popular leaders.

### Briefly Noted

- The 1971 edition of the Uniformed Services Almanac, compiled and edited by Lee E. Sharff, is now available to the public. This little almanac is an excellent reference document for all military people. In addition to comprehensive pay tables for both officers and enlisted personnel, it contains detailed information on such things as allotments, insurance, dual compensation, social security, income taxes, veterans benefits, etc. Although not an official publication, all information contained in it was researched from official sources. It costs \$1.25 and can be ordered from Uniformed Services Almanac, P.O. Box 400, Washington, D.C. 20044.

- A selection board is scheduled to meet at the Air Reserve Personnel Center on July 12 to consider promotion of eligible Reserve lieutenant colonels, both on and off extended active duty, to the grade of colonel. Under the provisions of Chapter 21, AF Manual 35-3, eligible officers may send a personal letter directly to the President, USAFR Colonel Selection Board, Air Reserve Personnel Center, 3800 York St., Denver, Colo. 80205. Letters of recommendation on behalf of eligible officers are not appropriate.

- In February the VA processed 61,000 requests from veterans seeking to establish eligibility for GI home loans. This was an eighty-three percent increase over February 1970, and the most for any month since July 1967. The increase apparently was stimulated by the Veterans Housing Act of 1970, plus the recent lowering of mortgage interest rates. The Veterans Housing Act restored unused, expired home-loan benefits to 8,900,000 World War II and Korean conflict veterans, and authorized the VA to guarantee mobile-home loans for veterans and servicemen.

- The Air Force has announced the selection of forty-nine high schools to

host new Air Force Junior Reserve Officer Training Corps (AFJROTC) units in the next two school years. This brings the total number of high schools participating in the AFJROTC program to 194 in FY '72 and to more than 200 in Fiscal 1973. Selection of the new schools is based on their demonstrated interest in aerospace education; facilities and enrollment to support the program; proximity to Air Force bases; and geographic locations. Every attempt is being made to locate AFJROTC units throughout the United States and its possessions.

• Besides being a backup force available for wars, disasters, and civil disturbances, the National Guard is a full-time partner in this country's air defense network. The Army Guard operates more than forty percent of the Nike-Hercules missile sites around key cities, while the Air Guard provides fifty percent of the fighter-interceptor force on round-the-clock runway alert.

• The great "Lib" movement can work both ways! Civil Air Patrol's Annual Nurse Orientation Course, previously open only to female CAP cadets, is now open to male cadets. The course has been presented each year at Sheppard AFB, Tex., to give teen-age CAP members a look at ca-

reer opportunities in the field of nursing. Since men play a vital role in medical services as doctors, veterinarians, laboratory technicians—and nurses—the course will be open in the future to male cadets and will be known as the Medical Services Orientation Program. This year, the course will be held at Sheppard from July 19 to July 23. Highlight of the week will be a simulated disaster exercise and a tour of the School of Aerospace Medicine at Brooks AFB, Tex.

• The 901st Military Airlift Group, L.G. Hanscom Field, Mass., has scored the highest rating ever recorded in the US Air Force Reserve for an Operational Readiness Inspection. The inspection by the Military Airlift Command covered every facet of the unit's capability to launch and recover aircraft and fly far-ranging missions. Each unit assigned to support the 901st flying operation was also examined in detail, as well as the unit's records, morale, appearance, and its ability to respond to simulated emergencies and other assignments that could occur if the nation were threatened. Units are graded on a point system, and the 901st's total of 96.4 percent of the maximum number of possible points established a new record within the Air Reserve. ■



*Long-time Director of Air Force Civilian Personnel, John A. Watts retired May 31 after thirty-five years of federal service, twenty-two of which were spent at the helm of the Air Force Department's civilian corps. A WW II Navy veteran, Mr. Watts transferred to the Air Reserve in 1950 and now holds the rank of colonel. He was instrumental in establishing AFA's Civilian Personnel Advisory Council.*

## Senior Staff Changes

**B/G Conrad S. Allman**, from Chief, Policy Div., Directorate of Personnel Planning, DCS/P, Hq. USAF, to DSC/P, Hq. ATC, Randolph AFB, Tex. . . . **Col. (B/G Selectee) Jesse M. Allen**, from Cmdr., 4403d TFW, TAC, England AFB, La., to Asst., DCS/Plans, Hq. TAC, Langley AFB, Va. . . . **B/G William A. Dietrich**, from Cmdr., USAF Tac. Airlift Ctr., TAC, and add'l duty as Cmdr., 839th Air Div., Pope AFB, N.C., to V/C, 22d AF, MAC, Travis AFB, Calif. . . . **B/G (M/G Selectee) William J. Evans**, from Spec. Asst., Sensor Exploitation, Office, C/S, to Dir., Operational Requirements and Development Plans, DCS/R&D, Hq. USAF, replacing M/G Donavon F. Smith.

**B/G John H. Germeraad**, from Cmdr., 60th MAW, MAC, Travis AFB, Calif., to Cmdr., 834th Air Div., PACAF, Tan Son Nhut Airfield, Vietnam, replacing M/G John H. Herring, Jr. . . . **Col. (B/G Selectee) Abbott C. Greenleaf**, from Cmdr., 483d TAW, PACAF, Cam Ranh Bay AB, Vietnam, to Asst. DCS/Ops, Hq. AFSC, Andrews AFB, Md. . . . **M/G John H. Herring, Jr.**, from Cmdr., 834th Air Div., PACAF, Tan Son Nhut Airfield, Vietnam, to Cmdr., 839th Air Div., TAC, Pope AFB, N.C., replacing B/G William A. Dietrich.

**M/G Homer I. Lewis (USAFR)**, from Reserve Dep. to the Cmdr., HEDCOM, USAF, Bolling AFB, Wash., D.C., to Chief, USAFR, Hq. USAF, replacing retired M/G Tom E. Marchbanks, Jr. . . . **Col. (B/G Selectee) George A. Pappas, Jr.**, from Asst. Dir., Cmd. Control and Communications, DCS/P&R, to Dep. Dir., J-6, The Joint Staff,

OJCS, Hq. USAF . . . **Col. (B/G Selectee) Ralph S. Saunders**, from Cmdr., 9th Weather Recon Wg., MAC, McClellan AFB, Calif., to Cmdr., 60th MAW, MAC, Travis AFB, Calif., replacing B/G John H. Germeraad . . . **B/G Robert R. Scott**, from Cmdr., 17th Strategic Aerospace Div., SAC, Whiteman AFB, Mo., to Cmdr., 4th Strategic Missile Div., SAC, Francis E. Warren AFB, Wyo. . . . **Col. (B/G Selectee) Henry Simon**, from Dir., Materiel Mgmt., SAAMA, AFLC, Kelly AFB, Tex., to IG, Hq. AFLC, Wright-Patterson AFB, Ohio.

**M/G Donavon F. Smith**, from Dir., Operational Requirements and Development Plans, DCS/R&D, to Asst., DCS/P&O, Hq. USAF . . . **B/G Harold A. Strack**, from Cmdr., 90th Strategic Missile Wg., SAC, Francis E. Warren AFB, Wyo., to Cmdr., 44th Strategic Missile Wg., SAC, Ellsworth AFB, S.D. . . . **B/G August F. Taute**, from Chief, MAAG, Oslo, Norway, to Dep. Cmdr., Lackland Military Training Center, Air Training Command, Lackland AFB, Tex.

**PROMOTIONS: (Air Force Reserve)** To be **Major General:** Earl O. Anderson; Russell F. Gustke; Maurice I. Marks; Evelle J. Younger. To be **Brigadier General:** Richard Bodycombe; Byron K. Boettcher; Arthur W. Clark; William J. Crandall; Mortimer I. Gordon; John H. Grimm; William G. Hathaway; William Lyon; Oscar D. Olson; John S. Warner; William A. Willis.

**RETIREMENTS:** B/G Earl W. Brannon, Jr.; B/G David S. Chamberlain; B/G James M. Vande Hey. ■

World War II primary flight instructors were civilians, many of them veterans of barnstorming days. Such a man was Billy Lynam, a hardheaded romantic with his own "instruction technique." It wasn't just casual conversation when he asked . . .

# Is Your Safety Belt Fastened?

By Col. Cal Carpenter, USAF (Ret.)

Cartoons by Bob Stevens

I MET HIM on an August day in 1942 when my flight of five Aviation Cadets reported alongside a PT-17 trainer at the Army Primary Training School in Douglas, Ga. He said he was Mr. Lynam and, in a pronounced Southern drawl, told us he was our flight instructor and that he was going to teach us to fly the damned airplane we saw before us. Then, with complete disregard for wartime regulations, he hauled out a camera, lined us up beside the wing of the old Stearman, and took our picture.

"You might want it sometime," he explained. I did, and I still have it.

You might say that incident characterized Billy Lynam. He was a practical, hardheaded flying instructor. But at the same time he

was a romantic of the riding-breeches, white-scarf days of aviation. He thought every pilot should have a picture of himself, in helmet and goggles, beside his mount at the beginning of his adventurous career—Army regulations notwithstanding.

Billy Lynam was a latter-day member of that old barnstorming fraternity that flourished so noisily and recklessly after World War I—a fraternity in which a man made his own decisions in accordance with his own lights, and accepted the risks.

From all I ever found out, this smallish man—slender, blond, and with aristocratic features—was a thoroughgoing rake with the ladies. I don't know how old he was; I'd guess around thirty. And I know very little of his background. I only know he'd been flying ever since he'd been old enough to see over the rim of the cockpit, had done everything from crop dusting to stunt flying at county fairs, and had a total of flying hours that automatically accorded him a godlike image in the eyes of his five primary students.

For those who may not be famil-

iar with World War II Army pilot training, perhaps I should explain that Billy Lynam was a civilian flight instructor in an Army contract primary training school. He was "Mr. Lynam" to us, since he rated officer treatment. I found out his name was Billy because it was on the back of his flying helmet, inked on the white elastic band that held his goggles. Sitting behind him in the rear cockpit of the Stearman, I looked at that name for quite a few hours.

In the contract schools, Army pilot hopefuls, fresh out of preflight basic military training, got their first exposure to an airplane. There the aviation cadet had his opportunity to prove whether or not he was worth the expense of the further flight training, which would win him wings and a commission. The schools were operated at private airports that, for the wartime period, had been converted into Army airfields with barracks, ground schools, parade grounds, and a full complement of drills and discipline.

After a few informal words about the "damned airplane," to which we listened with round-eyed attention,

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Col. Clarence A. "Cal" Carpenter retired from the Air Force in 1966 to a second career as gentleman farmer and writer in the hill country near Brevard, N.C. His "Retire, Regroup, Resume" appeared in the January '71 issue of AIR FORCE Magazine.

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"He'd slap the dual control stick violently from side to side."

Billy Lynam asked if any of us had ever flown before. I had a private license, earned in sixty-five-horsepower Cubs, of which I was very proud. I modestly admitted this world-beating achievement.

"Well, tear it up," he said, unimpressed. "The Army flies different."

"Yes, Sir," I said.

At the end of every flight thereafter, he had something uncomplimentary to say about private licenses and "Cub pilots," although I'm sure he had thousands of hours in that lovable little bird himself.

It seemed the Army required something called "Precision Flying," and that was drummed into us every time we got near the airplane. If we failed to enter the downwind leg exactly forty-five degrees to the wind-sock direction, if we lost or gained twenty feet in our pylon eights; if we recovered from a spin ten degrees off the point, we were not flying with precision.

Billy Lynam, in the front cockpit, would put both his arms outside and pound the fuselage in open-handed agony. He'd yell into the gosport and stick his speaking horn out into the slipstream. Since this

horn was connected by a rubber tube to earpieces in our helmets, the resulting roar of air would nearly blow our ears off. He'd slap the dual control stick violently from side to side, rocking the airplane wildly and banging our knees painfully, and then he'd make us do it over again.

In the air he was as irascible as Donald Duck, but on the ground he was soft spoken, courteous, every inch the Southern gentleman—with the possible exception of his spicy language. He once explained his air manners as his "instruction technique." "I've taught a lot of people to fly, and I've never had a man hurt or a cadet washed out either," he'd say.

That was good enough for us. The washout rate in primary flying school was something better than thirty-five percent. We were willing to put up with his "technique" if it would keep us from that final, fearsome ride in the "Maytag Messerschmitt" with the Army lieutenant assigned to the base to pass final judgment on those who were up for elimination.

Billy Lynam was a kind-hearted man, beneath all that in-flight iras-

cibility. But in this, too, he had his own somewhat unorthodox way. At the end of our first week of training he offered his prescription for fledgling fatigue:

"Go out Saturday night and get drunk," he said. "You're all tensed up from working hard all week. A good drunk will relax you! A hang-over all day Sunday will make you fly better on Monday!"

He even assisted in the administration of the prescription. All five of us were loaded into his convertible that Friday afternoon and taken to a dive on the highway outside of town. He even provided the Scotch. I don't remember very well whether or not he followed his own advice—in fact, I don't remember very much about the whole episode. I do recall how he herded the group of us around like a hen with five chicks and finally brought us back to the base in a deplorable state. I think we all had big heads that Sunday, and I, for one, felt more limp than relaxed the following Monday.

I soloed first (the private ticket must have helped some, after all). Following a few circuits of the field one morning, he stopped the airplane at the far end and got out. "Go kill yourself alone," he said grouchily. "I'm tired of your trying to kill me."

I taxied back and took off, but he stood there at the end of the field, a lonely looking little figure in coveralls and dangling parachute, until I'd made the customary three take-offs and landings.

Throughout the two-month primary training period, he worked us unmercifully. We were allowed no time to enjoy flying. Every minute aloft with him we worked; and when we were solo, we worked in preparation for our next flight with him. Sometimes, as a reward for good performance, he would take over and show us what precision aerobatics were really like—eight-point slow rolls, or pylon eights with snap rolls between the pylons at 500 feet!

Billy Lynam expected a certain basic responsibility on the part of his students and sometimes checked on it the hard way. We were climbing out one cool September morning, some 2,000 feet above the red clay and scrub pines of southern Georgia, when I faintly heard his

voice through the gosport but couldn't make out what he was saying. The gosport was bad enough at cruise, but in that open cockpit, with the engine at climb power, you could hardly hear yourself think, much less listen to the instructor.

I shook my head and pointed to my ear. Billy Lynam yelled something again. Again I shook my head. He tried a third time, and still I shook my head. He suddenly took the controls, leveled out momentarily, and rolled the Stearman over on its back! I dangled for a moment on my safety belt and then he rolled us right side up again. He cut the throttle briefly and yelled: "I was asking if you had your safety belt fastened!"

The last time I saw Billy Lynam was the day of my so-called "transition ride." This was the last flight in primary, after all the checks had been passed and we were ready to move on to basic flight training at another field. On the transition ride, the student had the privilege of riding in the front seat. He became, theoretically, the instructor and the instructor became the student. He had, also, the new experience of talking into the gosport horn—a rare pleasure indeed, since for two months he had been on the receiv-

ing end, with no means of talking back.

We took off in the late afternoon and no sooner were airborne than I, with great relish, closed the throttle and yelled, "Forced landing!" into the gosport. I figured I had Mr. Billy Lynam across the barrel, as he'd often had me: There was no field in sight that you could put a Stearman into with a shoehorn.

He threw the plane into practically a vertical slip and dropped it into a postage-stamp clearing. He would have landed perfectly if I had not opened the throttle. A few minutes later I tried to catch him on a forced landing again. When he executed that one perfectly in an impossible clearing, I gave up in disgust. I think he could have dead-sticked that machine in a doll-house backyard.

We climbed on up and I, enjoying the novelty of being in command, grandly shook the stick as the sign I was taking over, and essayed a creditable loop. He took over and did a loop with a beautiful roll on top. I did an Immelmann, a vertical reverse, and, with some trepidation, tried a slow roll myself. He took over and did a vertical roll, split-essed out, followed with three snap rolls, rolled into a sharp

turn, vertical reversed, pulled up in an Immelmann, and came down in a masterful falling leaf!

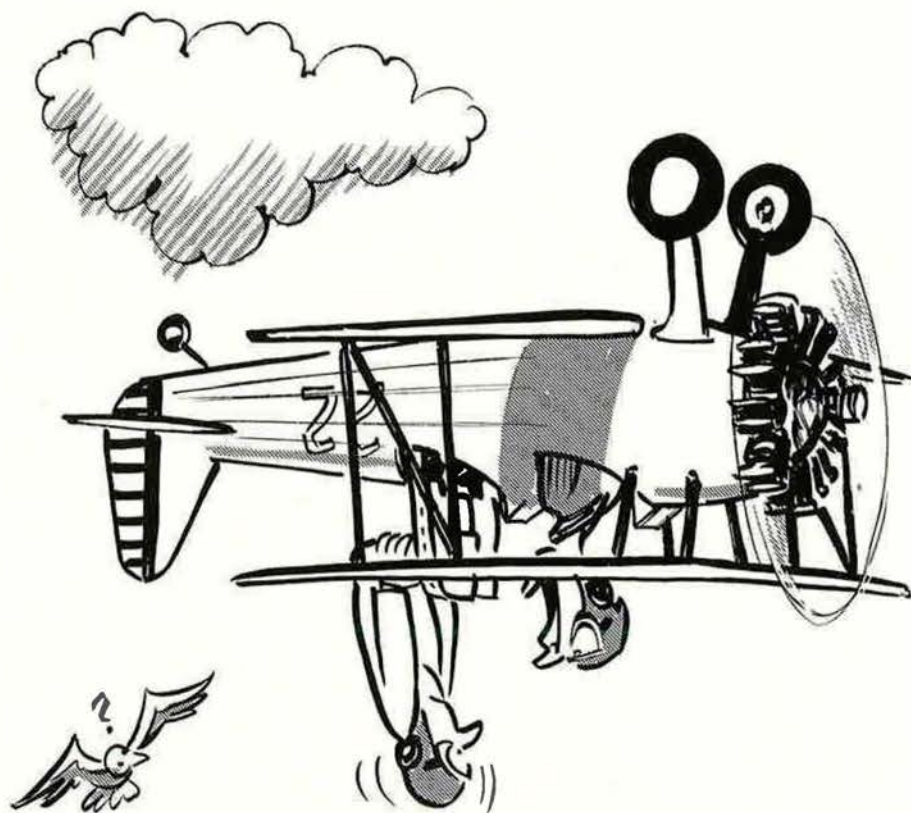
I'd had enough. I leveled out and, when my eyeballs stopped spinning, started looking for the way home. I felt the stick firmly taken away from me again.

The Stearman flew level for a moment. Then the throttle came back and the nose went down. It went down, down, down until it was vertical; then, with the stick all the way forward, it passed vertical and began coming up—upside down in an *outside* loop!

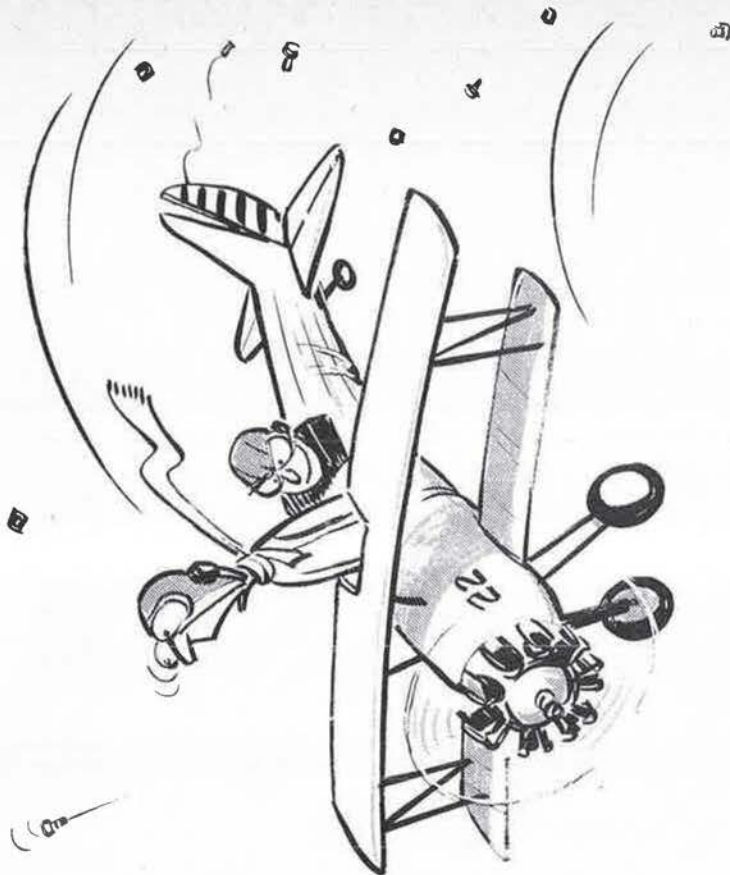
The ancient Stearman's wings groaned. The wires screamed in torment. I was forced outward against my safety belt as the loop tightened. The blood rushed to my head. My face felt like an overinflated balloon. My eyes filmed, the upside-down world appeared through a pinkish haze.

My safety belt was not tight enough for *this!* I found my feet off the floor, my bottom off the seat, and the belt practically cutting me in two. Because fuel was gravity fed, and in this position was being forced away from the carburetor, the engine quit running.

With wings creaking and wires moaning lower as we slowed down,



"I was asking if you had your safety belt fastened!"



"... upside down in an outside loop!"

the upside-down nose of the Stearman came further above the horizon. We completed perhaps two-thirds of the outside loop but, without the engine, we couldn't finish it. Billy Lynam rolled us back right side up, the engine caught again, and he signaled control back to me. I headed for home immediately.

I had a terrific headache and bloodshot eyes when we landed.

"That's something we don't teach," Billy confided. "It's against regulations—too dangerous. But you might want to know how to do it sometime."

I don't know where Billy Lynam is now. I heard he accepted a commission and finished the war a captain. But I'll bet this much: If he's alive, he's still flying airplanes. And lucky indeed are his passengers to have him up front. If he should read this, I hope he takes it as the man-to-man compliment it's intended to be. If not, I'll be glad to discuss it with him at the nearest bar, and this time I'll buy! ■

### IN-HOUSE OUTHOUSE ENGINEERING

During World War II, my husband served with the 73d Bomb Wing in the Pacific. After the capture of Iwo Jima made Saipan, where he was based, relatively safe from enemy air raids, beautification and improved sanitary facilities became a major project of the administrative people. Early in April 1945, an edict was issued by the Personnel Officer that a three-hole latrine would replace the slit trenches used by the 500th Bomb Squadron.

The Engineering Officer requisitioned wood from Island Command. The wood never showed up, and, on the next monthly inspection, the EO was duly giggered. A check with Island Command disclosed that the requisition had been lost.

A second requisition—also unproductive—was submitted, and after a second chewing out for "failure to comply," the EO paid a personal visit to Island Command. The lumber, it seemed, had been delivered and signed for under a fictitious name. The Army Engineer Group across the field, with its newly constructed club, was a prime suspect.

In order to avoid still another chewing out, two details were formed: one to carry the new requisition to Island Command and act as an honor guard for the wood; the other to dig a hole to specified depth in the solid coral.

By the time both details had finished their work, a tropical rain shower was in progress. The EO, sympathetic to pleas of the men, gave permission to delay construction until the following morning, provided the lumber was kept safe from midnight requisitioners.

Morning arrived, and to everyone's consternation the hole had vanished. An Army Engineer Beautification Team had leveled the area during the night.

All hands were turned out under the personal direction of the EO to dig the hole again and cap it with the prescribed edifice before anything else could happen. When the job was finished that night, the Commanding General of the Wing was invited to inaugurate this splendid new service. He graciously accepted, but, being a man of disciplined habits, requested that the ceremony be postponed until 0725 the next morning.

—MRS. H. E. REICHENBERG

(AIR FORCE Magazine will pay \$10 for each anecdote published.)

# AFA's 25th Anniversary

## Convention and Aerospace Briefings and Displays

Washington, D.C.—September 19-20-21-22-23



AFA's 1971 Annual National Convention and Aerospace Briefings and Displays, highlighting AFA's Silver Anniversary, will be held at the Sheraton-Park and Shoreham Hotels, Washington, D.C., September 19–23. All reservation requests for rooms and suites should be sent directly to the Sheraton-Park Hotel or Shoreham Hotel Reservation Office. Be sure to refer to AFA's Annual Convention when making your reservation requests, otherwise your request will not be accepted by the Sheraton-Park or Shoreham Hotels.

The Sheraton-Park Hotel's address is: 2600 Woodley Road, N.W., Washington, D.C. 20008; and the

Shoreham's address is: 2500 Calvert St., N.W., Washington, D.C. 20008.

AFA's National Convention activities will include luncheons for the Secretary of the Air Force and the Air Force Chief of Staff, a Silver Anniversary Reception, and the Air Force Anniversary Reception and Dinner Dance. The National Convention will also feature AFA's Business Sessions, Seminars, and several other activities, including a reception in honor of AFA's Chapter Officers and Official Convention Delegates, the Annual Outstanding Airmen Dinner, and the Chief Executives Buffet Reception.

### SCHEDULE OF EVENTS

#### Sunday, September 19

12:00 NN Registration Desk Open  
6:00 PM AFA Opening Ceremonies and Awards

#### Monday, September 20

8:00 AM Registration Desk Open  
8:15 AM USAF Memorial Service  
9:00 AM 1st AFA Business Session  
1:30 PM 2d AFA Business Session  
6:30 PM AFA President's Reception for Chapter Officers and Convention Delegates

#### Tuesday, September 21

8:00 AM Registration Desk Open  
9:00 AM AFA Workshop  
9:00 AM Briefings and Displays Open  
11:30 AM Briefing Participants Buffet Luncheon  
11:45 AM AF Chief of Staff Reception  
12:30 PM AF Chief of Staff Luncheon  
2:30 PM Air Force Symposium  
6:00 PM AFA's Silver Anniversary Reception



1946



1971

## Last Chance to Brief and Display Your Equipment

Companies desiring to participate in the Air Force Association's Silver Anniversary Briefings and Displays should request a booth without delay. Some 40 major aerospace firms have already reserved 85% of the available exhibit space at the Sheraton-Park Hotel. An early "sell-out" is expected.

Since 1971 marks the Silver Anniversary of the Air Force Association, the Briefings and Displays will be the best attended since this unique program was initiated in 1964. Last year, 5,764 key military, government and industry personnel attended the Briefings and Displays, including 227 General Officers and Admirals and 535 Colonels and Navy Captains.

The Briefing and Display Program combines the presentation of equipment with 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 of the presentations offered in any order of preference.

Since most of the space has already been reserved, companies interested in briefing or exhibiting, or both, should contact the AFA Briefing Office as soon as possible. A minimum of 300 square feet of space is required to brief; no minimum is required for displaying only. Request your space today!

### TO REQUEST BRIEFING/DISPLAY SPACE, WIRE OR CALL:

AFA BRIEFING AND DISPLAY OFFICE

Attn: Ralph V. Whitener  
1717 K St., N.W., Suite 1107  
Washington, D.C. 20036  
Telephone: (202) 833-9440



#### Wednesday, September 22

- 8:00 AM Registration Desk Open
- 9:00 AM Briefings and Displays Open
- 9:30 AM Reserve Seminar
- 11:30 AM Briefing Participants Buffet Luncheon
- 11:45 AM AF Secretary's Reception
- 12:30 PM AF Secretary's Luncheon
- 4:00 PM Briefing Participants' Reception
- 7:00 PM AF Anniversary Reception
- 8:00 PM AF Anniversary Dinner Dance

#### Thursday, September 23

- 9:00 AM Briefings and Displays Open
- 11:30 AM Briefing Participants Buffet Luncheon
- 4:00 PM Briefing Participants Reception

| ADVANCE REGISTRATION FORM   |  |
|---|--|
| 25th ANNUAL AIR FORCE ASSOCIATION CONVENTION & AEROSPACE BRIEFINGS & DISPLAYS |  |
| SEPTEMBER 19-23, 1971   | WASHINGTON, D.C.   |
| 1946 AFA SILVER ANNIVERSARY 1971  |  |
| Type or print   | <b>Reserve the following for me:</b><br><input type="checkbox"/> Advance Registrations @ \$50.00 per person ..... \$ .....<br><input type="checkbox"/> *Current Registrations @ \$60.00 per person ..... \$ .....<br><input type="checkbox"/> AF Anniversary Reception & Dinner Dance Tickets @ \$30.00 per person ..... \$ .....<br><input type="checkbox"/> Amount Enclosed ..... \$ ..... |
| NAME _____  |  |
| TITLE _____   |  |
| AFFILIATION _____   |  |
| ADDRESS _____   |  |
| CITY, STATE _____   |  |
| *Current Registration fee (after Sept. 10): \$60.00                           |  |

by Don Steele

AFA AFFAIRS EDITOR

## THE CALIFORNIA STATE ORGANIZATION. . .

cited for effective programming in support of the mission of the Air Force Association.



*AFA President George D. Hardy, left, accepts a token of appreciation from Robert Lawson, Chairman of the California AFA Executive Committee and an AFA National Director. Adm. John S. McCain, Jr., CINCPAC, speaker at the California AFA's 1971 Convention banquet, witnesses the proceedings.*

Pasadena's Huntington-Sheraton Hotel was the site of the **California AFA's 1971 Convention**, held March 25-28 under the direction of Convention General Chairman **Jo Ann Doell**, Secretary of the Pasadena Area Chapter. In every respect it was a successful and productive effort by AFA's largest state organization.

The three-day program included two State Executive Committee Meetings, a Kickoff Breakfast, an Aerospace Crisis Symposium, an Aerospace Education Symposium, an Aerospace Benefit Day at the Santa Anita Races, a Military Reception, a State AFA Reunion, an Internal Awards and MIA/POW Luncheon, AFA Workshops, and an Honors and Awards Reception and Banquet.

The breakfast program included welcoming remarks from Pasadena Mayor **Walter Benedict**, and an address by **G. L. Sheffield**, Director, Department of Human Resources, State of California.

**Bob Dornan**, radio and TV commentator, moderated the very timely Aerospace Crisis Symposium (see page 94). The afternoon at the races was enjoyable for all and, from unconfirmed reports, profitable for some.

The Aerospace Education Symposium was planned especially for psychologists, counselors, and educators interested in the role and the findings of psychologists working in the

Air Force and in the aerospace industries.

The Symposium program included a welcome from **Miss Kathy Arnett**, the Pasadena Rose Queen, and presentations by **Dr. Hal Coleman**, Manager of Human Engineering and Advanced Design at Northrop; **Eugene Ebright**, psychologist for Northrop; **Dr. Anchar Zeller**, Staff Psychologist in the Life Sciences Group of the Directorate of Aerospace Safety, Deputy Inspector General, Norton AFB; and **Col. Robert Stephens**, USAF, Technical Adviser for SST Development, Office of Supersonic Transport Development, Department of Transportation.

Dr. Coleman spoke on "Applications of Psychological Principles to Aerospace Design and Human Engineering." He discussed the systems approach used in the aerospace industry. Mr. Ebright talked about the planning of time consumption by the worker in developing new instruments, and the need to consider the physical limitations of man in producing new designs. Dr. Zeller's presentation covered Air Force research on safe driving, which has proved that it is the driver's attitude that makes him cautious or careless. Through multimedia Dr. Zeller showed the films and programs that have been so successful in lowering the accident rate in the armed forces, and explained their

psychological significance. Copies of AFA's *The Safe Driving Handbook*, based on Air Force research, were distributed with the compliments of the California AFA.

At the close of the program Colonel Stephens discussed briefly the status of the SST and the need for continuing the SST development program. A display of AFROTC activities was exhibited by the AFROTC detachment from the University of Southern California. Col. Phillips J. Copeland, Professor of Aerospace Studies, and cadets from the University attended the Symposium. **Dr. Marjorie Beringer**, California AFA Education Director, was chairman of the Symposium.

AFA Workshops on Public Relations and Programming were conducted by **Phil Lockwood**, of Phil Lockwood Associates, and AFA Director of Field Organization **Don Steele**, respectively. **John Beringer**, Chairman of the State AFA's Constitution Committee, and **Robert Szabo**, Treasurer, led a Workshop on AFA Charters and Finance Reports. **Brig. Gen. Daniel "Chappie"**



*Dr. Anchar Zeller, left, Staff Psychologist from Norton AFB, Calif., Miss Kathy Arnett, Pasadena Rose Queen, and Dr. Hal Coleman, Manager of Human Engineering and Advanced Design at Northrop, visit the AFROTC display during the California AFA Convention. The three also participated in the Aerospace Education Symposium.*

**James, Jr.**, Deputy Assistant Secretary of Defense for Public Affairs, was the luncheon speaker, and **Bruce Wayne**, "KFI in the Sky" traffic reporter, was Master of Ceremonies. During the program, State AFA awards were presented to California AFAers for their work in the MIA/POW program and for contributions to the success of state and local programs during the year.

In his banquet address, **Adm. John**

**S. McCain, Jr.**, USN, Commander in Chief, Pacific, said, "Never before in the history of mankind has the world been more dependent upon the acts of men of peace, or more reliant on brave men to defend it.

"We live in a troubled period of history, a dangerous era. We live in this world, and we cannot get out of it. We will not survive if we do not rise to the security challenges facing our nation.

"As President Nixon has stated, the United States is a Pacific power, and it will continue to maintain a presence in Asia as a vital national interest.

"Our ultimate goal is the encouragement of strong, viable economies and democratic political processes in the nations of the region."

**Col. Beirne Lay, Jr.**, USAF (Ret.), author of *12 O'Clock High*, one of the greatest novels to come out of World

## AFA's Baltimore Chapter—Twenty-five Years Old

Twenty-five years ago this month, on June 21, 1946, AFA's first squadron (now called "Chapters") was chartered in the city of Baltimore, Md.

On that date, in Baltimore's War Memorial Building, Lt. Gen. James H. "Jimmy" Doolittle, AFA's first National President, presented the AFA charter to John R. Mitchell, Commander of Baltimore No. 1 Squadron.

Participants in the charter ceremonies included the Hon. W. Stuart Symington, then Assistant Secretary of War for Air, who became the first Secretary of the Air Force, on September 18, 1947, and is now the senior Senator from Missouri; Gen. Carl A. Spaatz, then the Commanding General, US Army Air Forces, who became USAF's first Chief of Staff, and still later served as Chairman of AFA's Board of Directors; General Doolittle; Willis S. Fitch, AFA's first Executive Director; and Baltimore No. 1 Squadron Commander Mitchell.

Among the many honored guests were the late Sen. Millard E. Tydings and Sen. George L. Radcliffe, both of Maryland; Maryland Gov. Herbert R. O'Connor; Baltimore Mayor Theodore R. McKeldin; Lt. Gen. W. H. Simpson, Commanding General, 2d Army; the late Glenn L. Martin, President, Glenn L. Martin Co.; the late Mark Watson, aviation reporter for *The Baltimore Sun*; and Dorsey Warfield, Publisher of the *Baltimore News-Post*.

In his remarks, General Doolittle said, "America must remain strong and must have teamwork with all the armed forces, as it did during [World War II], each arm doing that work which it knows best."

Other officers of the Squadron were: John Marshall Boone, Vice Commander; Stanley Fisher, Secretary; Julian A. Devereaux, Corresponding Secretary; Samuel Hecht, Treasurer; and Lewis M. Hess, Jr., Emmett C. MacCubbin, H. Riall Jackson, Mendes E. Morstein, and Victor H. Poole, all members of the Executive Staff.

In addition to the officers, Charter Members included J. B. Browne, J. F. Davies, Jr., P. G. Hall, T. Harrington, G. G. Carey, N. H. Long, C. E. Miller, R. R. Peard, C. F. Reese, B. S. Stearn, C. F. Thompson, W. C. Warner, Maj. H. D. Hively, and Capt. E. R. Wright.

During its first year, the Squadron's membership grew. Its officers and members helped to organize other squadrons, and one of its members, Charlie Purcell, established "Wings of Song," the Squadron's official radio program, aired weekly over WCAO in Baltimore.

To climax its first year of operation, the Squadron sponsored an "Air Force Day" air show at Homewood Field, on August 1, 1947, in recognition of the fortieth anniversary of the US Army Air Forces and its predecessor services.

John R. Mitchell, the first elected leader of a local



Twenty-five years ago this month, AFA's Field Organization was established when Jimmy Doolittle, on the left, AFA's first President, presented the first AFA charter to John R. Mitchell, right, Commander of Baltimore No. 1 Squadron. Looking on are, from left, Baltimore Mayor T. R. McKeldin; W. Stuart Symington, Assistant Secretary of War for Air; and Gen. Carl A. Spaatz, Commanding General, Army Air Forces.

AFA unit, now lives in Corona Del Mar, Calif., and is active in the Santa Monica Chapter.

Several of the unit's charter members went on to higher offices in AFA. Mr. Hecht served four terms as AFA National Treasurer, three terms as a National Director, President of the Baltimore Chapter at the time it was reactivated in 1968 after a short inactive period, and now serves as one of the Chapter's Vice Presidents. Mr. Purcell served three terms as an AFA National Director and now serves as a Vice President of the Chapter. Mr. Boone served two terms as an AFA National Director.

From its beginning with this one local unit, AFA's Field Organization has grown to some 246 chapters located in forty-five states, the District of Columbia, England, Germany, Mexico, Puerto Rico, Spain, and Venezuela.

*We are indebted to Mr. Mitchell for furnishing us the material for this item and would appreciate stories from other members about the early days of AFA. Please send them to: AFA Affairs Editor, AIR FORCE Magazine, 1750 Pennsylvania Ave., N.W., Washington, D.C. 20006.*

# 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.

## 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 Cadets, Civil Air Patrol Cadets, Cadets of the United States Air Force Academy, or a USAF Officer Trainee—\$5.00 per year.

**Associate Members** (nonvoting, nonofficeholding): Non-US citizens who support the

aims and objectives of the Air Force Association whose application for membership meets AFA constitutional requirements—\$10 per year.

## 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 principle of freedom and equal rights to all mankind.



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Information regarding AFA activity within a particular state may be obtained from the Vice President of the Region in which the state is located.



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## AFA News

War II, and a charter member of AFA, was Master of Ceremonies, and **Ozro Anderson**, a past President of the host Chapter, did an excellent job as the offstage voice during the awards portion of both programs.

AFA President **George D. Hardy** made brief remarks in support of the Association's MIA/POW program, then presented an AFA Certificate of Honor to **Jo Ann Doell** "for 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."

The highlight of the awards program was presentation of the State AFA's top four awards. For her outstanding contributions to California AFA's work in aerospace education, **Dr. Marjorie Beringer** received the "Jack Sheldon Memorial Award." The State AFA's "Military Man of the Year" award went to **Maj. Gen.**

**George W. Edmonds**, Chief of Staff, California Air National Guard. The **Santa Clara Chapter** was designated "Chapter of the Year," and **Edward A. Stearn**, the State AFA's Organization Director, was named the California AFA "Man of the Year."

Convention delegates elected **Floyd Damman** to succeed **L. Eugene DeVisscher** as State President. Other officers elected are: **Stanley Hyrn** and **Robert Szabo**, Vice Presidents; **Barbara Rowland**, Secretary; and **Gordon Meinert**, Treasurer.

Among the many distinguished guests were Congressman **John Rouselot** (R-Calif.); **Lt. Gen. Samuel C. Phillips**, Commander of SAMS0 and Military Host to the Convention; **Rear Adm. H. S. Moore**, USN, Commander, Pacific Missile Range at Point Mugu; **Will H. Bergstrom**, Vice President for AFA's Far West Region; AFA National Directors **William R. Berkeley**, **Robert S. Lawson**, and **Martin M. Ostrow**, and a group of MIA/POW wives, including **Mrs. Carol Hanson**, **Mrs. Pat Hardy**, and **Mrs. Sue Lyon**.

We congratulate **Gene DeVisscher**, **Jo Ann Doell**, and the **Chairman of all the Convention Committees**—



California's AFA State President **L. Eugene DeVisscher**, left, presents the Golden State's AFA "Man of the Year" award to **Ed Stearn**, San Bernardino.



Attending the Alamo, Tex., Chapter's observance of AFA's 25th Anniversary were, from left, AFA Board Chairman **Jess Larson**, principal speaker at the affair; **Lt. Gen. George B. Simler**, Commander, Air Training Command; and Chapter President **A. O. de la Garza**.



**Sen. Barry M. Goldwater** (R-Ariz.), center, featured speaker at the Tucson Chapter's Air Force Appreciation Luncheon, discusses US airpower with **Lt. Gen. Paul K. Carlton**, left, Commander, Fifteenth Air Force, and Chapter President **William P. Chandler**.

**Carolyn Carter**, **Roy Gilliam**, **Gordon Meinert**, **John Beringer**, **Dr. F. J. von Delden**, **Mel Burt**, **Ozro Anderson**, **Michael O'Connor**, **Dr. Marjorie Beringer**, **Cecil Howard**, **Tom Burt**, and **Chauncy Hamlin**—on a very significant and productive convention. We are pleased to name the California AFA as AFA's "Unit of the Month" for June.

**CROSS COUNTRY . . .** At a recent luncheon sponsored by the **Nation's Capital Chapter**, **William M. Magruder**, Director of Supersonic Transport Development, Department of Transportation, told Chapter members and congressional guests that handling the traffic anticipated for 1985 would require 285,000 DC-3s or 4,000 subsonic jets. If the proposed fleet of 500 SSTs fails to materialize, 1,500 trijet DC-10 jumbojets of the type entering service this year, or 1,000 huge 747s will be needed to handle the traffic. Thus, he said, the SST, instead of contributing to environmental problems, will reduce airways congestion and cut the volume of air pollution. Chapter President **Robert J. Schissell** presided.

• Under the sponsorship of the **Alaska AFA**, **Col. Robert L. Stephens**,

## AFA NEWS

USAF, Technical Adviser for SST Development, Office of Supersonic Transport Development, Department of Transportation, presented the case for the SST in separate appearances before the Fairbanks Chamber of Commerce, the Fairbanks Chapter of AFA, the Anchorage Chamber of Commerce, and the Chamber's Aviation Committee. In his presentations, Colonel Stephens, a former test pilot who holds the official world absolute speed record, as well as the sustained altitude record for aircraft, stated that the supersonic transport must be built "or US money will leave the country" to buy foreign SSTs such as the British/French Concorde.

• Congressman **Henry Helstoski** (D-N.J.) headed the list of dignitaries who attended the recent installation of **New Jersey State** and Chapter officers at the VFW Hall in Hasbrouck Heights. **Mrs. Alfred (Mamie) Kinsley** of Belleville was installed as President of the State AFA. Installation ceremonies were conducted by AFA's Director of Field Organization, **Don Steele**. During the program, the **Garden State Chapter** received the New Jersey AFA's award for the "Best Single Activity of 1970," and the **Sal Capriglione Chapter** received the award for the "Best Yearly Programs of 1970." **Mrs. Joseph (Phyllis) Gajdos**, President of the Garden State Chapter, was Chairman of the Program Committee.

• The **Front Range Chapter** of Denver, Colo., recently sponsored a Testimonial Dinner for **Brig. Gen. Walter E. Williams**, Commander, 140th Tactical Fighter Wing, Colorado Air National Guard. Highlight of the evening was the presentation of Front Range Chapter awards by President **Roy Haug** and Vice President **Noel Bullock**, and an AFA Special Citation by **S. P. Deming**, a member of AFA's Board of Directors.

• A recent dinner meeting of the **Northern Virginia Chapter** featured an address by **Col. Stella Levy**, who recently retired as Chief of Women in the Israeli Defense Forces, and now serves as an attaché at the Israeli Embassy in Washington, D.C. Colonel Levy spoke on "How the Women of Israel Face Up to Total Mobilization." Chapter President **William McCall** presided, and Vice President **Everett Burlando** introduced Colonel Levy.

• The March dinner meeting of the

**Eglin, Fla., Chapter** featured two presentations, one by Chapter President **C. C. Widaman** on the SST, and the other by **Thomas Dalehite**, Chief Scientist, Armament Development and Test Center, on "One Hundred Years of Technology." In closing his presentation on the SST program, Mr. Widaman requested all members and guests to inform their congressmen and senators of their position concerning the SST. Mr. Dalehite traced engineering developments during the last century and forecast future developments. Chapter Vice President **G. P. Brenner** presided.

• **Sgt. Robert G. Bushnell**, Airman of the Year at Luke AFB, Ariz., and **MSgt. George W. A. Ellenberg**, 26th Air Division Airman of the Year, were honored by AFA's **Sky Harbor Chapter** of Phoenix, Ariz. Chapter President **Nick Volcheff** presented each a citation and invitation to dinner in recognition of their accomplishments.

• Some 200 Utah AFAers, guests, and civic leaders turned out for the Utah AFA's welcome-aboard party for the 1550th Aircrew Training and Test Wing, newest unit of the Military Airlift Command (MAC) at Hill AFB. Guests of honor were **Lt. Gen. James C. Sherrill**, MAC's Vice Commander, and a cadre of officers from the 1550th. After his remarks, General Sherrill introduced **Maj. Paul Gerblisch** of the Aerospace Rescue and Recovery Service (ARRS), parent organization of the 1550th, who briefed the audience on the various ARRS functions. Special guests included AFA National Secretary **Nate Mazer**; **Jack Price**, Vice President for AFA's Rocky Mountain Region; **Maj. Gen. Richard M. Hoban**, and **Brig. Gen. Wesley L. Pendergraft**, Commander and Vice Commander, respectively, of the Ogden Air Materiel Area.

• During a week of appearances sponsored by the **Chennault Chapter** in the Detroit, Mich., area, the North American Air Defense Command's Briefing Team estimates that it reached 822 people face to face, 575,000 via radio, and 812,500 via TV. Members of the team are **Lt. Col. William H. Copp**, USAF Aerospace Defense Command; **Maj. Lowell B. Griffin**, US Army Defense Command; and **Capt. Donald Kidd**, Canadian Forces Air Defense Command.

• In an address to a graduating class of the Headquarters Command, USAF, NCO Academy, AFA President **George Hardy** stated that professionalism, involvement, leadership, and management are "some of the key ingredients of a common denominator that spell NCO leadership in the United States Air Force today." He

stated that "Air Force noncoms are accomplished experts in their fields of specialization," and that they are involved in their work groups, in the Air Force, and in their communities. President **Hardy** commended the NCOs for answering their summons to leadership and reminded them that "it can also be your summons to greatness." Mr. Hardy presented awards to three members of the class for their distinguished achievements while attending the Academy. **SSgt. Orloff T. Morton** was presented the Academic Achievement Award; the Commandant's Award was presented to **MSgt. Kenneth R. Oyer**; and **SMSgt. Thomas J. Brenner** was named as Honor Student. Sergeants **Morton** and **Oyer** are assigned to the 1035th Field Activities Group, and Sergeant **Brenner** is assigned to the USAF Postal and Courier Service.

• Two Michigan AFA chapters—the **Mount Clemens** and **Hoyt S. Vandenberg Chapters**—cosponsored a dinner dance at Selfridge AFB Officers' Open Mess to celebrate the Twenty-fifth Anniversary of AFA. During the program, **C. K. Vogt** and **Marjorie Hunt**, Mount Clemens Chapter President and Secretary, respectively, presented an AFA Award of Merit to **Robert Farr**, Secretary-Treasurer of the POW Committee of Michigan, and Certificates of Honor to **Mrs. Patrick Carroll, Jr.**, and **Sen. Robert P. Griffin** (R-Mich.), for their outstanding efforts in behalf of the MIA/POW program and families. State Representative **David M. Serotkin** accepted for Senator **Griffin**. Special guests included State Senator **John Bowman**; State Representative **Serotkin**; **Col. Leonard Baldock**, a Past President of the Royal Canadian Air Force Association; **Virgil O'Connor**, President, POW Committee of Michigan, and **Mrs. O'Connor**; **Mrs. Carroll**, a POW wife; **Mr. Farr**; and **Casmir Mazek**, President, Detroit Wing, Polish Air Force Veterans, and **Mrs. Mazek**.

**COMING EVENTS . . .** AFA's annual dinner honoring the **Outstanding Squadron** at the Air Force Academy, Colorado Springs's Broadmoor Hotel, June 5 . . . **Colorado AFA Convention**, Denver, June 12 . . . **Virginia AFA Convention**, Olde Colony Motor Lodge, Alexandria, June 19 . . . **Texas AFA Convention**, Green Oaks Inn, Fort Worth, June 25-27 . . . **Illinois AFA Convention**, O'Hare Officers' Club, July 10 . . . AFA's Twenty-fifth Anniversary **National Convention and Aerospace Development Briefings**, Sheraton-Park Hotel, Washington, D.C., September 19-23. ■

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## An 'AFA News' Feature

The depressed state of the aerospace industry, and its prospects for improvement, were analyzed in depth by a unique, highly informative symposium held recently during the California AFA State Organization's Convention in Pasadena. What emerged from the presentations and discussions was the forecast of . . .

# A Coming Upturn in the Aerospace Industry

**A** HIGHLIGHT of AFA's 1971 California State Convention was an "Aerospace Crisis Symposium" held on March 26. The Symposium probed the problems of the beleaguered aerospace industry and suggested remedies in the form of diversification, improved public image, and retrenchment.

The lead-off speaker, Northrop Corp.'s Dr. William C. Ellet, suggested that the depression in the aerospace industry, which had been building over the past few years, "has started to bottom out." He added that, "on the whole, NASA and DoD programs should provide a relatively

stable base for the industry through the rest of the decade." The Vietnam War, contrary to general public opinion, contributed in many ways to the problems of the industry by thwarting new program starts as well as causing stretchouts of projects not directly tied to the Southeast Asian effort, he said.

Dr. Ellet added that while the Vietnam War depleted the research and development budgets of all the services, "there is considerable evidence now that this trend is to be reversed with a number of new initiatives in the offing from all three services. This should benefit the aerospace industry generally, particularly with respect to scientific and engineering employment."

By contrast, Dr. Ellet pointed out the industry's potential for significant cost reductions and elimination of peripheral personnel as a result of the government's current streamlining of its documentation and procurement procedures. "If the hoped-for streamlining is achieved in both documentation and procurement procedures, the aerospace industry will probably never again employ the numbers and types of people" which were needed to meet government paperwork requirements and which in the late 1960s, according to the General Accounting Office, absorbed between twenty percent and fifty percent of the total cost of a development contract, he said.

Turning to the civilian sector of aerospace, Dr. Ellet predicted that the growth in air cargo and air travel forecast by the FAA, combined with the need to improve all modes of transportation in the US, is likely to open up significant new markets for the aerospace industry during the second half of this decade.

Mr. Charles de Bedts, a vice president of the Lockheed California Co., directed some of his remarks at present tendencies which make technology the scapegoat for social problems. Anti-technology attitudes in the country, he said, are becoming an epidemic, adding: "The anti-technology blight has manifested itself in hysteria among the afflicted—made worse by the witch doctors who treat them, and who are paid in political coin . . . the hysterical led by the cynical."

Arguing for a *balanced* concern about the environment, Mr. de Bedts quoted CAB Chairman Secor Browne who said, "Sure, we need an environment. We also need a gross national product. We can well wind up sitting in front of our caves in clean air, and I'm not sure that our personal environment will be very clean because we will have shut down the factories that make soap and shovels."

Other speakers included Dr. Robert Williams, a UCLA professor; Dr. Charles Cook of Stanford Research Institute; Robert T. Diehl of the Jet Propulsion Laboratory; and L. A. Drazin of Hydraulic Research and Manufacturing Co., Inc.

—EDGAR ULSAMER



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America's Men in Space" and commemorative art for the United States Air Force Academy.

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### Air Force Association Silver Anniversary Medal

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Thanks to you, whom we admire,  
Those cotton-pickin' fighter jocks will fly, fly again.

# "There I was..."

A DOWNED FIGHTER JOCK IS BEING SCARFED UP BY A JOLLY GREEN IN 'NAM—



AMERICAN  
FTR ACES  
REUNION  
SAN DIEGO  
AUG 12-15



ANOTHER CHOPPER SWOOPS IN—



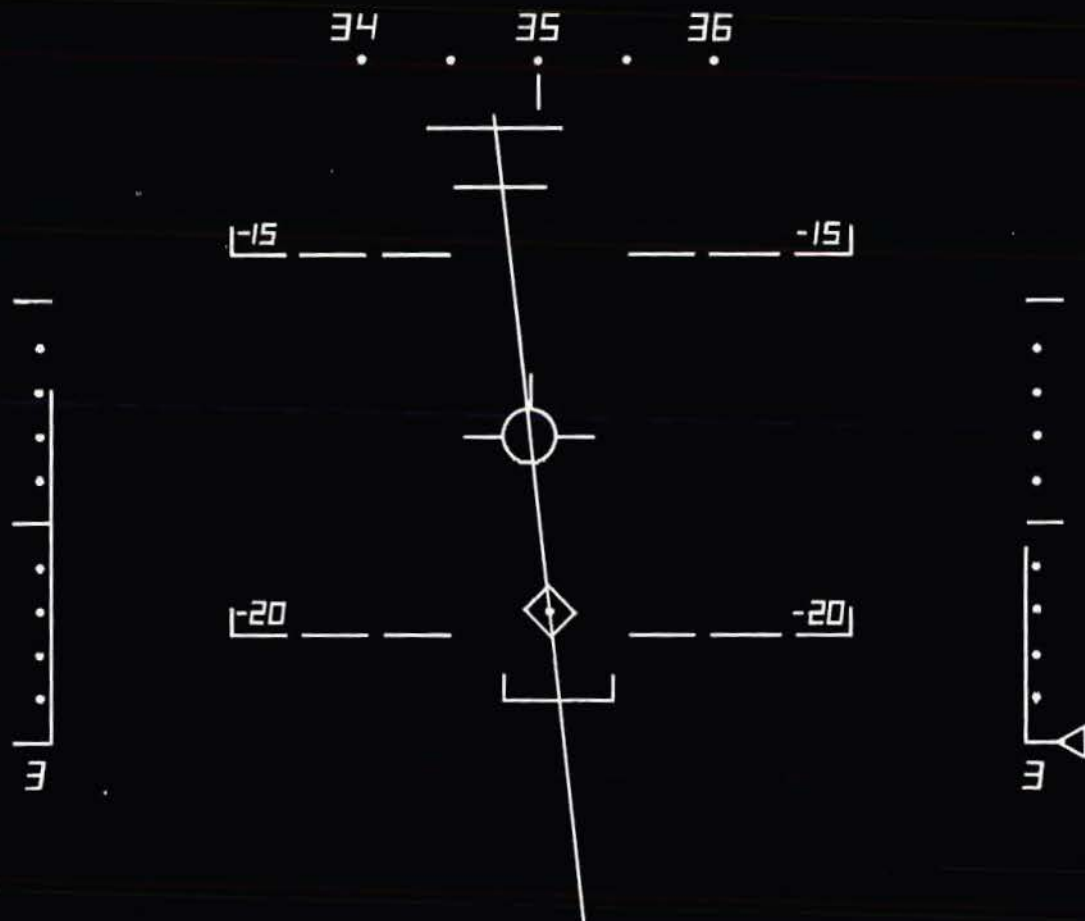
THIS CHOPPER IS A DIFFERENT RIDE THAN THE '105, ISN'T IT, SIR?

IT'S NOT THE RIDE I MIND SON, IT'S THE *TRANSFERS* THAT ARE KILLIN' ME!



THANKS TO BOB HOWARD, COLUMBUS, OHIO.

Bob Stevens



## 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**

# The Phantom: fighter choice of nine Free World nations.

The Phantom is the first-line fighter choice of nine nations of the Free World. In its new lightweight configuration, the F-4E Phantom, with its 20mm rapid-fire nose gun, has no equal as an area defense air superiority fighter. □ Its two powerful engines provide superb acceleration to speeds in excess of Mach 2. □ Phantom performance and maneuverability are a matter of record in the world's record books, in combat, and with two U.S. military aerobatic demonstration teams. □ Weigh all the factors. Pound for pound, capability for capability, the lightweight F-4E leaves all the others far behind.

**MCDONNELL DOUGLAS**

