

DECEMBER 1977/\$2

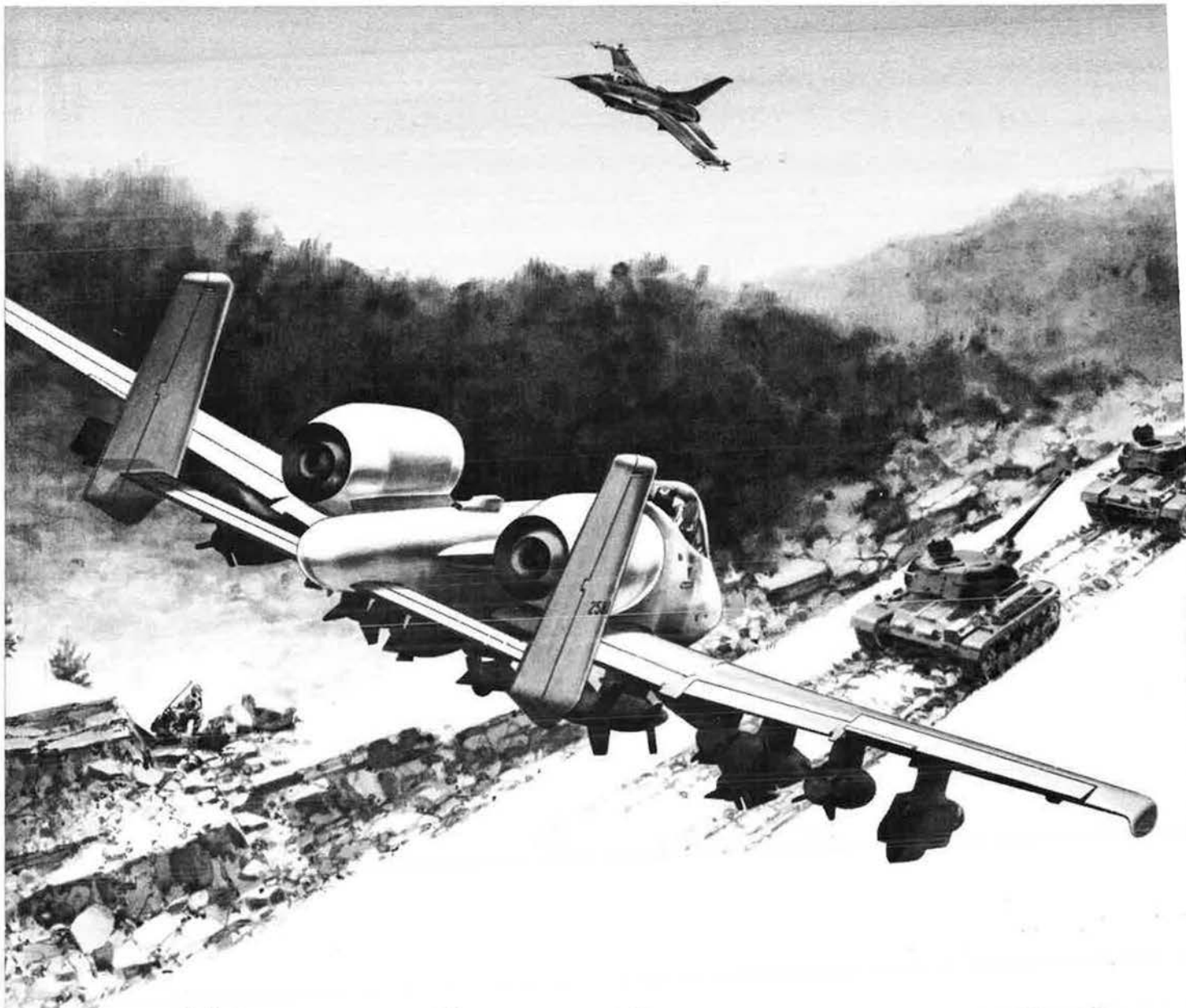
AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

The Military Balance 1977/78





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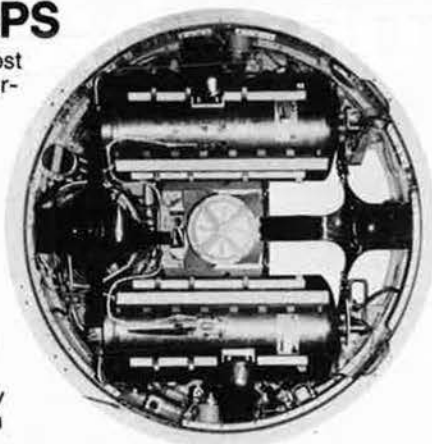
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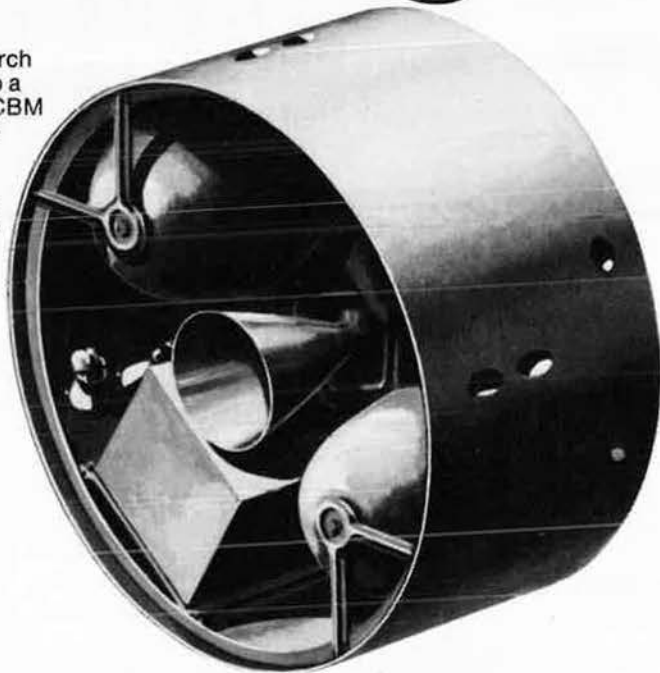


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AIR FORCE

PUBLISHED BY THE AIR FORCE ASSOCIATION

MAGAZINE

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US Strategic Deterrence at the Crossroads

By Edgar Ulsamer

Characteristics of the FB-111A and FB-111H

Leadership, Followership, and Unit Spirit

By Capt. Donald M. Bishop, USAF

The Military Balance 1977/78

A Publication of The International Institute for Strategic Studies, London

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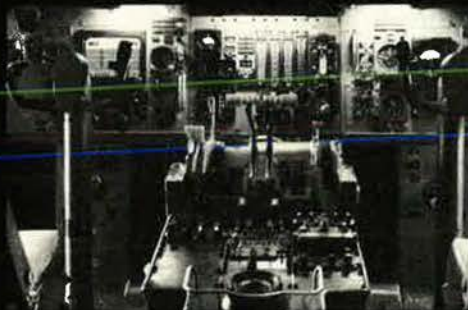
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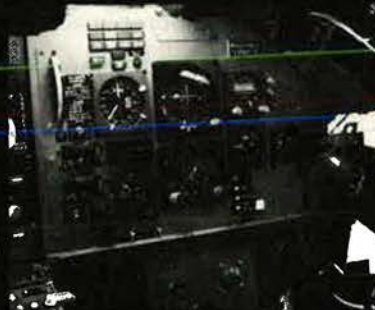
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A 100,000 MILE REPORT ON THE YC-14

After 600 hours in the air and over 100,000 miles, the U.S. Air Force has completed its flight test program for the Boeing YC-14.

For a year they put the YC-14 through its paces. Flew her in good and bad weather. In and out of unimproved airfields. Empty and loaded.

They made over 900 short-field landings. And sometimes stopped in less than four airplane lengths. This summer, they scheduled the



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4 for a month-long trip. She visited
ports and flew 58 scheduled flights,
ding 7 sorties in one day.
hich is pretty remarkable for a

brand new prototype airplane.

We're grateful to the USAF YC-14 test
pilots. They've helped us prove what
we've been saying all along.

That the YC-14 is the reliable answer
for the AMST program.

BOEING YC-14

AN EDITORIAL

NATO—And the Pinch of SALT

By John F. Loosbrock, EDITOR

ALMOST since the very beginning of the North Atlantic Alliance, going on twenty-nine years ago, the pending demise of NATO has been a favorite topic of military analysts, pundits, commentators, and, save the mark, editors. We plead guilty ourselves to having succumbed to the temptation from time to time. We recall specifically one occasion many years ago—it was soon after the building of the Berlin Wall—when we took issue with a spate of predictions that the Alliance was on the verge of collapse. Our view was only slightly less pessimistic, it being that a more likely though not so dramatic fate would be, not collapse, but a slow sinking of NATO out of sight into its own ooze.

We are glad that time has proved us wrong in that the longest-lived formalized peacetime coalition in history is still alive, reasonably well, and, more importantly, beginning to gain in strength, vigor, and general well being.

This is not to say that all, or even many, of NATO's endemic problems have disappeared or been solved. Some of the more persistent are outlined in "The Theatre Balance" essay on NATO and the Warsaw Pact, beginning on p. 118 of this issue. But new winds are blowing in terms of organization, sharing of burdens, responsibilities, and economic opportunities; planning, equipment, and disposition of forces; government and public support as evidenced by current and proposed US budgetary increases; and by a general focusing of interest and attention on improving the military, political, and economic posture of the Alliance.

This theme ran strongly through a series of exceptionally high-quality presentations, as well as in unusually lively and provocative question-and-answer sessions, at what we immodestly assess as one of the best, most productive symposiums the Air Force Association has ever put together. Entitled "Theater Deterrence for the '80s," the symposium attracted some 600 participants (it was truly an audience-participation meeting) to the Hyatt House near Los Angeles International Airport on October 27 and 28. Secretary of the Air Force John C. Stetson keynoted the first day's session, with Chief of Staff Gen. David C. Jones handling the same duties on the closing day. Gen. Alexander M. Haig, Jr., Supreme Allied Commander in Europe, provided a deftly articulate summation, emphasizing what he calls "the three Rs": a three-pronged force improvement program of readiness, rationalization (national forces moving in concert), and rapid reinforcement (to cope with steadily diminishing warning time).

All this and more will be reported in detail in forthcoming issues by Senior Editor Edgar Ulsamer, and reinforced with observations and conclusions Ulsamer gained in a subsequent interview with General Haig and in on-the-spot talks last month with US commanders in Europe. (See box for full list of symposium speakers.)

In the midst of encouraging developments, including the \$12-14 billion dollars reported to be ticketed for NATO in the FY 1979 US defense budget, one cannot forget, how-

ever, that the third leg of the NATO deterrent Triad, in addition to theater nuclear forces and theater conventional forces, is the strategic nuclear forces of the free world, the great bulk of which is represented by US bombers and missiles.

Already dealt a severe blow by last summer's cancellation of production of the B-1, the strategic nuclear umbrella essential to the maintenance of a credible NATO deterrent posture is being placed at risk at the SALT negotiating table. The reported list of US concessions at Geneva is long and alarming. It includes restricted range for US cruise missile, supposed to take up the B-1 slack, retention of all 308 of Moscow's super-heavy ICBMs aimed at the US Minuteman silos, vague promises about production and deployment restraints on the Soviet supersonic Backfire bomber, a possible freeze on full-scale development and testing of the Mobile MX ICBM, a ban on transfer of certain advanced US technology to our NATO allies, and more. What is termed "rough parity" between Soviet and US strategic nuclear capabilities is trending toward added emphasis on "rough" and diminished prospects of "parity." Should this come about, and the prognosis is ominous, then the resources committed to NATO will have lost much of their effectiveness. Thus, even as it embarks on a buoyant upward course, NATO feels the pinch of SALT.

Speakers at the AFA Symposium

Gen. Lew Allen, Jr.
Commander, AF Systems Command

Dr. Gerald P. Dinneen
Assistant Secretary of Defense (C&I)

Gen. Alexander M. Haig, Jr.
Supreme Allied Commander, Europe

Lt. Gen. James D. Hughes
Commander, Twelfth Air Force, TAC

Gen. David C. Jones
Chief of Staff, USAF

Ambassador Robert W. Komer
Advisor to the Secretary of Defense

Dr. James J. Kramer
Associate Administrator, NASA

Gen. F. Michael Rogers
Commander, AF Logistics Command

The Hon. John C. Stetson
Secretary of the Air Force

The world's biggest airlift bargain.



Those whirling Hercules props are one of the answers to soaring fuel costs.

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Payload is up 26%. Engine power, up 20%. Range stretches out 52% farther. Cruise speed is 11% faster. And structural life has risen 100%.

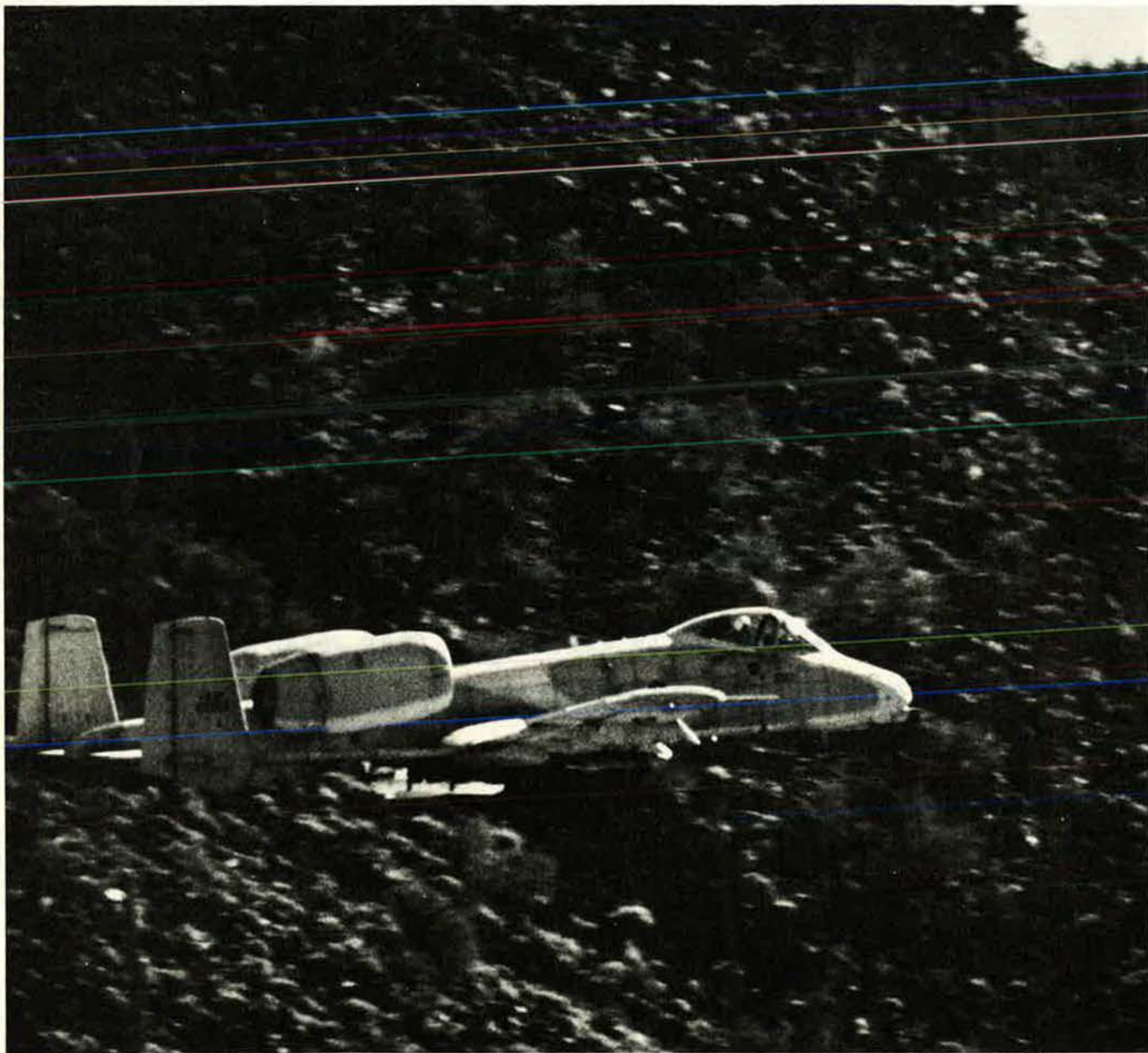
Hercules the weight-lifter is also Hercules the money-saver. In many ways for many nations and airlines. It just keeps getting better and better.

Lockheed Hercules
Lockheed-Georgia Company

A-10 PILOT REPORTS

“...the real issue isn't so much a matter of whether the A-10 can do the job...but rather the A-10 happens to be the only airplane that will do the job.

THERE IS NOT ANOTHER AIRCRAFT—SINGLE OR IN COMBINATION—THAT CAN DO THE CLOSE AIR SUPPORT MISSION LIKE THE A-10.”



With the A-10 now in the USAF Tactical Air Command, fighter pilots have a tactical aircraft to defeat armor and protect the lives of friendly ground forces. The A-10 is the only modern attack aircraft developed for the CAS mission.

 **FAIRCHILD**
INDUSTRIES

Airmail

September Issue Comments

Congratulations on the Anniversary issue of AIR FORCE. It is magnificent—and I don't include my lightweight article on the LB bomb. I am thinking in particular of the fine essay by Prof. Richard Pipes ["Why the Soviet Union thinks It Could Fight and Win a Nuclear War"]. I have read and reread the article and have studied it in detail. I hope every other reader has done the same.

As might be expected, I disagree with Professor Pipes in one regard. He has taken the prevalent position that strategic air warfare in World War II was indiscriminate, barbarous, and ineffectual. I have reached diametrically opposite conclusions, though I certainly acknowledge the regrettable delay in the launching of the strategic air offensive against Germany. The oft-quoted statement that German production rose steadily until the fall of 1944 is correct, but fails to note that the US air offensive did not begin until that time and that German industry and economy literally collapsed in the following four months—before any Allied soldier had set foot on German soil.

This does not obscure the brilliance of Professor Pipes' essay, but it eliminates a feature which he might have explored and discussed. If strategic air warfare is indeed a valid military option, it should be considered in the spectrum of military strategies open to us in nuclear or nonnuclear war; certainly it is as valid as the armored vehicle ground strategy for NATO that seems to go unchallenged. I would go so far as to say that there will be no military success or victory on the ground unless there is again a "fatal weakening" of the enemy through strategic air warfare.

Jack Loosbrock's article on General Kenney really caught the spirit of the great pioneer and a superb human. I knew George well at the old Tactical School when it was at Langley. George was an instructor in Attack Aviation. His ideas were original and imaginative and they were clothed in delightful, sardonic humor. His classes often broke up

in uproarious laughter, but his ideas were caught and remembered. He earned the respect of MacArthur in the Pacific by recognizing that his Far Eastern Air Forces were—and should be—committed to maximum air support of joint air-ground efforts. And his tactics were bold and imaginative. "Hell—let's try it" indeed!

Maj. Gen. H. S. Hansell,
USAF (Ret.)
Hilton Head, S. C.

Tribute to a Great Leader

I wish to thank you for your outstanding tribute to my Dad—Gen. George C. Kenney—occasioned by his death.

He did indeed have a long, full, and inspiring life. He was always concerned for his people and felt that one of the prime qualities of any real leader was that "He takes care of his gang." As my Episcopal minister wife said, "It should come as no surprise when an eighty-eight-year-old man dies—but he told me he would live forever and I believed him." I loved him, was proud of him, and will miss him.

I appreciate your words.

Col. William R. Kenney,
USAF (Ret.)
Oxon Hill, Md.

Those Eroding Benefits

My compliments to Ed Gates for his fine piece on "The Problem of Eroding Benefits" as well as his article on the retirement debate, both of which appeared in the June issue. They were excellent pieces and I would just like to add a couple of footnotes.

First, with regard to the erosion issue. A pay loss in recent years is commonly demonstrated by listing the annual pay raises vs. the annual rates of inflation:

Year	CPI	ORMC*
1970	5.5	6.0
1971	3.4	6.0
1972	3.4	10.9
1973	8.8	4.8
1974	12.2	5.5
1975	7.0	5.0
1976	4.8	4.83

*Quadrennial Review of Military Compensation

Two points must be added, however. First, this simple comparison misses the fact that we have had a recession. In a recession, the economy contracts. And when the economy contracts there isn't much money to go around. Workers in the private sector also saw this average pay rise more slowly than inflation in 1973 and 1974 (though not in 1975 when the military pay raise lagged behind the Consumer Price Index).

Second, and most importantly, the table above doesn't reflect what anybody in the military was actually paid because it doesn't count the longevity pay raises. Longevity pay is not standard in the private sector the way it is in the government.

Crank the longevity pay in and you get a different picture. I took four arbitrary examples of servicemen and looked at their regular military compensation on October 1, 1974, and then compared again two years later on October 1, 1976. Here's how their income rose:

Consumer Price Index	13.3%
E-5 with 5 YOS	15.7%
E-7 with 16 YOS	12.7%
O-3 with 5 YOS	14.4%
O-5 with 18 YOS	13.9%

The picture varies. The senior E-7 in this example doesn't keep up with inflation. But, when I looked at an E-7 with thirteen years of service in 1974, it turned out that his pay rose 14.2 percent in the next two years and did fully cover inflation. The fairest way to look at pay and "erosion" is to crank in the longevity increases because this reflects how a person's real income has been affected.

With regard to the article on retirement, I would make a few small corrections. The article said, "Military pensions are modest compared to congressional pensions and those of various state and local governments." Congressional pensions are quite good, since Congress isn't known for slighting itself. And many, though not all, state and local pension schemes are also quite generous. But, apart from the Louisiana state scheme, I haven't found one that holds a candle to the military system.

As AIR FORCE Magazine pointed out on page 68 of the same issue, I once introduced legislation to put the military on the congressional pension system and noted that

Airmail

would save money. So, it stands to reason the congressional system is not more generous, but less. Take a lieutenant colonel and a congressman, each retiring today after twenty years of service. Assuming four percent inflation a year, and using longevity tables, the colonel will collect \$730,000 in retirement checks over the remainder of his life while the congressman will get \$512,000. The congressman will get a higher annual pension—but he won't be able to collect it until he is sixty years old, and his total take will be reduced correspondingly.

Remember, that the congressional system is different from the military system in several ways: The congressman pays eight percent of his salary into a pension fund every payday; his pension is a percentage of his average pay in his last three working years, not just his final paycheck; he doesn't begin to collect his pension until he is sixty or sixty-two, depending on his number of years of service (or age fifty-five if he accepts a reduction in the pension).

The article also states that I generally ignore the X Factor in discussing military retirement. On the contrary, I have addressed that many, many times.

The article also quotes an Air Force officer as questioning whether my proposal would save any money. He points out that if you keep people in uniform longer, they will earn higher pay and a greater pension multiplier. Then military retirees would get larger pensions. Let's just accept that for a moment. Then why should the Aspin proposal be termed a prospective benefit erosion? It would appear to be an increase to me!

Finally, Ed Gates made a reference to a Bureau of Labor Statistics study involving a new price index "that reportedly is less responsive to inflation!" The point of the study is to get an index that is more responsive. There are indications that the present Consumer Price Index actually overcounts inflation. Just one nontechnical example: when the price of meat skyrocketed a few years ago, consumers bought less meat and more poultry. But, the

Consumer Price Index continued to assume high meat consumption. That is one of many, many anomalies in the CPI measurement.

I don't wish to be negative by focusing on these points in the articles. I felt they were excellent and helped a great deal to clear the fog away from an issue that is too often clouded by emotion rather than dispassionate analysis.

Les Aspin
Member of Congress
Washington, D. C.

• It's true, as Mr. Aspin states, that private sector employees suffered a loss in purchasing power. But it was less than the military, according to the Pentagon. Its figures: Between 1972 and 1975, officers' real income dropped nearly ten percent, that of enlisted members seven percent. These compared to a six percent decline among private sector nonfarm employees.

On longevity raises, service officials do not consider them proper inclusions in measuring real income. Longevity raises reflect growth and experience in the job, handling of increased responsibilities and greater worker productivity. They are not intended to maintain purchasing power, rather to increase it. Note that the Civil Service and many private firms provide longevity-type increases.

Mr. Aspin's comparison of retirement earning of a lieutenant colonel and a congressman, both retiring after twenty years on the job, suggests that the military system is far more generous. However, let's assume the congressman and the officer both live to age seventy-five; the former, who begins drawing retired pay at sixty, will average over \$34,000 a year in retired pay. If the lieutenant colonel is forty-three at retirement, he will average \$22,800 per year.

Furthermore, the Aspin comparison overlooks the fact that the congressman can practice law, engage in private business, etc., and generally take advantage of numerous private sector income benefits until he is forty or so. Then he moves to Congress, where he en-

joys a big salary and spectacular benefits and, on retirement, collects the aforementioned much larger annual pension than the military ficer.

The latter, on the other hand, made the military his primary work. Entering service at an early age, he's had little chance to come a person of means. And with family expenses soaring at forty so, he opts for a twenty-year retirement where he must compete with those who have well-established civilian careers.

In his paper "Guns or Pension Representative Aspin does note the significant differences exist between conditions of military and civilian life. However, he downplays many differences. For instance, he contends that only 3½ percent of the USAF billets are in remote assignments, but fails to mention that the one-year tour length annual exposes another 22,000 members to family separations. Indeed, virtually all members receive one or more remote, unaccompanied tours during a career.

Finally, Mr. Aspin talks about saving money. It's a tricky area. The government could, for example, chuck the twenty-year retirement option. Or switch to the Civil Service or the congressional systems so that military pensions wouldn't begin until age fifty-five or sixty. The savings are great to behold.

But what about the extra bonuses and new incentives required to keep people in uniform to offset the loss of the early retirement privilege? What happens when far too few first and second termers with vitally needed skills, incensed at the removal of the cherished twenty-year retirement option, refuse to re-enlist? Not only might the "savings" be erased, but overall readiness could be placed in serious jeopardy.—THE EDITORS

Some Good, Some Bad

Your October 1977 magazine had both good and bad news.

"The Wayward Press," by Claude Witze, was good news. It was good news because a journalist from within had the courage and ability to tell outsiders and other journalists what he believes to be wrong with his profession. As I recall, to identify the problem is the most important step in solving a problem.

The bad news is the "OER System: Battered and Bruised," by E-

We suggest that readers keep their letters to a maximum of 500 words. The Editors reserve the right to excerpt or condense as required in the interests of space or good taste. Names will be withheld on request, but unsigned letters are not acceptable.

Sperry Update

3

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

Sperry shares milestone delivery by Boeing.

When Boeing announced the delivery of its 3000th jet transport recently, Sperry had good reason to reflect on its role in this milestone. The 3000th jet was a 727-200 model. Sperry autopilots are standard on all 727, 737 and 747 aircraft, which account for more than two thirds of the 3000 aircraft produced.

Combining these Boeing totals with those of other production airliners gives Sperry undisputed autopilot leadership on U.S. air frames. Sperry autopilots are also standard on the DC-8 and DC-9.

TRW selects Sperry reaction wheel for TDRSS.

TRW Defense and Space Systems Group has awarded Sperry a \$1.12 million contract for gyroscopic reaction wheel assemblies for its Tracking and Data Relay Satellite System.

Up to four Sperry reaction wheels will be used for stabilization of the four satellites currently planned for production.

The first launch is scheduled for September 1979 with two more to follow in mid-1980. TDRSS will relay data to and from the space shuttle, unmanned spacecraft and the ground control center at White Sands, N.M.

Sperry symbol generator selected for Hughes AH-64.

A Sperry all-raster symbol generator for cockpit displays has been selected by Hughes Helicopters for the AH-64 advanced attack helicopter.

The symbol generator will process TV data from infrared and other sensors, superimpose symbology and distribute the combination to various CRT and helmet-mounted displays.



Sperry tapped for more shuttle work.

Sperry's multifaceted role in the space shuttle program was expanded by NASA recently as the tempo and excitement of activity surrounding the orbiter free flights heightened.

Already very much involved in reentry, approach and landing study work, Sperry has been asked to continue and expand its autoland system design, verification, and support effort.

Sperry also builds the multiplexer/demultiplexer unit for the orbiter and solid rocket boosters. And, in the future a super-accurate pointing system developed by Sperry will aim telescopes and other research instruments from the open orbiter bay.

In a related program, Sperry has been involved in the modification of two Gulfstream II aircraft now used extensively for training astronauts in orbiter approach and landing techniques.

Single pilot IFR okayed for Bell 212 with floats.

Sperry's certification of the Bell 212 for single pilot IFR operation has been extended to 212's with floats. Authority has also been granted in Canada and the United Kingdom.

Business and commercial helicopter activities are centered in Sperry Flight Systems' Avionics Division.

General Electric picks Sperry reaction wheels.

Sperry Flight Systems received two contracts from General Electric's Space Division for gyroscopic reaction wheels to stabilize and control spacecraft.

Sperry will supply reaction wheels for the U. S. Air Force DSCS III communications satellite system and NASA's Solar Maximum Mission spacecraft.

Four reaction units, each weighing just 5.5 lbs., will be used on DSCS III. This represents a breakthrough for Sperry in the small space reaction wheel market. The current Sperry-General Electric Company contract calls for 17 reaction wheels, with delivery starting this fall.

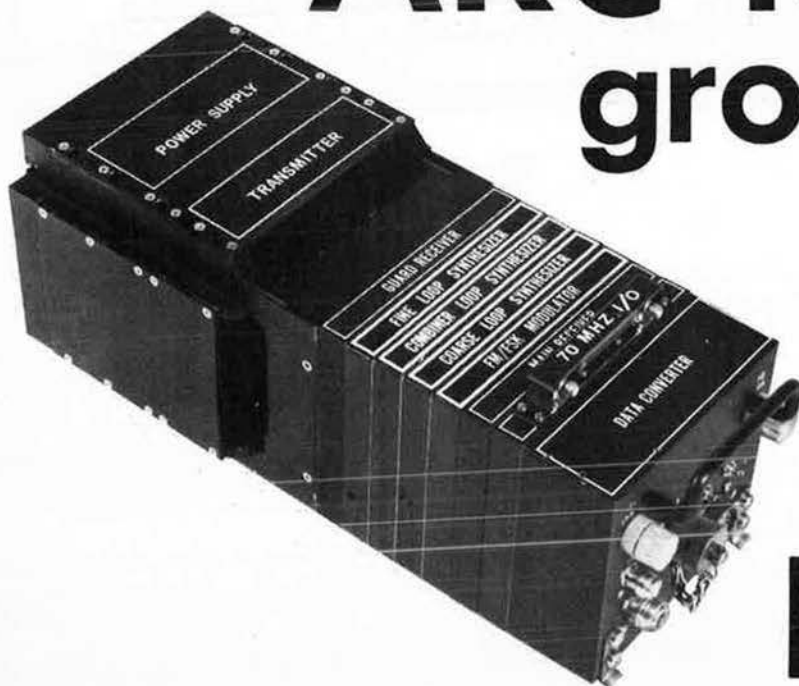
The NASA spacecraft, being developed by the Goddard Space Flight Center, will use reaction wheels similar to those developed by Sperry for the High Energy Astronomy Observatory satellite (HEAO).

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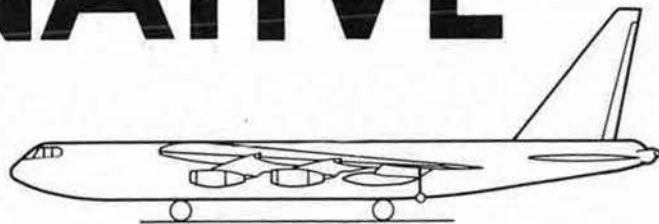


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*for AFSATCOM

The Magnavox CA-771 "grown-up" versions of the ARC-164 utilize proven high-production, high reliability slices plus the established plug-in adapter tray approach — for complete electromechanical interface with no aircraft wiring changes. They are the new alternatives to the ARC-171-1A and ARC-171-1C — at a fraction of the cost. For complete information call the Director of Marketing, 219/482-4411.



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Airmail

es. It is sad to read that "Air ce leaders had hoped that of- rs would regard 3s as 'competi- ' for promotion purposes." In old SEA code that is a big 101! e recent change allowing a larger centage of 2s will not solve the blem, and our Air Force leaders ow it. Perhaps they should read he Wayward Press" and then try tell it like it is one time. We may t like hearing the truth about the ER system and actual promotion obabilities, but understanding and lieving are the first two steps for pport of the system, whatever it or is not.

I think it is a lot of smoke about e mature OER system and giving lded responsibility to reviewers. 3 hurts a lot, but the reasoning for e change adds insult to injury. A se by any other name is still a ise.

Lt. Col. Bernard F. Albers,
USAF (Ret.)
Pueblo, Colo.

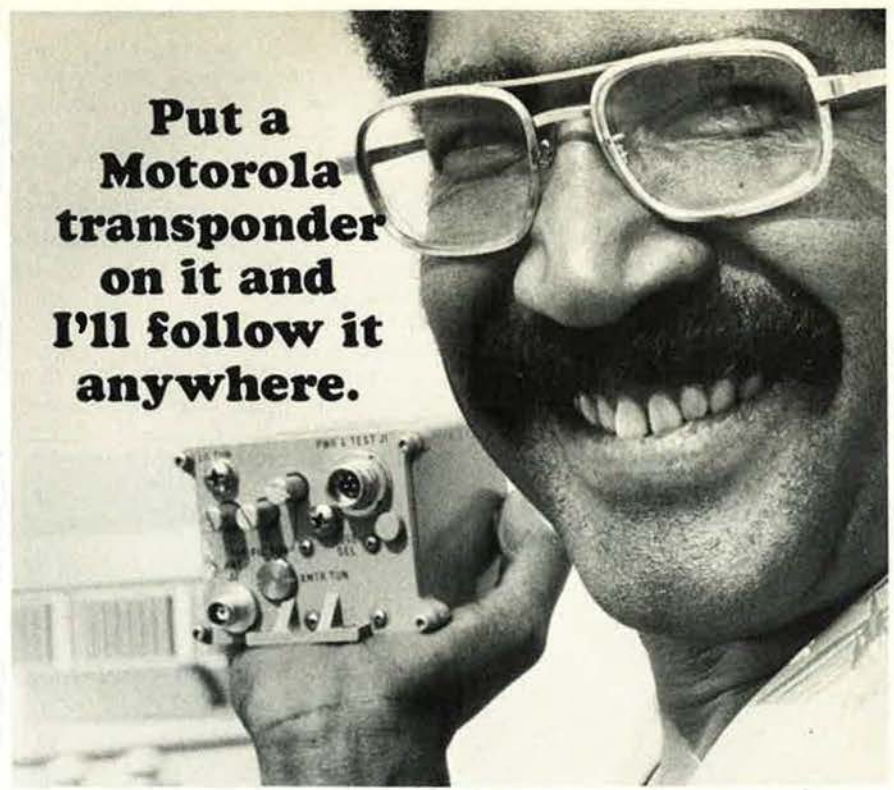
Another Balloon Barrage

did not see the item by Bob Stevens in the August issue of AIR FORCE, but I did see his letter in the October issue, and was appalled both by his confident but inaccurate assertions on the history of and terminology of military captive balloons, and by the meek way in which your editors accepted his unjustified criticisms.

First, Mr. Stevens was not in error in using the term "antiaircraft balloons," if only because this is a functionally descriptive term for the balloons which were, as a result of use in World War II, more generally called "barrage balloons."

But the captive balloons used to direct artillery fire in World War I were properly called either observation balloons, or artillery observation balloons. They were *not* called barrage balloons, and they were never, ever, used to direct artillery barrages, for two reasons, each overriding. In the first place, there was no need to direct an artillery barrage, since the settings on the guns were predetermined and fired either on call or on schedule, depending on what kind of barrage was being fired. (The word "bar-

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rage"—a barrier of fire—has a precise meaning in the artilleryman's lexicon, and relates to mass fires that are, and were, *not* directed or controlled by observers.) Second, no person in his right mind would have been up in a balloon with all that stuff flying through the air.

Balloons—antiaircraft balloons, of course—were used by the British in World War II to form aerial barrages (a different kind of barrier, not the same thing at all as an artillery barrage). Thus, the balloons in aerial barrages became generally known as barrage balloons.

Thus, Mr. Skinner can retract his apology, and Mr. Heflin's reputation as a lexicographer is at least partially restored.

T. N. Dupuy, Exec. Dir.
Historical Evaluation & Research
Organization
Dunn Loring, Va.

Black Thursday

Re the article by Gen. T. R. Milton entitled "Decision Over Schweinfurt" in your September issue—

As one who participated in the

first two Schweinfurt missions, I would like to report that Col. Budd J. Peaslee led the 40th Combat Wing (comprised of the 92nd, 305th, and 306th Bomb Groups) on August 17, 1943, and again as the Command Pilot on the October 14 mission to Schweinfurt, leading the Eighth Air Force effort, and not General Milton as stated in your article.

I was Squadron Leader on the August 17th mission and a lead pilot with Colonel Peaslee on the October 14 mission.

J. Kemp McLaughlin
Charleston, W. Va.

As a member of the 91st Bomb Group on that raid, I do know that General Milton *led* the mission; however, Colonel Peaslee retained *command* of the air. . . .

The facts of Colonel Peaslee being unable to find the third group of his wing are well known. The 305th Bomb Group that should have formed with him couldn't and that is the reason he did not lead the formation that day. . . .

The Second Schweinfurt Memo-

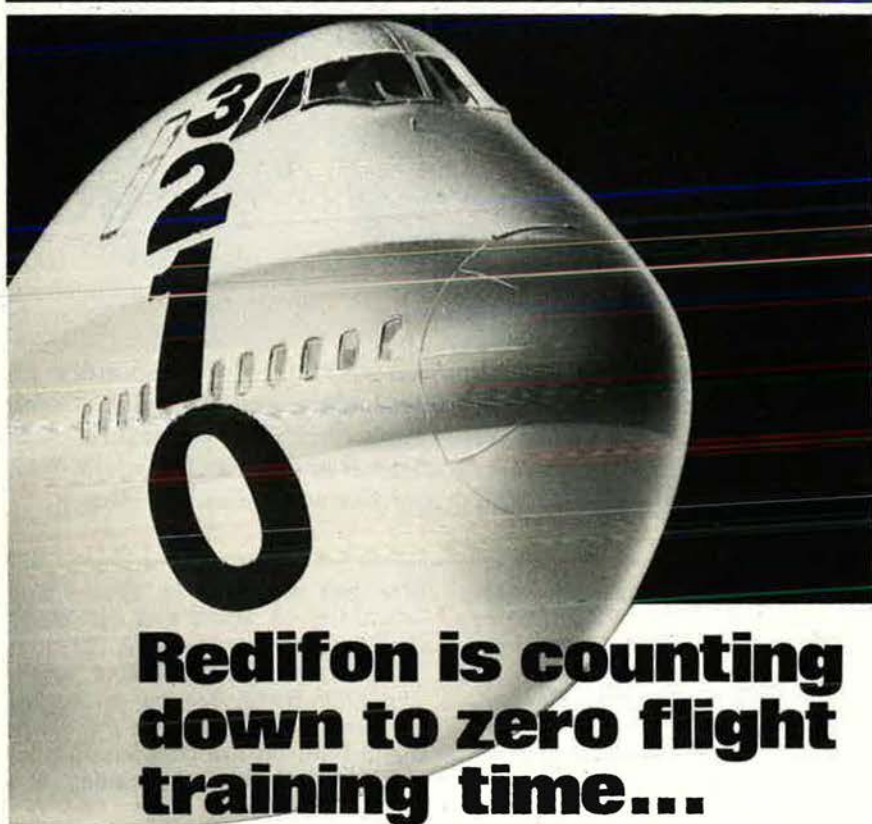
Airmail

rial Association was founded in February 1975 when I learned Colonel Peaslee was living in Salinas, Calif. I contacted him with regard to starting an Association composed of the men who flew that day and penetrated enemy airspace. The Colonel's reply was instant. Since that

date we have located many men who flew and survived that day.

This is a unique organization as it is not just an individual group. It is in remembrance of the sixteen groups that flew to Schweinfurt and back that day and what has come to be realized as the greatest air battle ever fought by any nation in the world. . . .

An aim of our Association is to create a lasting memorial in memory of that raid and of the men both living and dead who participated.



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2201 Arlington Downs Road, Arlington, Texas 76011, U.S.A. Tel: 817 469 8411

This is about to be fulfilled as Air Force Museum at Wright-Patterson Air Force Base has agreed to accept a living memorial in the form of a tree, with appropriate bronze plaque, to that never-to-be-forgotten air battle. Dedication ceremony will be held on October 14, 1978.

Phillip R. Taylor, Sec'y/Treasurer
Second Schweinfurt Memorial Association, Inc.
Alameda, Calif.

• *The bracketed, italicized statement in the review of Thomas Coffey's book, Decision Over Schweinfurt, should not be attributed to General Milton. It was added by us. We do not want to take direct credit from Colonel Peaslee, who did, in fact, start the mission in the lead position. However, when one of his groups became lost in the fog and did not rendezvous, Colonel Peaslee ordered then-Lieutenant Colonel Milton's wing forward to take over the lead position, but retained command of the mission himself.—THE EDITORS*

History of the Ninety-Nines

The Ninety-Nines, Inc., International Organization of Women Pilots, is developing a comprehensive history of the Ninety-Nines since its inception in 1929. We want this history to tell the story of all its members, not just a famous few. Every member is a part of women in aviation. So please help us—and soonest!

If you have, or know of, photos, clips, reminiscences, anecdotes, books, or any type of memorabilia about the Ninety-Nines that would be of historical value to us, please get in touch with

Gene Nora Jessen
2814 Cassia
Boise, Idaho 83705

Papers for Posterity

The Office of Air Force History is interested in securing the personal papers of Air Force personnel, officers, airmen, and civilians that will be of value to the history of the USAF and its predecessor organizations. Letters, diaries, and other papers are particularly desirable.

Papers offered will be deposited in the Albert F. Simpson Historical Research Center at Maxwell Air Force Base, Ala., and made available to scholars, writers, and students in the Professional Military Education courses at Air University. Arrangements can be made to

ofilm and return to the owner materials which the individuals old like returned.

hose willing to donate papers ould contact

Office of Air Force History
Attn: Mr. Schoem
Hq. USAF (AF/CHO)
Forrestal Building
Washington, D. C. 20314
Phone: (202) 693-7386
Autovon 223-7386

Mountaintop Wreckage

am a Boy Scout in Rapid City, D. Recently, our troop took a p to the Big Horn Mountains in yoming. This included a trip to Bomber" Mountain.

On this mountain, near the peak, the scattered wreckage of a B-17. legend is known by all who have een there, but nothing is certain. would appreciate any information om readers who might know the ircumstances of this crash.

Mike Doyle
2808 Garden Lane
Rapid City, S. D. 57701

Maj. David J. Haney Award

The Institute of Navigation Awards Policy Committee is considering a recommendation that a "Practicing Navigator" award be established in honor of Maj. David J. Haney, USAF (Ret.), a polar navigation expert who died December 10, 1975, at March AFB, Calif. The committee invites any of Major Haney's friends, associates, or acquaintances to please forward to the undersigned factual information—biographical, historical, or anecdotal—that can be used to justify approval of the award establishment.

Col. Leonard R. Sugerman,
USAF (Ret.)
3025 Fairway Dr.
Las Cruces, N. M. 88001

Bomber Command Operations

I am researching World War II reports of operational flights from aircrews in Bomber Command who flew from the airfields of Lincolnshire, England, for a book I am writing. If any readers have memories or any documents, letters, diaries, photos, or related items that they could let me know about I would be grateful.

I shall acknowledge all letters and return any items sent.

Barry Halpenny
Bar-H-Farm, Eagle
Lincolnshire IN6 9DZ, England

Paging Elmer W. Clary

Would like to hear from anyone who knows of Elmer W. Clary, who was a lieutenant pilot in the 859th Squadron of the 467th Bomb Group in England during the latter part of 1943 through 1944. An address or even the city where he might now be contacted would help.

Lt. Col. Al Blanco, USAF (Ret.)
4915 Tyrone Ave., #205
Sherman Oaks, Calif. 91423
Phone: (213) 784-3107

Former 320th Bomb Gp. Members

I am writing the World War II history of the 320th Bomb Group (M)—B-26s in the MTO and ETO with the Twelfth Air Force and 1st TAF (Prov.). Also am starting a Group Association.

Victor C. Tannehill
3760 North Bay Dr.
Racine, Wis. 53402
Phone: (414) 639-2729

UNIT REUNIONS

OCS

OCS Miami Beach, Fla., Class 43H and Stevens Hotel, Chicago, Ill., Air Corps '43-44 Hq. personnel please report in for reunion plans. A brief of service history and experience, and knowledge of those missing would be appreciated.

Lt. Col. Andy M. Kmetz, USAF (Ret.)
1715 W. Haven Dr.
Champaign, Ill. 61820

20th Air Force Tours

The 20th Air Force Association announces two special tours in '78. Vets and families eligible at greatly reduced fares. April 11 departure from New York for a 3-week tour to Athens, Greece; a 7-day land tour of Greece, including the island of Corfu; a week cruise of Aegean Islands; and Istanbul, Turkey; ending with a 3-day visit to Cairo and the Nile Valley. Tour limited to first 45 accepted applications.

In early August, for the 9th consecutive year, vets will depart from the West Coast for a 3-week tour to the Mariana Islands—Guam, Saipan, Tinian—Hong Kong and other stops in Asia, and return via Tahiti. Reservations are limited. Details from

20th Air Force Association
P. O. Box 5534
Washington, D. C. 20016

28th Composite BG, 11th AF

Planning a 3-4-day reunion, sometime between May and August 15, 1978, in the Los Angeles, Calif., area, celebrating the 35th anniversary of the Attu-Kiska invasions. Crews, operations, and administration personnel of Hqs. Command, 21st, 36th, 73d, 77th, 404th, and 406th Bomb Squadrons, 11th Air Force,

invited. Also Troop Carrier types if interested. Contact

Charles A. Pinney
Chamber of Commerce
P. O. Box 404
Hermosa Beach, Calif. 90254

Class 38A

Kelly Field Class of 1938A, widely referred to by the Air Staff as "That Fine Body of Looking Men," will hold a reunion on the 40th anniversary of its graduation. In San Antonio, Tex., at the Menger Hotel, March 23-25, 1978. Contact

Col. Marvin S. Zipp, USAF (Ret.)
4327 Snead Dr.
San Antonio, Tex. 78217

Aviation Cadet Class 42B

The 36th annual reunion of Mather and Luke Field graduates is scheduled for February 17-18, 1978, in Northern California, with our headquarters at the Marines Memorial Club. Send names of other 42Bs you feel may be interested. Contact

R. E. Monroe
1210 Park Newport #215
Newport Beach, Calif. 92660
Phone: (714) 755-0111

or

W. E. Radtke
Thompkins & Co.
P. O. Box 457
San Leandro, Calif. 94577
Phone: (415) 895-9200

71st Bomb Sqdn. (M)

WW II's 71st Bomb Squadron (M), New Guinea 1943-44, will hold a reunion August 18-19, 1978. Write

George M. Sevy
450 S. 150 W.
Cedar City, Utah 84720

388th Bomb Group

The annual reunion of the 388th Bomb Group Association will be held in Colorado the first week of August 1978. This outfit was stationed at Knettishall, England, and anyone who was a member of this or any unit attached is invited.

Edward J. Huntzinger
1925 S. E. 37th St.
Cape Coral, Fla. 33904

390th Bomb Group

A reunion of the 390th Bomb Group Memorial Fund (WW II, Framlingham (Parham), England, will be held February 17-18, 1978, in Orlando, Fla. Contact Patrick Rossi, Pres. 58 Doat St. Buffalo, N. Y. 14221

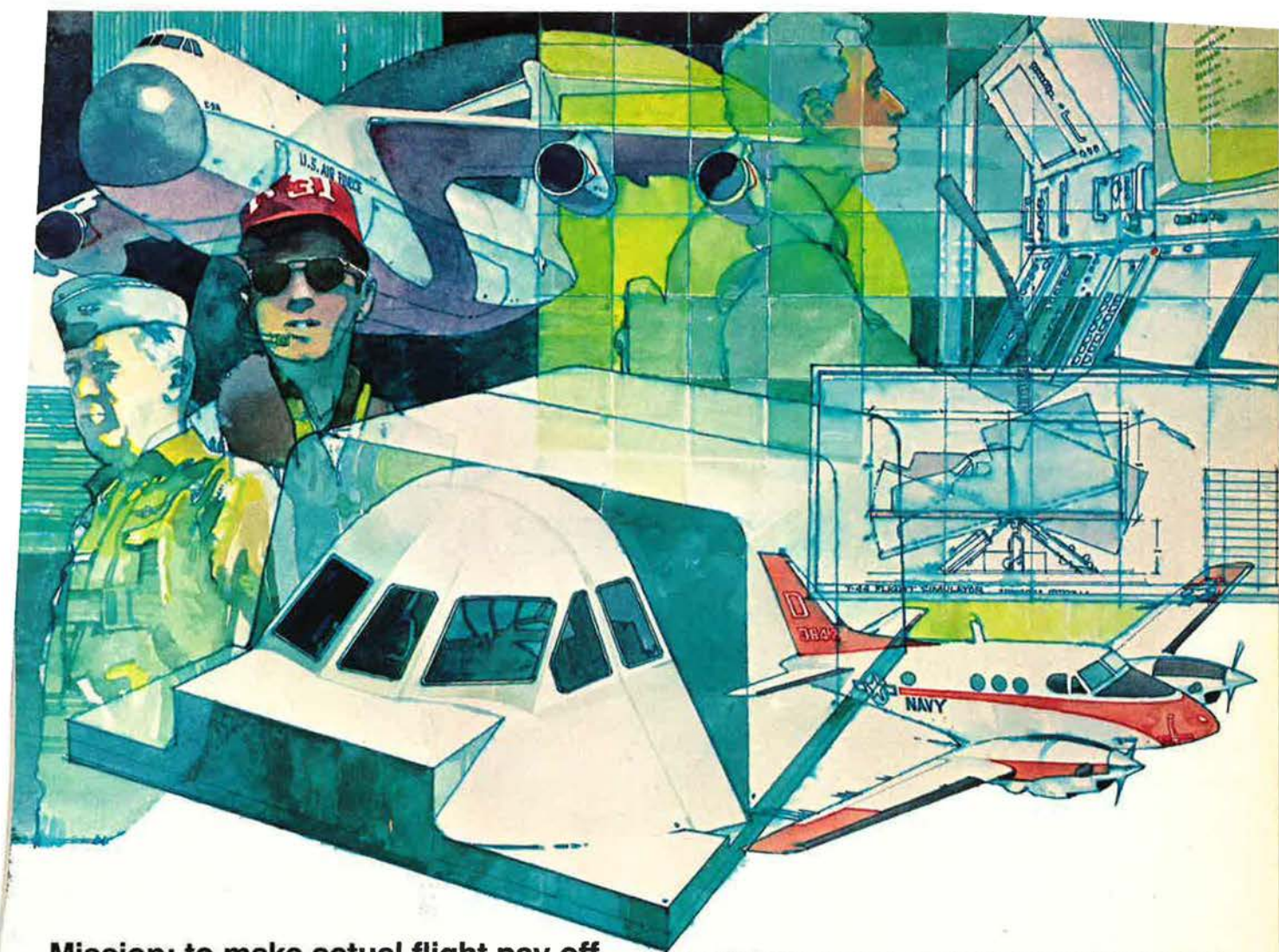
417th Bomb Group

The 417th Bombardment Group Association's reunion will be held at Barksdale AFB, La., June 23-24, 1978. For details write

Glenn E. Clark, Chairman
1705 Bradley St.
Bossier City, La. 71112

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The Hydrosystems Division of Gould Government Systems is developing an all-digital cockpit procedures trainer for the C-5. One step short of a complete mission flight simulator, it will not only familiarize a pilot with cockpit procedures, but will allow him to operate all systems and gain a better understanding of them. A limited flight simulation capability is an added bonus.

The same innovative total systems concept that is at work on the C-5 program — a team approach that still encourages individual initiative — is working to design a highly sophisticated full-capability flight simulator for the Navy's T-44A. Combining creative engineering with advanced computerized technology and Hydrosystems' experience, the simulator will interface a pilot with the total capabilities of the aircraft in an environment that closely approaches the sensations of actual flight.

Hydrosystems' experience includes cockpit procedures trainers for the F-14, F-4, KC-130, A-10, T-34 and E-2C.

Gould's total systems approach means more than technical excellence. Skilled management members of every team make sure that their program "flies" on time and within budget — every step of the way from design through logistic field support.

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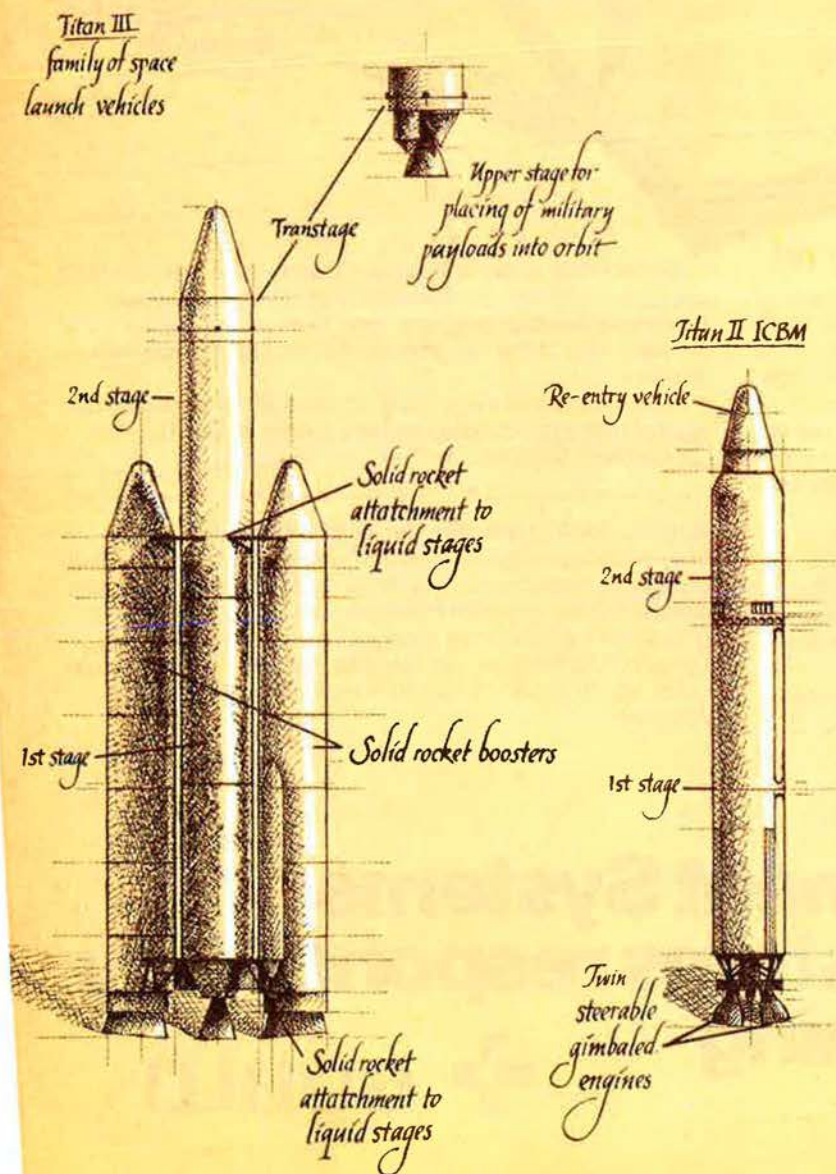
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We've been building successful missile systems since 1946, using the knowledge and experience gained with each successive system in the design, development and delivery of the next system. That's our system for developing systems.

It's the way we've produced the ground mobile Pershings, the canister-launched Patriots, and the silo-stored Sprints and Titans. In all, this philosophy has worked on 26 missile systems, and for over 1200 test and operational flights.

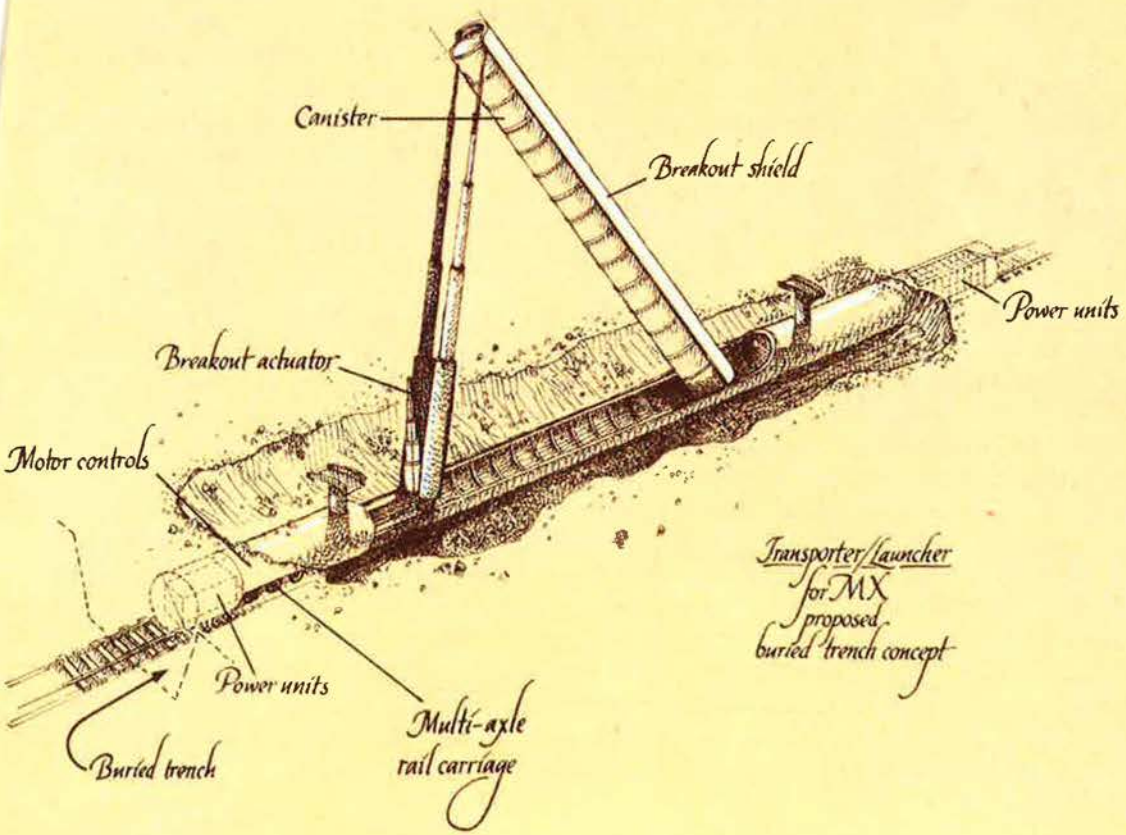
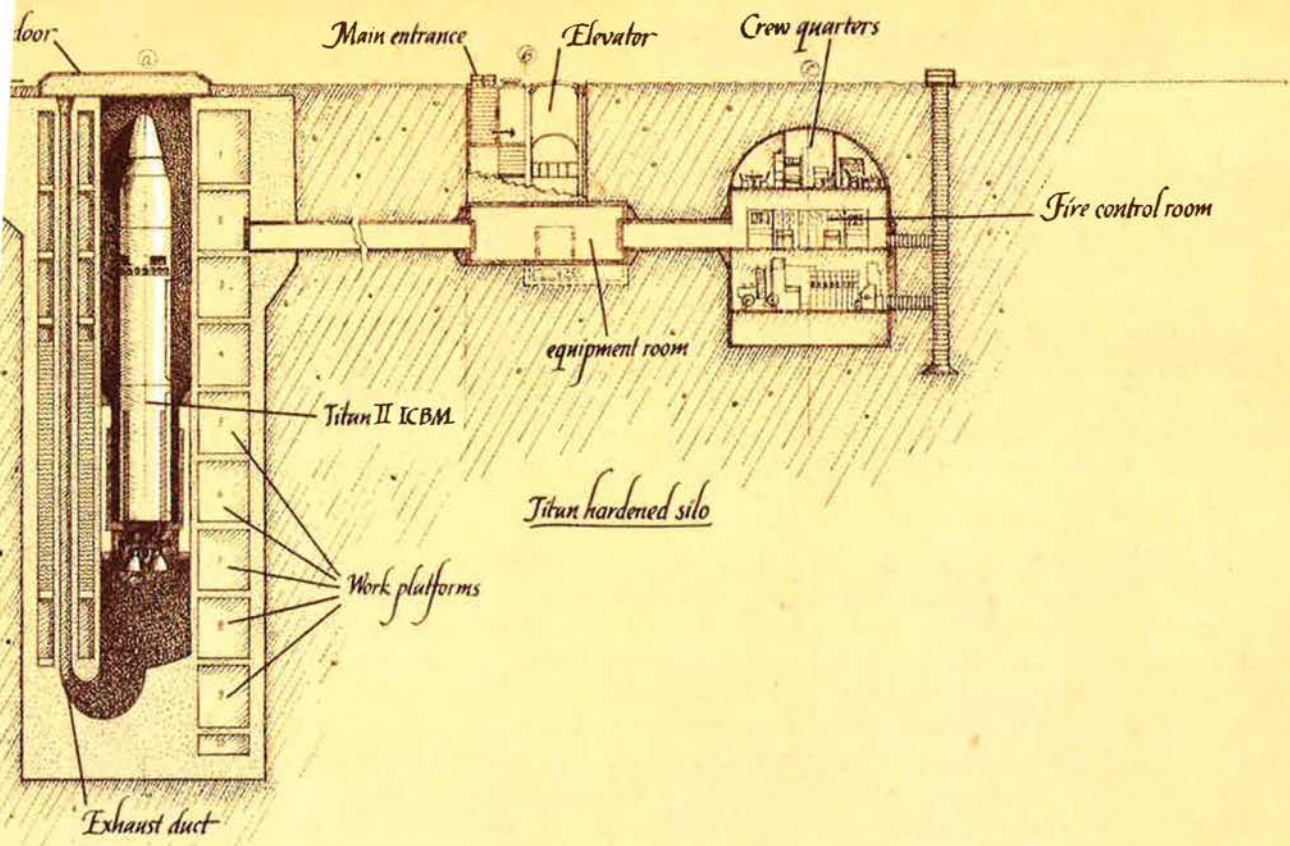
Take the Titan, for example. It is still part of our basic defense system, well into the second decade since we designed, developed, tested, and delivered it to the Air Force. At the time, we activated the underground facilities, provided the logistic support and supplied the technical data for operating and maintaining the full launch system.

Today, this basic Titan has evolved into our nation's workhorse launch vehicle known as the Titan III. It's used for both military space missions and planetary exploration by the United States.

While no one has yet developed the next generation of strategic ICBMs, Martin Marietta Aerospace, with more than 31 years of experience and success in developing all types of tactical and strategic systems, has the preeminent credentials to join in an active partnership on the MX program.

MARTIN MARIETTA

Martin Marietta Aerospace
6801 Rockledge Drive, Bethesda, Maryland 20034



SCIENCE/SCOPE

Air Force/Navy "dogfights" over Nevada, involving F-15 Eagles, F-14 Tomcats and F-5E Tiger IIs, are creating ammunition for the coming successor to Sidewinder. The mock air battles, conducted at Nellis AFB over the Air Force's ACMI range since early 1975, function as an aerial combat "laboratory" for the Air Intercept Missile Evaluation test program, nearing completion.

Analysis of AIMVAL data will provide operational criteria for the eventual replacement to the Sidewinder air-to-air missile. Whether the Air Force or Navy gets the nod as lead service for the new missile is the subject of a soon expected DOD decision. Meanwhile, the two services are developing a Joint Specific Operational Requirement (SOR) for a missile that will satisfy the needs of both Navy and Air Force.

New Manpack High-Frequency Radio passes muster. Approved after extensive field, laboratory and environmental testing, the AN/PRC-104 -- only one-third the size and half the weight of its predecessors -- is in full production at Hughes. Designed to provide an ultra-lightweight man-on-the-move backpack set, the 14-pound AN/PRC-104 incorporates large-scale integrated circuits (LSI) and multi-level modular construction that allows speedy replacement of units, modules and sub-modules. Its basic Receiver-Transmitter unit, as driver and controller for 20-, 100- and 400-Watt systems, provides 280,000 channels in 100 Hz steps from 2 to 29.9999 MHz, on either upper or lower sideband. Reduced power mode and added AM mode are optional capabilities.

The operator simply turns on the power switch, selects a frequency and presses the push-to-talk switch. The antenna is automatically and noiselessly tuned and the transmitter rises to full power instantaneously. The radio's silver-zinc battery delivers over 16 hours of normal operation between recharges.

An initial order of several thousand sets will be built for distribution to the U.S. Marine Corps, U.S. Navy and U.S. Air Force and Sweden's National Defense Forces where it is the new standard HF backpack radio. The U.S. Army is also testing the AN/PRC-104 as a possible replacement for AN/PRC-74s previously developed by Hughes.

Printed repair manuals may soon be replaced by an electronic display, part of the Technician's Maintenance Information System (TMIS) developed by Hughes. It can direct the repair of equipment as complex as a radar unit simply by asking the repairman to describe his problem. The system comes in two portable packages: a video display with an electronic keyboard; and a mass memory device that uses floppy disks, plus a microprocessor. A few disks can store all the troubleshooting data normally contained in a large stack of manuals.

A technician simply selects the appropriate disk, loads it into the system and types in the problem. In less than two seconds, the display screen provides a series of pertinent questions. After he provides the answers, the system pinpoints the failure, the part needing replacement, shows its location, and tells how to replace it. It also explains what tools and test equipment are needed, and how to use them. With this method, many repairmen will no longer require extensive technical training or cumbersome stacks of data. By cutting troubleshooting and repair time to a small fraction of present requirements, costs can be reduced drastically.

Creating a new world with electronics

HUGHES

HUGHES AIRCRAFT COMPANY

Aerospace World News, Views & Comments

by William P. Schlitz, ASSISTANT MANAGING EDITOR

Washington, D. C., Nov 7
In mid-October, the Defense Systems Acquisition Review Council (DSARC IIIB) recommended, and Deputy Secretary of Defense Charles W. Duncan, Jr., approved, that the F-16 Multimission Fighter enter full production.

The decision calls for an initial production run of 105 aircraft in FY '78, part of a planned total purchase of 1,388 F-16s.

The DSARC IIIB meeting was attended by representatives of Belgium, Denmark, the Netherlands, and Norway, who took full part "in the decision process and supported unanimously the production recommendation." The European Participating Governments, as these four countries are referred to, intend to purchase 348 F-16s. (Additionally, Iran wants 160.)

In a related matter, Air Force pilots and those employed by prime contractor General Dynamics in the F-16 flight test program at Edwards AFB, Calif., have been joined by pilots from the four EPG nations.

The first production F-16s will

begin entering service in January 1979 from assembly lines located in the US, Belgium, and the Netherlands.

In another development, officials at Edwards report that flight test and integration of the F-16's new air-to-air, air-to-surface fire control radar are "progressing well," and that the Westinghouse Electric Corp.-built radar is "meeting or exceeding" USAF requirements.

★ The Soviet Union suffered another humiliating failure in space early in October when the two-man crew aboard Soyuz-25 aborted a docking attempt with orbiting space station Salyut-6 and returned to earth.

The mission was to coincide with the sixtieth anniversary of the Soviet Revolution and was heavy with symbolism. (The capsule was launched from the same pad used to orbit Sputnik-1 early in October 1957; aboard Soyuz-25 was a copy of the recently adopted revised Soviet Constitution.)

A number of Western observers

believe that the Soviets may have been taking a crack at the record of eighty-four days spent in space by American astronauts in 1974.

The twenty-ton Salyut-6 was orbited September 29 and was said by officials to be "functioning normally," prior to the docking attempt.

The last successful Soviet manned mission was in February 1977 when two cosmonauts spent eighteen days aboard Salyut-5.

The Soyuz-25 crew consisted of Soviet Air Force Lt. Col. Vladimir Kovalenok and Valery Ryumin, a civilian flight engineer. They landed safely in Soviet Asia.

One suggested reason for the link-up failure was a lack of sufficient fuel; this theory infers that limited Soviet booster capability means a cutback in fuel when long mission durations are attempted.

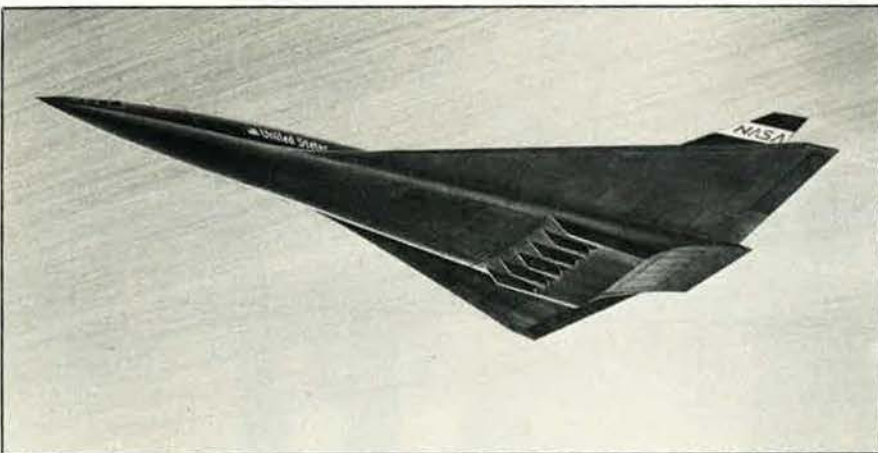
★ NASA is researching the feasibility of a liquid-hydrogen-fueled aircraft capable of transporting 200 passengers more than 5,750 statute miles (9,265 km) at a hypersonic cruise speed of about 4,000 mph (6,400 km/hr.).

The aim of the fifteen-month project, to be undertaken by Lockheed-California Co., Burbank, Calif., is to determine the configuration of a hypersonic vehicle equipped with a dual-mode propulsion system. The end result of the study will be a design concept; the space agency doesn't intend construction of an actual aircraft.

The propulsion system for the theoretical craft would include five conventional turbojet engines and five supersonic combustion ram (SCRAM) jet engines. Following takeoff, the turbojets would accelerate the aircraft to Mach 0.9 (about 600 mph or 965 km/hr.). Then the SCRAM jets would be cut in and the combined thrust would boost the aircraft to Mach 3.5 (about 2,000 mph or 3,200 km/hr.), or three and a half times the speed of sound.

At Mach 3.5, the turbojets would shut down and the SCRAM jets would accelerate the craft to Mach 6 (about 4,000 mph or 6,400 km/hr.).

Cruising at Mach 6, the aircraft could cover the distance between Los Angeles and Tokyo (5,420 miles or 8,722 km) in two hours eighteen minutes (including departure and approach at subsonic speeds demanded by environmental considerations). A flight between New



Artist's concept of a theoretical passenger airliner of the future capable of cruising at Mach 6. The aircraft would be powered by a dual system, employing both turbojet and supersonic combustion ramjet engines. (See item this page.)

Aerospace World

York and London would take just under two hours.

Such an aircraft would lick the sonic-boom problem by cruising at altitudes of 110,000 to 120,000 feet (33,500 to 36,500 m), to dissipate the intensity of the sonic boom before it reaches the ground.

★ NASA is also looking into a return to the propeller to power commercial airliners of the future.

Lewis Research Center, Cleveland, Ohio, is currently wind-tunnel testing the flight characteristics of a family of small-diameter, eight-blade props designed for efficiency at high speeds.

Engineers estimate that at speeds

over 500 mph (805 km/hr.) and at cruising altitudes above 30,000 ft. (9,145 m), propellers of the new design could provide fuel savings of twenty to forty percent over current turbofan engines and ten to twenty percent savings over an advanced turbofan engine.

The work at Lewis is part of NASA's overall program to develop future aircraft that would operate on up to fifty percent less fuel than the air fleet of today. One aspect of this would be to help the US retain its dominant position in the world's commercial airliner market.

According to the space agency, advances in composite materials have led to the creation of the strong, thin, short prop blades required.

★ A major milestone in the development of the Space Shuttle occurred on October 12 with the successful fourth free-fall flight of the Orbiter vehicle *Enterprise*.

Since the previous flight late September, the craft had been reconfigured—the conical streamlining shroud that covered its tail had been removed and dummy nozzles simulating its engines fitted. Thus, the *Enterprise* was shaped exactly as it will be on landing after a mission in space.

These physical changes had the effect on handling characteristics. The flight from release by its carrier 747 took only two minutes, thirty-four seconds, about half the time of the earlier free-fall flights from about the same altitude.

The craft was piloted by Joe Engle and Richard Truly, astronauts who crewed the Orbiter on the second flight in mid-September.

The fifth and final flight in the free-fall phase of the Orbiter development program took place on October 26. Except for a bumpy touchdown, the flight was a success. For the first time, *Enterprise* piloted by Astronauts Fred W. Haise, Jr., and USAF Lt. Col. C. Gordon Fullerton, landed on a concrete runway instead of the dry lake bed of the Mojave Desert in California.

Enterprise now enters a year-long program of ground vibration tests.

★ The space agency is considering two companies—Martin Marietta Corp., Denver, Colo., and Ball Brothers Research Corp., Boulder, Colo., to conduct parallel Shuttle Tethered Satellite System definition studies.

Such a tether system (also see *October issue*, p. 15), attached to an orbiting Space Shuttle by a cable



—WIDE WORLD PHOTOS

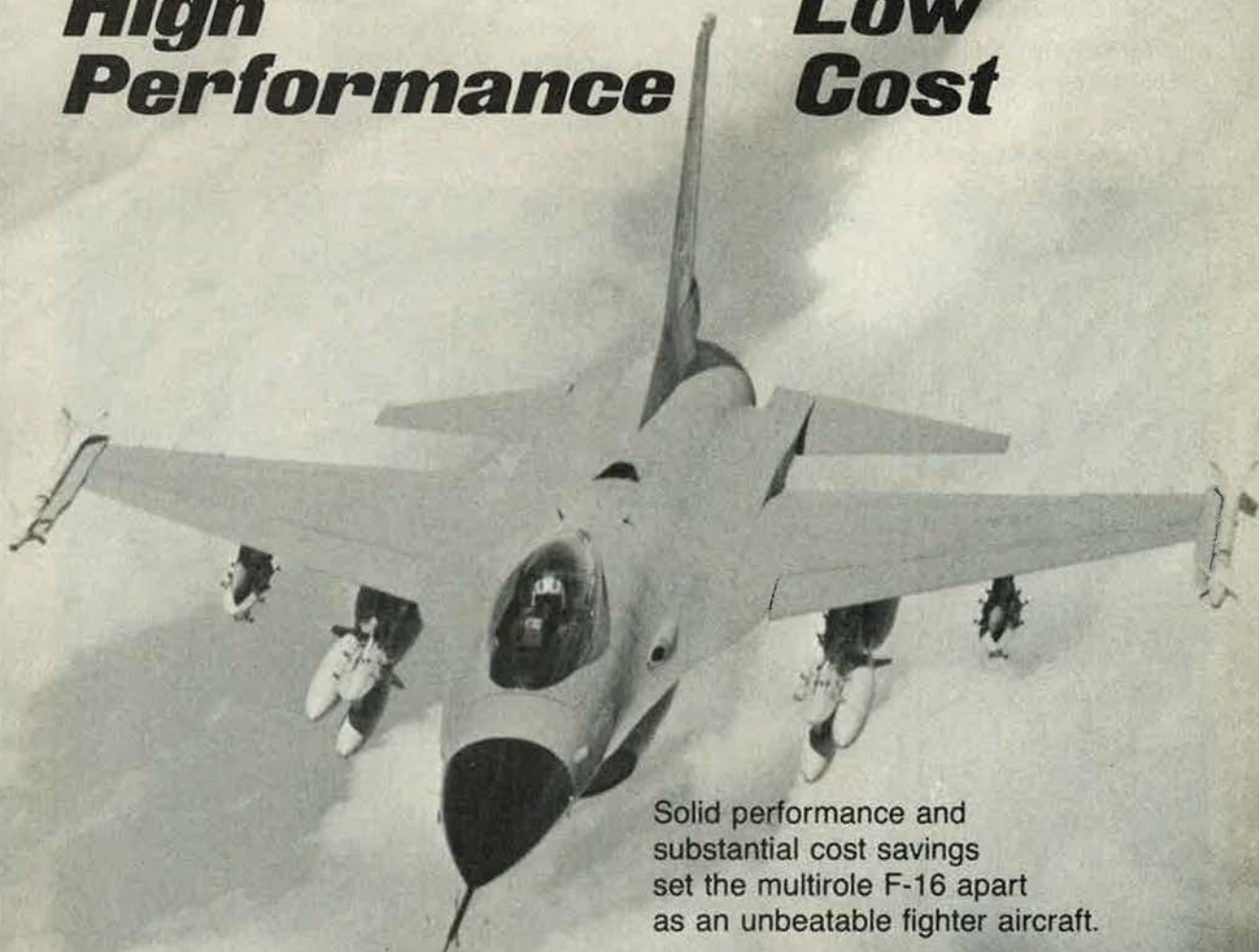
In Moscow on November 1, the USSR began scheduled SST Tu-144 service between the Soviet capital city and Alma-Ata in Central Asia, a two-hour flight. The Tu-144 was to have entered passenger service in 1973, but setbacks, including a crash at the Paris Air Show in 1973, delayed regular service. Right, His Royal Highness Prince Charles of Great Britain chats with the crew of Orbiter *Enterprise* following the craft's final free-fall flight and landing in late October. (For word on the Space Shuttle development program, see item above.)



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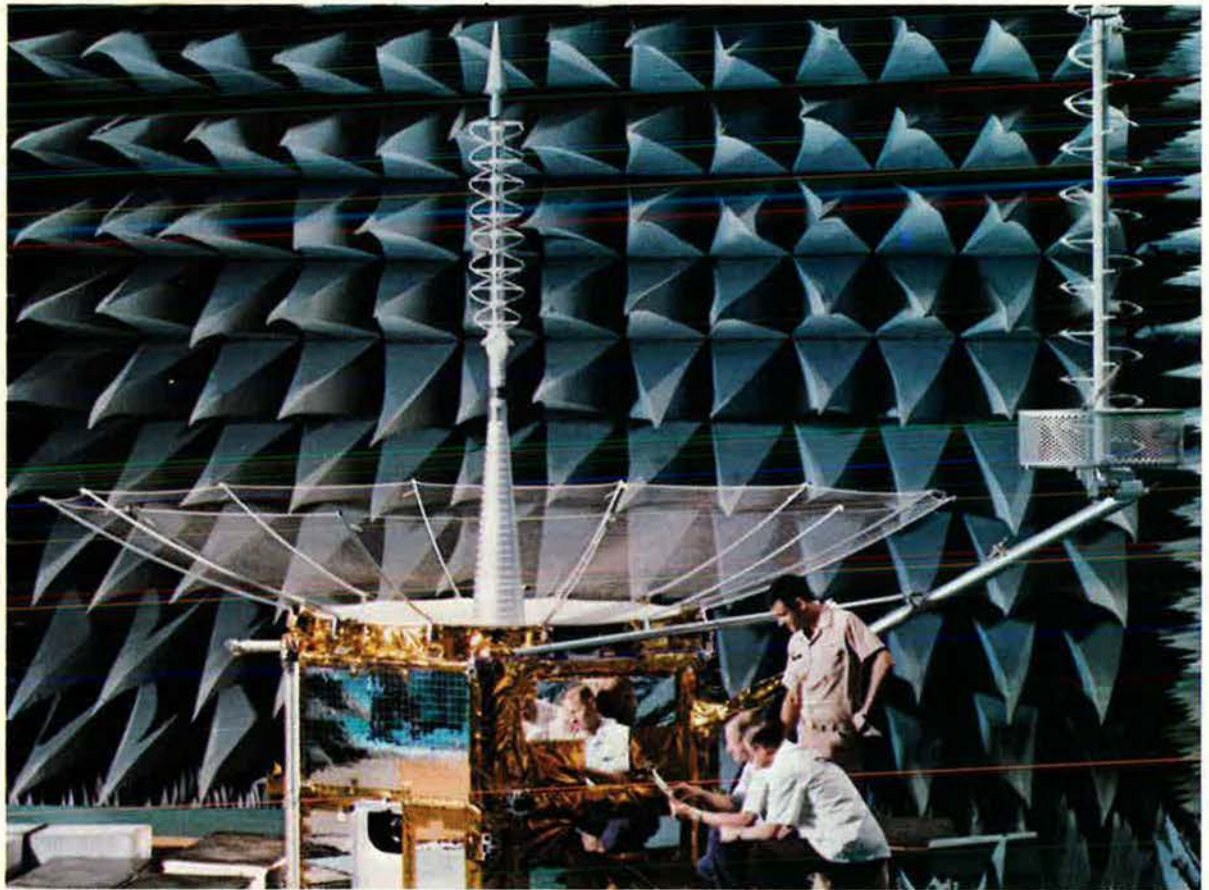
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to sixty-two miles (100 km) long, could have a number of applications other than long-duration measurements of earth's upper atmosphere.

According to NASA, similar other systems could:

- Transfer cargo between space vehicles.
- Retrieve satellites or orbiting debris without having to maneuver the Shuttle.
- Transfer large amounts of energy to a remote experiment or from a remote, even hazardous, power source to a space station.

Women are going places in today's Air Force.

In September, the male-only pilot tradition ended with the graduation of ten women from undergraduate pilot training at Williams AFB, Ariz.

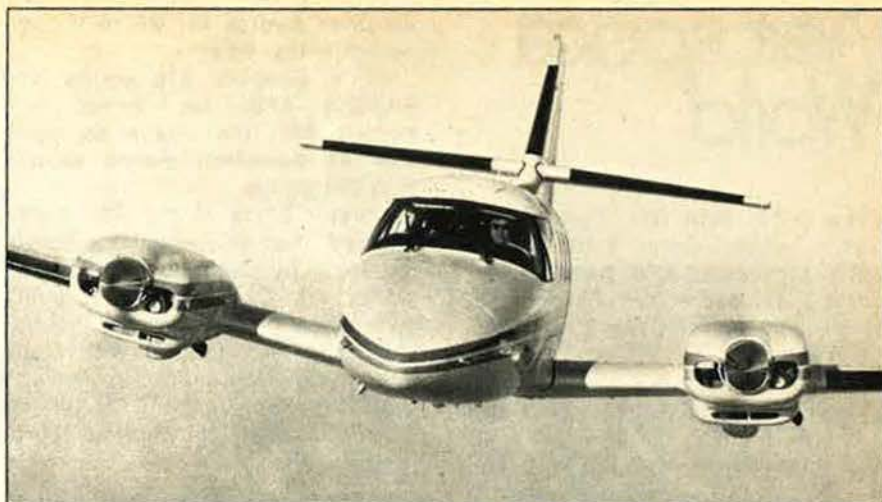
Two of the women graduates took top awards: Capt. Connie J. Engle, the ATC Commander's Award and Officer Training Award, and Capt. Mary E. Donahue, the Academic Award.

In October, six women graduated from undergraduate navigator training at Mather AFB, Calif., the first to be so rated. And again, the women scored high, with 1st Lt. Mary K. Higgins emerging tops in her class of eighteen after earning highest grades in both flying and academic subjects. 1st Lt. Ramona L. Roybal was named a distinguished graduate.

And next year, according to Hq. USAF, about fifteen officers and enlisted women will begin some thirty weeks of training to prepare them for duty underground in Titan II ICBM silos, the first women to serve in that capacity in the missile force.

The instruction will include ballistic missile theory, familiarization with missile systems, electronic principles, and operations and maintenance concepts.

★ The 4th Tactical Fighter Wing, Seymour Johnson AFB, N. C., has assumed USAF's European dual-based mission from the 49th TFW,



Recently certified was this Rockwell Commander-700, a pressurized, wide-body business aircraft developed jointly by Rockwell International and Fuji Heavy Industries of Japan. Five Commander-700s are currently under flight test.

Holloman AFB, N. M. The 49th, a dual-based unit since 1967, is converting from F-4 Phantoms to F-15 Eagles.

To reflect the 4th TFW's change in mission from primary air superiority to primary air-to-surface weapons delivery, the wing will schedule nearly two-thirds of its flight training to hone air-to-surface capabilities.

Under dual-basing, the F-4Es of the 335th and 336th Tactical Fighter Squadrons at Seymour Johnson will serve in the US under TAC aegis but remain committed operationally to USAFE.

As such, the two squadrons will participate in Crested Cap, the annual JCS-directed deployment of personnel and aircraft to Europe to train in the NATO environment.

★ Spain's new computerized air defense radar system went operational in mid-October.

Called Combat Grande, the system is composed of a ring of remotely located long-range radar sites linked to a computer in operation around the clock. Nerve centers for Combat Grande's electronic network are hardened multiconsoled combat operations and sector operations centers located at Torrejon AB near Madrid.

As with other radar nets (such as NATO's air defense ground environment system, also built by Hughes Aircraft Co. in conjunction with local contractors), Combat Grande automatically detects, tracks, and identifies intruding aircraft, evalu-

ates the data, and, if required, can vector fighter-interceptors to intruder aircraft.

And, while Combat Grande is basically an air defense system, information from it is already helping Spanish air traffic controllers handle civil air traffic.

★ Giant Voice 77, a three-month bombing and navigation competition among SAC, TAC, AFRES, ANG, and RAF Strike Command units, ended late in September.

When the smoke had cleared, the 380th Bombardment Wing, Plattsburgh AFB, N. Y., had garnered the top award—the Fairchild Trophy—by amassing 4,988 points of a possible 5,400. (The 380th also took the Best Bombing Trophy and the Navigation Trophy.) Runner-up was the 509th BW, Pease AFB, N. H., with 4,900 points.

The tanker unit award—the Saunders Trophy—went to the 384th ARW, McConnell AFB, Kan.

Bombing honors—represented by the Mathis Trophy—were taken by the 509th BW, Pease AFB, N. H., which also captured FB-111 honors in the form of the John C. Meyer Trophy for low-level bombing.

Presented for the first time was the Doolittle Trophy, to the best B-52 unit in low-level bombing (the 379th BW, Wurtsmith AFB, Mich.).

The 7th BW, a B-52 unit from Carswell AFB, Tex., won the William J. Crumm Linebacker Memorial Trophy for high-altitude bombing.

In addition to unit trophies, crew awards were presented to Bomber

Aerospace World

Crew E-13, 96th BW, Dyess AFB, Tex.; Tanker Crew E-108, 384th ARW, McConnell AFB, Kan.; FB-111 Crew E-31, 509th BW, Pease AFB, N. H.; and Vulcan Crew 3 from RAF Waddington.

★ And in early October, TAC's 23d Tactical Fighter Wing—A-7D Corsair II equipped—won the 1977 RAF

Tactical Bombing Competition and all other awards for which it competed in the meet.

Of a possible 976 points, the England AFB, La., based unit scored 886; the Jaguar-equipped RAF 41 Squadron placed second with 794 points.

Corsair pilots of the 23d distinguished themselves in the bombing event by sweeping the four top marks, with Capt. John Miller being awarded the bombing and leadership trophies. Second was Capt. Robert Gatliff, while Lt. Col. Hugh D. "Dave" Ebert and Capt. W. W. Turner placed third and fourth respectively.

The Flying Tigers of the followed suit in strafing, with Top Gun award being captured by Maj. Ron Brekke, followed by Captains Gatliff and Miller and Lt. exchange pilot Lt. Cmdr. Mike Svan.

In the competition were eight teams of six aircraft each—six from the RAF flying Jaguars and Buccaneers, and two USAF in Corsairs and F-111s.

★ US citizens took the lion's share of annual aerospace honors awarded by the Fédération Aéronautique Internationale in October Rome.

MIA/POW Action Report

Remains Identified

Of the twenty-two remains of American servicemen who died in Southeast Asia that were returned by the Vietnamese to US custody in September, seventeen have been identified as Air Force personnel. Of the others, three were listed as Navy, one civilian, and one remained unknown. Name, rank, and home town of the Air Force casualties follow:

Brand, Maj. Joseph W., Chicago, Ill.

Clark, Capt. Donald E., Jr., Lynchburg, Va.

Dawson, Maj. Clyde D., Fond du Lac, Wis.

Fantle, Capt. Samuel III, Sioux Falls, S. D.

Fryer, 1st Lt. Bennie L., Logan, Utah.

Goldberg, Capt. Lawrence H., Duluth, Minn.

Graham, 1st Lt. Allen U., Helena, Ark.

Hockridge, Capt. James A., Jacksonville, Fla.

Lodge, Maj. Robert A., New York, N. Y.

Mearns, Maj. Arthur S., New York, N. Y.

Morris, Capt. Robert J., St. Louis, Mo.

Nelson, Col. William H., Fillon, Mich.

Paul, Capt. Craig A., Columbus, Ohio.

Singer, Maj. Donald M., Newark, N. J.

Spencer, Capt. Warren R., Martinsville, Ind.

Wimbrow, Capt. Nutter J. III, Berlin, Md.

Winston, Capt. Charles C., Peekskill, N. Y.



Mr. and Mrs. Lamar Fryer of Stockton, Calif., witness the return of the remains of their son, USAF 1st Lt. Bennie L. Fryer, in the latest turnover by the Vietnamese of the remains of Americans who died in Southeast Asia.

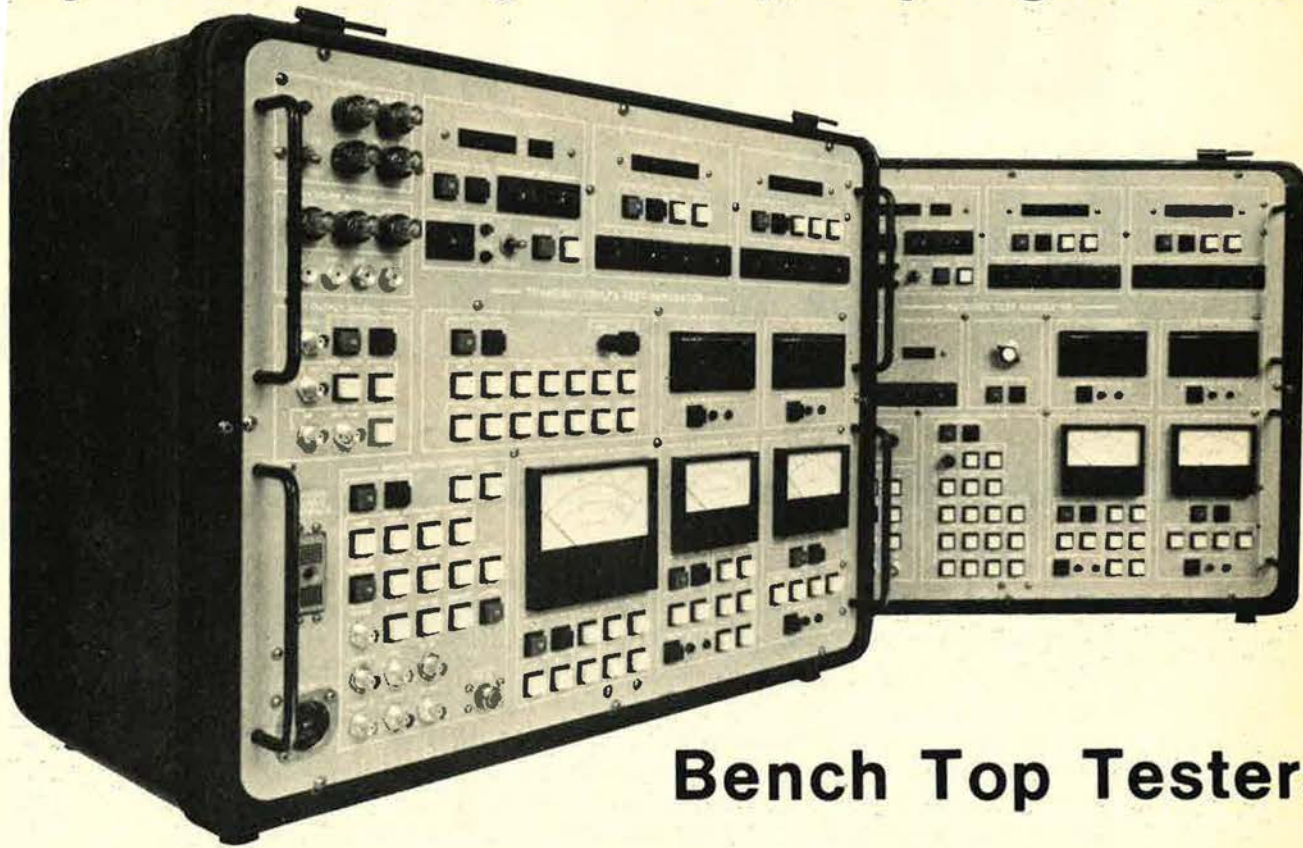
—WIDE WORLD PHOTOS

Meanwhile, the National League of Families of American Prisoners and Missing in Southeast Asia, represented by twenty-one plaintiffs (MIA/POWs and family members), has brought suit against the government to block changes in status of the remaining missing in action to presumed killed. (Recently, change of status reviews were ordered resumed by President Carter. See October issue, p. 16.)

The League's position is that Title 37, US Code Sections 555 and 556 (the statutes under which presumptions of death are undertaken) are unconstitutional. At this writing the outcome of the suit, and the government's legal countermoves, is pending.

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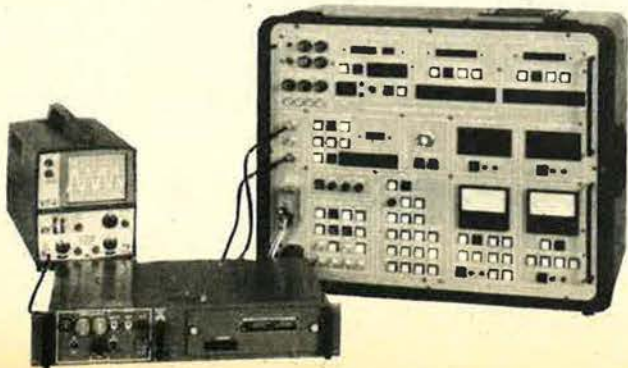
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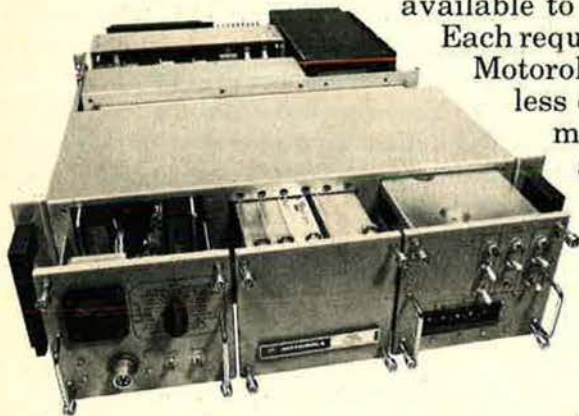
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The top award—the Gold Space Medal—went to US National Air and Space Museum Director **Michael Collins** for his total contribution to manned spaceflight during his career as an astronaut.

The US copped eleven other awards, including three for absolute world records set by USAF pilots last year: top speed of 2,193 mph (3,530 km/hr.) over a straight course as set by **Capt. Eldon W. Joersz**; speed over a closed circuit of 2,092 mph (3,367 km/hr.) was captured by **Maj. Adolphus H. Bledsoe**; and **Capt. Robert C. Helt** attained altitude in horizontal flight of 85,068 ft. (25,929 m). (All three flown in an F-71.)

Dr. Rodney T. Nixon of Port



Phantoms on the flight line at Ramstein AB, Germany, prior to their return to home base at Holloman AFB, N. M. F-4s of the 49th Tactical Fighter Wing were assigned to the host unit—the 86th TFW—during Exercise Crested Cap 77, which concluded in October. The annual deployment of TAC aircraft and personnel to Europe is now a routine segment of USAF's repertoire.

Angeles, Wash., was honored for his distance record of 2,794 miles (4,496 km) in a Cessna 170A.

US balloonists also scored: **Paul "Ed" Yost**, Harrisburg, S. D., for his 107-hour flight from Maine to the Azores—2,475 miles (3,983 km); and **Bruce Comstock**, Ann Arbor, Me., the first person to twice win the US hot air national balloon championship.

Other winners:

- **Beech Aircraft Corp.**, Wichita, Kan., for forty-five years of building structurally sound and safe aircraft.

- **The US/Viking team** of Langley Research Center, Jet Propulsion Laboratory, and Martin Marietta Aerospace Corp.

- **Betty Huyler Giles**, Rancho Santa Fe, Calif., for a lifetime of promoting women in aviation.

- **Richard H. Johnson**, Dallas, Tex., for improvements in sailplane safety and performance.

- **National Pilots Association** Executive Director **William H. Ottley**, for contributions to the development of general aviation.

FAI is the governing organization for aviation records and official competitions. The National Aeronautic Association, Washington, D. C., is its US representative.

★ Yet another attempt to cross the Atlantic via balloon ended in the drink off the Canadian coast on October 12.

The balloon—the *Eagle*—was rescued by Canadian Coast Guard cutter *Provo Wallis* along with its two-man crew, Dewey Reinhard and Steve Stephenson, both of Colorado Springs, Colo.

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Aerospace World

NASA had been tracking the balloon by satellite and noted it ditched almost exactly forty-six hours following launch from Bar Harbor, Me. Both crewmen were uninjured.

★ **NEWS NOTES**—Navy's newest aircraft carrier, *Dwight D. Eisenhower*, was commissioned in mid-October at Naval Station Norfolk, Va. *Eisenhower* is USN's third nuclear-powered carrier and the second of the *Nimitz* class, the largest naval vessels ever built.

NASA picked the ion drive system over the solar sail concept as the propulsion system for Interplanetary Automated Shuttle use in the 1980s and beyond. First mission of the unmanned vehicle could be a comet rendezvous in the 1980s.

With 1977 marking the twenti-



An anthropomorphic dummy is propelled into flight during a test of the Advanced Concept Ejection Seat at the McDonnell Douglas facility at Long Beach, Calif. The seat, designed for ejection during inverted flight and below 200 ft., can also operate up to 50,000 ft.

eth anniversary of the first satellite launch—Sputnik-1—NORAD is keeping tabs on 4,472 objects orbit. That figure could climb more than 19,000 in another two years, NORAD analysts said.

Col. (Dr.) David R. Scott, US (Ret.), veteran astronaut, resigns as Director of the Dryden Flight Research Center, Edwards Air Force Base, Calif., on October 30, to enter private business. Deputy Director Isaac T. Gillam is serving as Acting Director.

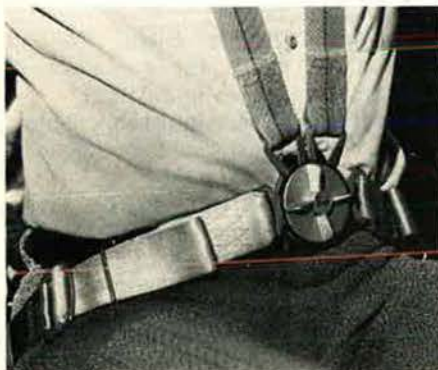
Griffiss AFB, N. Y., has been named the winning installation for the Secretary of Defense Natural Resources Conservation Award for 1976.

An eight-foot-high, granite memorial—dedicated to USAF airlietter "who valiantly served and gallantly died" in their country's service—was unveiled at Hq. MAC, Scott AFB, Ill., on October 27.

Died: Stephen W. Thompson, the first in the US Air Service to shoot down an enemy aircraft (in February 1918), in Dayton, Ohio, in October. He was eighty-three.

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matter of paramount importance that "they" perceive, clearly and fully, our national purpose and the strength that gives it meaning. It is equally important that what "they" are trying to communicate to us be properly analyzed, understood,

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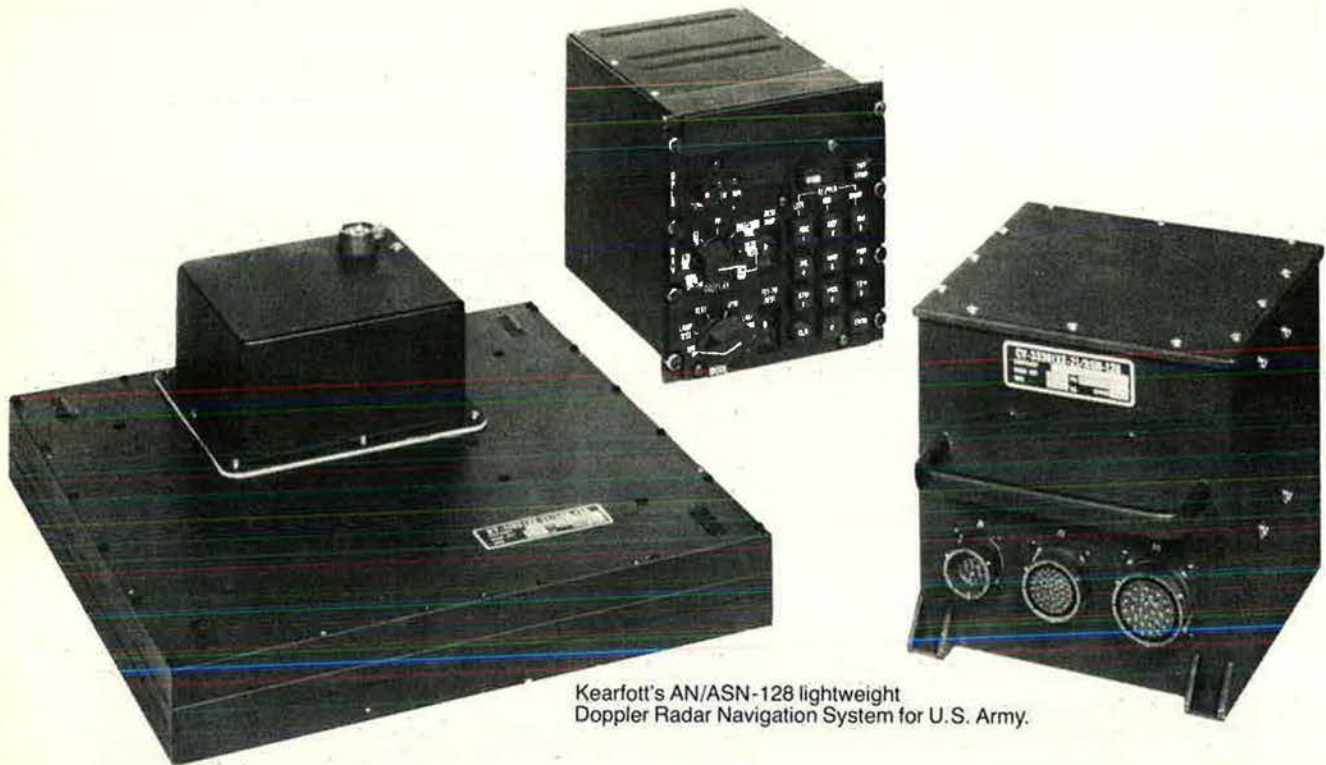
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The Receiver/Transmitter Antenna (RTA) and Signal Data Converter (SDC) constitute the Doppler Radar Velocity Sensor (DRVS), which continuously measures the velocity of the aircraft. The Control Display Unit (CDU) provides control and display functions for the operator, and contains the navigation computer.

With inputs from external heading and vertical references, the ASN-128 system provides accurate aircraft velocity, present position, and steering information. It is completely self-contained and requires no ground based aids.

The DRVS accepts heading, roll, and pitch as synchro inputs and converts them into digital format for transmission to the computer. The DRVS can also be used separately from the ASN-128 to provide velocity inputs to other aircraft equipment.

The CDU accepts beam velocities, heading, roll, pitch and true air speed (in some installations) from the Doppler Radar Velocity Sensor and performs the navigation computations. The front panel includes provisions for entering operator inputs and for displaying system data such as present position, steering information to 10 destinations, and status of the system. The CDU also puts out velocity and navigation data in ARINC digital format.

The CDU performs three functions for the ASN-128:

- Provides mode controls, display controls, and keyboard entry of destinations and other data.
- Performs all computations for LDNS including Doppler processing, velocity coordinate transformations, navigation in both UTM and latitude/longitude, steering signals to 10 destinations, and BITE functions.

- Displays navigation data on its front panel.
- BITE function identifies and displays failed LRU.
- Provides BCD and binary outputs for external equipment.

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- Weight 28 lb (12.7 kg)
- FM-CW transmission, with Doppler tracking of the J1 sideband providing accurate velocity measurement from ground level, to over 10,000 feet (3,048m).
- Printed-Grid Antenna—"Land-sea" switch eliminated, because of inherent beam shaping.
- Single transmit-receive antenna, utilizing the full aperture for both transmission and reception, minimizing beam width and reducing fluctuation noise.
- Navigation data in both UTM coordinates and Latitude/Longitude.
- Redundant navigation modes for backup.
- Single time-multiplexed signal processor module—only one-fourth the number of components of previous designs.
- Over 2000 hour MTBF for the ASN-128 and over 4500 hour MTBF for the DRVS alone.
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For additional information write to: The Singer Company, Kearfott Division, 1150 McBride Ave., Little Falls, N.J. 07424.

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With the B-1 apparently beyond resurrection, a stretched FB-111 is the best stand-in for the unique roles the manned bomber can play in deterrence or war. Those roles add up to a convincing argument for . . .

Why We Need a Manned Bomber

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

HAVING tried it, I have certain misgivings about going into a well-defended country in a bomber. Nonetheless, the fact remains that there have always been some reassuring advantages connected with putting aircrews into airplanes. Not the least of these advantages has been the ability of aircrews to salvage faulty mission planning with *ad hoc* improvisation. Thus, the demise of the B-1—and it takes a very great optimist indeed to think the B-1 project might still survive—is bad news for those of us who believe in the essentiality of manned bombers. The cruise missile may be all it is cracked up to be, and we can hope fervently that it is, but it is still a missile, dependent on information fed to it before launch.

There is no doubt as to its value in our constant and growing strategic arms confrontation with the USSR, but it does not take the place, in terms of flexibility and versatility, of long-range manned airplanes. Even though the new cruise missiles are a good many generations removed from those despised V-1s that putted across London on their mindless course to self-destruction, they are still direct descendants of the V-1s and will thus inherit a few of their miserable ancestor's bad traits. Rapidly changing situations, unexpected antiaircraft sites, targets of opportunity are the sorts of things you cannot expect even the best programmed missiles to deal with. And so it should be good news that the Air Force has a fallback plan in the form of a rejuvenated FB-111. Admittedly, logic is still firmly on the side of the B-1, but the stretched FB-111, with advanced B-1 avionics

and some badly needed new engines, seems clearly the next best answer.

However, since logic was never a strong factor in the B-1's defeat, the same forces will undoubtedly marshal against this new proposal. The great cost of the B-1 was often cited as reason to kill it, and certainly as inflation and program stretch-out worked the cost up, the figures did get disconcerting. But cost alone is not a convincing reason to kill off a needed weapon system. It was really the doubt cast on the need for a new bomber that made the decision stick. The cruise missile, even with, as we have learned, its wings clipped to a 1,500-mile range, was put forward as a plausible substitute for a penetrating bomber.

Maybe it is, for the single job of penetrating the USSR. In that role the cruise missile's chief value will lie in the complications it will give Soviet defenses and the deterrent value of these complications. It is a considerable contribution to gain at what appears to be a relatively modest cost. To that extent the cruise missile appears to be a huge plus for our side, although a look at the globe does cause a little worry about the 1,500-mile range limitation we have agreed to. With that range restriction, the imaginations of Soviet air defense planners are not very severely taxed in sorting out probable launch points.

But to get back to the manned bomber and why we need it. Without disputing the wisdom of the Triad and the bomber's role in that philosophy, that is not the reason I have in mind. Nor is the fact that bombers, by their responsiveness to recall and other changes of mind, are an in-

valuable crutch to a President who can thus do something without doing everything. There is still another reason, in spite of these excellent ones, why bombers should continue to be an essential part of our defense apparatus. It has to do with the extraordinary versatility of the modern long-range bomber and hence its usefulness in a world where, as we become more dependent on imports and international trade, we will become ever more vulnerable.

Control of the sea remains, of course, a mission for our Navy. But the earth, as we have all heard from time to time, has seventy percent of its surface in the form of oceans. These oceans, moreover, are no longer the private domain of ships, for the farthest point from land is now easily reachable by long-range aircraft. Satellites make sea reconnaissance child's play by comparison with World War II days when radio silence often was cloak enough to hide a ship. Because modern naval defenses are formidable by any standards, the long-range airplane needs more than just long range to be effective in a maritime role. It must have speed, highly sophisticated ECM, and standoff weapons. In short, it must be something very like the B-1, or failing that, the stretched FB-111. That, then, is one reason for a new manned bomber. There are others that come to mind, ranging all the way from a precise application of nonnuclear munitions in a NATO war to a convincing show of force over some troublesome spot. It was the B-52s, remember, that nearly bailed us out of Vietnam and might well have done so had the home front not collapsed first.

Cruise missiles are fine, and we ought to press on with them, but they are still missiles, limited to a single flight. They cannot patrol, or make demonstrations of force, or do a lot of other things a manned airplane can do. Hence, an air force should have some manned bombers as an essential part of its total combat strength.

There used to be a sign on the Chief of Staff's door, something about the Air Force's mission being to fly and fight. It ended with a peremptory injunction: "And don't you forget it." OK. Let's don't. ■

Perspective

Comment & Opinion

By Maj. Barry D. Watts, US AIR FORCE ACADEMY

The Changing World of Air Combat, or *Plus Ça Change, Plus C'est la Même Chose*

While I read Maj. Gen. Frederick C. Blesse's article "The Changing World of Air Combat" (October '77 issue) with considerable interest, I came away unconvinced that technology is changing the "world of air combat" as much as he thinks.

Blesse's basic thesis seemed to be that if we equip our fighters with a workable device for positively identifying hostile aircraft at long ranges together with the right missiles, "... aircraft performance no longer will be the determining factor in aerial battle." This conclusion, he argued, follows from AIMVAL missions whose outcomes can be summarized by the following representative encounter between the F-14 and F-5E. This "typical" engagement usually began head-on and unfolded as follows: Between ten and twelve miles, the F-14's Television Sighting Unit allowed the Tomcat crew to identify the F-5; they immediately fired a Sparrow missile. Eighteen or nineteen seconds later, the F-5 pilot visually identified the F-14 and launched an advanced Sidewinder. A second or two after this event, the F-5 was destroyed by the Tomcat's Sparrow, but shortly thereafter the F-14 itself was hit by the F-5's Sidewinder.

Evidently, AIMVAL engagement outcomes were largely driven by two factors: missile envelopes and the distances at which positive identification of bogey aircraft occurred. And Blesse's basic point is that these factors will dominate all future air combat. But this conclusion follows only if, in addition, Blesse can show that air-to-air encounters in all future conflicts *must necessarily* adhere to the pattern observed in AIMVAL, and it is precisely this additional (but necessary) premise that I do not think he can justify.

Insofar as AIMVAL itself goes, the

test cannot be used to show that, in the future, "Once you are inside the enemy's missile envelope, you're not likely to escape." Why not? Because, at least on Blesse's account, scoring during AIMVAL appears to have been predicated on the assumption that a missile fired within parameters was tantamount to a hit scored against a fighter. After all, no missiles whatsoever were fired during AIMVAL—only electronic telemetry signals—and Blesse makes no mention of the possibility that air-to-air missiles might be outmaneuvered or otherwise defeated *after they have been launched*.

Logically, this omission is a crucial one. In Vietnam and the Middle East, alert pilots time and again showed themselves able to outmaneuver both air-to-air and ground-to-air missiles. In addition, several other means of defeating hostile missiles (electronic jamming, chaff, etc.) were developed. So, in the past, a missile fired in parameters was by no means tantamount to a kill. Of course, you could reasonably object that Blesse is not talking about *past* missiles, but about those to come—the point being that the new missiles promise to be so deadly and reliable that fighters will not be likely to avoid them. Here, time may prove Blesse right. However, I am deeply skeptical. For

even if technology does eventually produce missiles that pilots will not be able to dogfight with much success (and, given the complex dynamics of the intercept-missile problem, it is by no means obvious that this will come to pass), I see no good reason to presume, with Blesse, that the technology that can build such missiles will fail utterly to find other means of defeating them.

But let us grant, for the sake of argument, that the next generation of air-to-air missiles, when coupled with long-range identification devices, will prove to be a virtually unstoppable offensive weapon against opposing fighters. Even so, *the capability to fight in close, relying on aircraft performance and the traditional fighter maneuvers, is still not necessarily antiquated*. After all, the airplane-limited, carefully controlled encounters typical of AIMVAL constitute relatively simple, uncluttered situations when contrasted with those that would most likely obtain during, for example, a conventional war in northern Europe. Instead of fairly "clean" one-vs.-one or two-vs.-two encounters, our aircrews might be forced to win air superiority in twenty-vs.-forty engagements or worse (with the numerical edge going to the other side). Moreover, they could expect to fight such battles in the midst of extensive electronic countermeasures, complex SAM/AAA defenses, and (quite possibly) marginal weather. The question then becomes: Can we assume, as Blesse tacitly does, that these (or similar) complications could *never* reshape the air battle to the point where few standoff missile shots would occur? I think not. For even if you yourself can shoot opponents twenty or thirty miles away, in crowded skies you are still going to have to be able to handle close-in attacks from two or three.

I will grant that some means of positively identifying bogey aircraft

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ell outside visual ranges would normously enhance the usability of long-range air-to-air missiles. For the first time, a relatively practical standoff missile capability would be at hand, and Blesse is probably right in arguing that we ought to develop this capability (assuming that it turns out to be reliable, hard to spoof, and affordable). But having said this, I must go on to emphasize that it does not therefore follow that we can forget about ever again having to fight in close.

In my view, then, Blesse's suggestion that launch-and-leave missiles coupled with long-range identification gadgets antiquate current tactics is simply mistaken. Missile kills without eyeball identification of the bogey were achieved (if infrequently) over North Vietnam during "Linebacker I" (Lavalle, *The Tale of Two Bridges and the Battle for the Skies Over North Vietnam*, p. 161). Thus, the development of a much more usable standoff missile capability than that we had during the Vietnam War, far from being any radical innovation, merely enhances an option that was already part of the tactical repertoire. And while on some future occasion that improved capability may make it possible for us to win air superiority almost exclusively from long ranges and without much maneuvering, we certainly would be foolish to think that, henceforth, we can always count on being able to do so.

There are two further problems with Blesse's analysis that I want to mention briefly. First, Blesse shows no awareness of the possibility of quality/quantity tradeoffs insofar as the problem of air superiority in the NATO environment is concerned. This omission has the effect of saying that we ought to concede a significant numerical advantage to our opponents and bet everything on technical sophistication.

But even assuming that our technical edge will not be countered or matched by the other side, it is still far from obvious that technical sophistication is the way to go. Surely this point can be argued, as those who fought for the lightweight fighter have shown.

Second, Blesse clearly assumes that, in the past, "aircraft performance" was the "determining factor in aerial battle." However, this assumption, too, seems highly questionable. To cite one fairly strik-

ing example, in the spring of 1945, Erich Hartmann, while piloting the "inferior" Me-109G, managed single-handed to hold no less than eight American-flown F-51s at bay—at least up until he ran low on fuel (Toliver & Constable, *The Blond Knight of Germany*, pp. 167-168). Similarly, in the skies of Korea—where Blesse himself fought—it can be pointed out that a mere 4.8% of the 800 Sabre pilots who flew at least twenty-five counterair mis-

sions are credited with no less than 38.2% of the kills (Torrance, Rush, Kohn & Doughty, *Factors in Fighter-Interceptor Pilot Effectiveness*, p. 1). Such episodes certainly suggest (although they do not prove) that, historically, the skill and cunning of the men inside the machines may often have been far more important in determining the outcomes of combat engagements than discrepancies in either the performance or weaponry of their opposing fighters. ■

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Airman's Bookshelf

Building a House With a Bulldozer

The Lessons of Vietnam, edited by W. Scott Thompson and Donaldson D. Frizzell. Crane, Russak & Co., Inc., New York, N. Y., 1977. 288 pages, with index. \$16.50.

Halfway through this volume I began to worry that the title promised far more than the book was going to deliver; after finishing the second half my worry changed to whether the book told me more than I really wanted to know about ineptitude and parochialism at the highest levels in our government, to include the military services. One reason for our failure in Vietnam may well have been that the war saw the coming of age in our officer corps of The Bureaucratic Warrior to whom the perceived future of his branch or service, along with its pet doctrines and modes of operation, became, in the absence of Presidential wisdom, the driving force behind what passed for strategy and policy.

The volume derives from a colloquium on "The Military Lessons of the Vietnamese War," conducted during the academic year 1973-74 at the Fletcher School of Law and Diplomacy. The year-long course concluded with a conference in May 1974 tying in the political lessons of the war. The list of contributors, including both colloquium speakers and participants in the final conference, is impressive: Maj. Gen. George Keegan, Ambassador Robert Komer, Maj. Gen. Edward Lansdale, Ambassador Henry Cabot Lodge, Brig. Gen. S. L. A. Marshall, Paul H. Nitze, Sir Robert Thompson, General Westmoreland, Barry Zorthian, Admiral Zumwalt—joined by assorted deans, professors, colonels, and at least one major.

Much of what is included from

the colloquium and conference is either old hat or not particularly relevant to the crucial issue identified in the title. But much valuable detail is included on programs unfamiliar to most blue-suiters—programs whose payoffs were proportionately far greater than their costs in dollars. Col. Robert Rheault's brief history of the CIDG (Civilian Irregular Defense Group) program, dating from the late 1950s, and the accounts of the Regional Forces (RF) and Popular Forces (PF) programs are cases in point.

The section on Tactics and Technology is particularly representative of how these discussions perform the valuable service of raising questions that were far less obvious when the bullets were flying. The section opens, as many of them do, with speakers who start from the assumption that superior technology must have meant that superior tactics were possible; hence, how come we didn't win? Here are two observations that emerge: "I suspect that, on balance, technology hurt us more than it helped us in Vietnam, because it confirmed us in trying to find better ways to fight the war *our* way rather than the Vietnamese way" (Robert Komer). And: "[our approach] tended to provide for a system of rewards and expectations in such a way that tactical professionalism was . . . seriously downgraded [because] the material and psychic rewards went to those who could employ or support the high technology systems rather than to those who could employ only basic [ground] combat tactics. . . . The point is not to discount or discard technology but to get back first to the basic human performance criteria in tactics and the rewards and sanctions which support them" (Jerrold Milsted).

But the real questions posed by this book zero in well above the lev-

el of tactics and tools. The first raised early on by General Lansdale is the American officer's total inability to come to grips with the Clausewitzian dictum that war, and hence military victory, is a means rather than an end in itself.

This ethic is alien to an American military man, who is conditioned throughout his military service by the checks and balances of our democratic system, wherein civilian politicians make the political decisions which the military carry out. [His] conditioning leads him to see political and military operations as separate, even compartmented, entities. . . .

The battleground of Vietnam saw the confrontation of two, significantly different, viewpoints. The Vietnamese Communist generals saw their armed forces as instruments primarily to gain political goals. The American generals saw their forces primarily as instruments to defeat enemy military forces. One fought battles to influence opinions in Vietnam and the world; the other fought battles to finish the enemy, keeping tabs by body count.

Irrelevant, perhaps, until one asks who won; or until one realizes that the problem affects our civilian leaders just as profoundly, a point Lansdale makes in reminding us of how ironic it was that civilian leaders, particularly President Johnson, suffered such grievous blows in domestic politics for their support of the traditional US military viewpoint.

The second major question has to do with the degree to which organizational incentives peculiar to particular military services drove strategy. Strategy is supposed to be the handmaiden of policy. When national policy is vague—as it was in the absence of clearly enunciated goals—the way is open for other considerations to drive strategy.

Ambassador Komer (along with Professors Earl Ravenal and Francis West) suggests that the something else in the Vietnam context was the "institutional inertia" of the various services who found themselves unable to break out of established modes of combat, modes designed for the NATO scenario and applied in a totally different context. Cases in point: USAF insistence that jets

were better than A-1Es for close support (lest the service end up after the war with a bunch of prop-driven planes with which to face the Russians); USAF vs. USN competition over sortie rates (lest future appropriations be adversely affected).

One thing's for certain: Unless we face the issues raised in this book, and debate them openly and widely within the services, we'll find ourselves unprepared once again. And the last thing this nation needs is another war that can be summed up as sarcastically as Stephen Young summed up the last one: "It was as if we were trying to build a house with a bulldozer and a wrecking crane."

—Reviewed by Lt. Col. David MacIsaac, Department of History, USAF Academy.

Air War in Vietnam

The United States Air Force in Southeast Asia 1961-1973, edited by Carl Berger, Office of Air Force History. Superintendent of Documents, US Government Printing Office, Washington, D. C. 20402, 1977. 381 pages with appendices, glossary, index. \$10.25.

USAF Chief of Staff Gen. David C. Jones notes in his foreword to this volume that definitive histories of US Air Force participation in the Southeast Asia war "are in progress but will not be widely available for several years. In the interim, this book can help fill a void in public knowledge of the Air Force's experience in Southeast Asia." While it more than lives up to that modest appraisal so far as public knowledge is concerned, it also is a work that will have great appeal for all those who served in SEA or supported the men and women who did.

The book was some three years in preparation by civilian and military historians in the Office of Air Force History and in the commands. Each of its twenty-one chapters, ranging from origins of the war to Operation Homecoming, has been prepared by a historian specializing in the subject of his chapter. In addition to covering all phases of combat operations throughout the theater, there are chapters on often-neglected support functions—logistics, base defense, medical services, training—

military civic action, and the Vietnamization program. The some 190 pages of text are supplemented by many maps and more than 600 carefully chosen photographs, many in color, as well as color reproductions of a number of paintings from the Air Force Art Collection. The full-page color work in particular is of exceptionally high quality.

Appendices include a listing, with dates, of key Air Force leaders during the war, from Secretaries of the Air Force and Chiefs of Staff through commanders of operational wings and support units. Also included are photographs of USAF's Vietnam War Medal of Honor recipients, together with accounts of the acts of heroism celebrated by the awards.

The only flaw in this handsome, heavily bound, large format volume is a rather generous sprinkling of typographical errors. They do not, however, detract from its historical accuracy or from its graphic appeal.

—Reviewed by John Frisbee, Executive Editor.

Combat Narratives

Aces and Aerial Victories: The United States Air Force in Southeast Asia 1965-1973. The Albert F. Simpson Historical Research Center, Air University, and the Office of Air Force History. Superintendent of Documents, US Government Printing Office, Washington, D. C. 20402, 1977. 188 pages with glossary and index. \$5.25 paperback.

Direct US participation in the Vietnam War lasted for more than eight years. Because of restrictions on the use of airpower, air-to-air combat took place during only about half of that time. In the some four years when US aircraft were allowed to operate north of the Demilitarized Zone, USAF aircrews scored 137 confirmed victories, the majority by F-4 aircrews, twenty-five by F-105D pilots, and two by B-52 gunners. The kill ratio at war's end was more than two to one in favor of USAF crews.

This book is a collection of first-hand combat narratives taken directly from aircrew after-action reports. It is introduced by an excellent summary of the evolution of tactics and equipment from the earliest air-to-air engagement

through Linebacker II. A concluding chapter is devoted to a description of the aircraft and armaments of both sides, tactics (with diagrams of the most frequently used formations and maneuvers), and both chronological and alphabetical tabulations of the individuals credited with victories, including pertinent data on each engagement. Another table lists all units credited with destroying MiGs in air-to-air combat, along with a summary of the SEA experience of each unit.

Accompanying the text are twenty-six maps and many photographs of aircrew members and of combat action. There is an extensive glossary of terms and abbreviations.

The authors, all members of the Albert F. Simpson Historical Research Center at Air University, have wisely made no attempt to dramatize their writing. There is enough drama and action in the aircrew accounts, which the authors have set in historical context.

—JF

New Books in Brief

A New Strategy for the West: NATO After Détente, by Lt. Gen. Daniel O. Graham, USA (Ret.). The author, a former Director of the Defense Intelligence Agency and a contributor to this magazine (see "The Decline of US Strategic Thought," August '77 issue) argues that NATO must adopt a new and far broader strategy as a counter to Soviet global designs. He is concerned by NATO's too narrow focus and convinced that détente has not worked to the advantage of the West. The Heritage Foundation, 513 C St., N. E., Washington, D. C. 20002, 1977. 72 pages with notes. \$3 paperback.

Arms Control and Disarmament Agreements, US Arms Control and Disarmament Agency. This revised edition, which includes texts of all major arms control and disarmament agreements made by the US since 1925, reports progress in the field over the last two years. Superintendent of Documents, US Government Printing Office, Washington, D. C. 20402, 1977. 187 pages. \$2.75.

Aviation Year, No. 1, edited by Michael J. Hooks. This first volume in a series offers an in-depth review of aerospace developments through-

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out the world in 1976. Includes military and general aviation, homebuilt aircraft, Washington's National Air and Space Museum, the Concorde, Farnborough, hot air balloons, men in space, and much more. Photos. Ducimus Books, Ltd., De Worde House, 283 Lonsdale Road, London SW13 9QW, 1977. 118 pages. \$12.50.

The Chinese Military System, by Harvey W. Nelson. This is said to be the first work that examines in detail the entire organization of the Chinese People's Liberation Army. It includes chapters on the high command, political organization, air and naval forces, provincial military administration, paramilitary forces, and military life. Westview Press, Boulder, Colo. 262 pages with notes, bibliography, and index. \$18.

"Classy Chassy," by Ian Logan and Henry Nield. The authors have compiled a picture book of "girl art" or "nose art" that adorned military aircraft from 1942 to 1953. A&W Publishers, New York, N. Y., 1977. 82 pages, \$5.95.

Combat Aircraft of World War Two, by Elke C. Weal, John A. Weal, and Richard F. Barker. In a foreword to this folio-size volume, J. M. Bruce of the RAF Museum at Hendon says it is "the optimum compilation of hard fact" on nearly 900 aircraft and variants produced by twenty-five countries immediately before and during the war. The book includes 176 full-color paintings of combat aircraft in battle dress, 250 line drawings, technical data on each of the combat planes, and the order of battle for each major combatant at the start of or during the war. Macmillan Publishing Co., New York, N. Y., 1977. 238 pages with index. \$17.95.

Fighting Gliders of World War II, by James E. Mrazek. Companion to the author's book, *The Glider War*, this volume portrays, in three-view silhouettes and photos, some sixty gliders that landed thousands of men and their light equipment during the war. Includes German, Brit-

ish, American, Japanese, and Soviet models as well as those of eleven other nations. Appendices, index. St. Martin's Press, New York, N. Y., 1977. 207 pages. \$10.

F-4 Phantom, by William Gunston. "When I first saw a Phantom I thought it so ugly I wondered if it had been delivered upside down," said an Air Force major. This ugly duckling became the greatest combat aircraft of its day and, after nearly twenty years' service, is still in production. The author, a veteran aviation writer, tells the Phantom's story, how it works, how it flies, and how it fights. Photos. Charles Scribner's Sons, New York, N. Y., 1977. 112 pages. \$8.95.

The German Wars 1914-1945, by D. J. Goodspeed. In analyzing the two world wars, which he views as a continuing conflict, the author asserts that France, not Germany, was the power that worked for a European war in 1914. Another theme is that the world's political leadership in this century has proved grossly inadequate. The author believes the most urgent problem facing contemporary mankind is how to improve the quality of the world's politicians. Notes, index. Houghton Mifflin Co., Boston, Mass., 1977. 561 pages. \$17.50.

Icebound in the Siberian Arctic, by Robert J. Gleason. In the author's words, this is a story of a small, old, Pacific coast lumber schooner's fight to traverse that coast in the summer of 1929, her forced wintering at North Cape, Siberia, and the attempts of an infant aviation industry to come to her aid. Photos, appendix, bibliography. Alaska Northwest Publishing Co., P. O. Box 4-EEE, Anchorage, Alaska 99509. 164 pages. \$4.95 paperback (include \$.50 for postage).

Instruments of Darkness: The History of Electronic Warfare, by Alfred Price. The first edition still is regarded as the standard reference on WW II radar and electronic warfare operations. This new edition has been enlarged and updated to provide a nontechnical guide to electronic warfare from its beginnings to the present. Photos, index. MacDonald and Jane's Publishers, Ltd., Paulton House, 8 Shepherdess Walk, London N1 7LW, England, 1977. 284 pages. \$10.50.

Join the Jet Set II on Military Retirement Pay, edited by Conni Gibson Wehrman. Here is a guide to low/no cost travel for military personnel, active and retired, and their dependents. Includes how to get there, where to stay, what to watch for, and where to write for specific travel information, including foreign and US tourist organizations, passport and visa requirements, and customs regulations plus who to contact in an emergency. US Travel and Treasures, P. O. Box 9, Oakton, Va. 22124, 1977. 245 pages. \$3.95 paperback plus \$.45, postage and handling.

Korean Phoenix: A Nation from the Ashes, by Michael Keon. The author believes the Republic of Korea might serve as a model for other nations that have experienced a history of invasions and wish to break into the twentieth century. Much of the book praises Park Chung Hee's efforts in behalf of the Republic. Says the author . . . "Korea's record, under the Park Chung Hee administration, has been one of steadily increasing responsibility, competence, and accountability." Index. Prentice Hall/International, Englewood Cliffs, N. J., 1977. 234 pages. \$10.

The Lancaster at War, by Mike Garbett and Brian Goulding, with foreword by Marshal of the Royal Air Force Sir Arthur Harris. During World War II, RAF Lancaster heavy bombers flew 156,000 sorties over enemy territory and dropped more than 600,000 tons of bombs. This is the story of the "Lanc," complete with combat narratives and more than 200 photographs from official sources or contributed by aircrew and ground staffs. Charles Scribner's Sons, New York, N. Y., 1977. 144 pages, large format. \$10.95.

Leaflet Operations in the Second World War, by James M. Erdmann. Here is the story of how and why more than six billion propaganda leaflets were dropped on Germany and Occupied Europe during the war years. It contains eighty-four illustrations, maps, and diagrams. The author is a former member of the Air Force Academy Department of History. The study may be ordered directly from: James M. Erdmann, Department of History, University of Denver, Denver, Colo. 80210. 600 pages with bibliography. \$10.

Lighter Than Air: An Illustrated History of the Airship, by Lee Payne. From the first Civil War observation balloons to the last fateful day of the *Hindenburg*, airships were front-page news and a continuing source of wonder. Here is the complete story with hundreds of photos of the airships that ruled the sky for more than a hundred years and the grip they had on the world's imagination. Bibliography, index. A. S. Barnes & Co., P. O. Box 421, Cranbury, N. J. 08512, 1977. 270 pages. \$20.

Luftwaffe Handbook 1939-1945, by Alfred Price. In addition to an account of the Luftwaffe's flying and airborne forces, the author—a British authority on the European air war—covers the flak arm, which used more than two-thirds of the Luftwaffe's manpower; pilot training; and the tactics used by various fighter and bomber units. Charles Scribner's Sons, New York, N. Y., 1977. 111 pages. \$6.95.

The Price of Preparedness: The FY 1978-1982 Defense Program, by Lawrence J. Korb. The author analyzes the DoD budget for Fiscal Year 1978 and its security implications for the next five years. Charts, graphs. American Enterprise Institute for Public Policy Research, Washington, D. C., 1977. 43 pages. \$1.50.

Quarterly Strategic Bibliography, edited by Col. John C. Damon, USA (Ret.), and Lt. Col. James D. Jordan, USMC (Ret.). Here is a compendium of the more important articles on strategic issues, listed by title and author, that were published in 183 magazines and newspapers between January and March 1977. AIR FORCE Magazine leads all other service-oriented monthlies in number of articles cited. Copley & Associates, 2030 M St., N. W., Washington, D. C. 20036, 1977. 62 pages. \$80 a year.

Temporary Military Lodging Around the World, compiled by the editor and staff of Military Living and Consumer Guide. This pocket-size guide lists rates and facilities available to active-duty and retired military personnel at 442 bases in the US and overseas. Military Marketing Services, Inc., P. O. Box 4010, Arlington, Va. 22204, 1977. 172 pages. \$3.95 paperback.

Understanding Flying, by Richard Taylor. Here is a common-sense approach to the basics of flying that includes everything you need to know to operate an airplane safely. Delacorte Press/Eleanor Friede, New York, N. Y., 1977. 341 pages. \$10.

The United States and the Philippines: Background for Policy, by Claude A. Buss. The once friendly relations between Washington and Manila have become strained. The author analyzes the current impasse and US policy since the withdrawal from Vietnam. Notes. American Enterprise Institute for Public Policy Research, Washington, D. C., 1977. 152 pages. \$3.75.

World Armaments and Disarmament: SIPRI Yearbook 1977, Stockholm International Peace Research Institute. Eighth edition reviews developments in the world military scene in 1976. Included are main concerns, military satellites, world armament data and expenditures, arms control, and a chronology of major events and issues. Appendices, index, tables, figures. Available from the MIT Press, Cambridge, Mass. 02142, 1977. 421 pages. \$30.

Four recently released volumes of the AIRCAM/AIRWAR series, published by Osprey Publishing Co., London, England, are: *RAF Bomber Units 1939-42*, by Bryan Philpott; *Luftwaffe Fighter Units 1939-41*, by Jerry Scutts; *USAAF Medium Bomber Units, ETO and MTO 1942-45*, by René J. Francillon; and *USAAF Fighter Units in Europe 1942-45*, by René J. Francillon. Each volume 48 pages with color plates and photographs. \$5.95. Distributed in the US by Sky Books Press, Ltd., 48 East 50th St., New York, N. Y. 10022.

These recently released Adelphi Papers will interest students of military/political affairs: *Latin America in World Politics: The Next Decade*, by Gregory F. Treverton, 45 pages. *Oil and Security: Problems and Prospects of Importing Countries*, by Edward N. Krapels, 34 pages. Copies may be ordered from The International Institute for Strategic Studies, 18 Adam St., London WC2N 6AL, England. \$1.50 postpaid.

—Reviewed by Robin Whittle

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UNDERSTANDABLY and unavoidably, the Administration's recent top-to-bottom rethinking of fundamental defense and related foreign-policy issues—in the form of a series of PRMs (for Presidential Review Memoranda)—has left considerable trauma, turbulence, and confusion in its wake. The mood of uncertainty, on Capitol Hill and off, is being heightened because much of the substance and many of the conclusions of the various PRMs, including the pivotal PRM-10 identified as "Comprehensive Net Assessment and Military Force Posture Review," remain closely held by the Administration's inner circle. What information has been disclosed, either formally or through news leaks, tends to raise more questions than it answers.

Feeding this sense of uneasiness and confusion are the present spurt toward SALT II and the associated backing, filling, and launching of trial balloons that are natural by-products of the negotiating process. On top of

that comes mounting apprehension, especially in Congress, over what is thought to be zigzagging by the Administration on such emotionally "loaded" defense questions as the continuing need for a penetrating strategic bomber. The result has been considerable congressional backfire that threatens the limited strategic initiatives being sought by the Administration. As a high placed source suggested to this writer, coherent U.S. strategic planning, hardly ever a thriving Washington business, seems to be headed for the endangered species list.

Rep. Melvin Price, Chairman of the Committee on Armed Services, recently informed President Carter of "my deep concern" over recent Administration decision which "could seriously impair the strategic posture of the United States." He added that "to date [Defense Department] presentations before our Committee have demonstrated a lack of adequate correlation between the state-

US strategic planning is in a state of turbulence and uncertainty because of reportedly lopsided US concessions at SALT, conflicts between the Administration and Congress concerning strategic issues, and cancellation or deferral of pivotal weapons programs.

US STRATEGIC DETERRENCE AT THE CROSSROADS

BY EDGAR ULSAMER, SENIOR EDITOR

requirements and the changes that will be made to our strategic posture by recent Administration decisions." Chairman Price asked for a "halt to the trend that sees the United States falling behind the strategic might of the Soviets." He expressed a special concern, putatively shared by other members of the Armed Services Committee, over the apparent "lack of correlation and adequate interchange between those in the military departments principally concerned with our strategic capabilities and those elsewhere in the Administration principally responsible for preparation of proposals for and participation in SALT negotiations."

Even such a staunch White House ally as Rep. M. Robert Carr (D-Mich.) finds that "the confusion can't get any worse than it is now." Congressman Carr's frustration stems from what both traditional defense critics and defense supporters in Congress perceive as contradictory Administration signals—the scuttling of B-1 pro-

duction earlier this year followed by tepid Defense Department support of Air Force plans for the prototype development of the FB-111H strategic bomber. On the surface, there is undeniable irony in the fact that a design deemed inferior in cost-effectiveness to the B-1 during the latter's brief lifespan should emerge now as the principal candidate for assuming its role.

The real story, however, is less illogical and more complex. President Jimmy Carter, in a letter to Representative Carr and thirty-seven other members of Congress who actively supported his decision to cancel the B-1, emphasized that "I did not make the politically difficult decision to cancel the B-1 so that I could build another less capable aircraft. . . . We cannot predict accurately what future Soviet strategic systems, air defenses, and SALT ramifications might be. Because of the stakes involved, I believe we might have to produce a new penetrating bomber. That is why I decided to

General Dynamic's proposed FB-111H—see specifications table on page 50—would incorporate the B-1's engines and some of its avionics to achieve reliable penetration.



finish the B-1's development, including the fourth aircraft, which is the last one needed in the flight-test program. We are, of course, engaged in a careful and continuing examination of the issue, but I would emphasize that we have made no decision other than to study the possibility of the FB-111H being a viable option. We have not decided to develop nor to produce this or any other new manned bomber."

Congress remained unimpressed, with the House voting down funds for the FB-111H—subsequently restored by a joint conference committee—and coming close (194 votes for vs. 204 votes against) to restoring the B-1 production funding—\$1.4 billion—that both congressional bodies had deleted from the defense budget earlier this year. In addition, Congress, at this writing, has not acted on the Administration's rescission (deletion of funding approved earlier) request involving the cost of two B-1 aircraft, in addition to the existing four research, development, and test aircraft. The amount involved is about \$460 million and, in the view of Sen. Jake Garn (R-Utah) and others, must be allocated by the Defense Department to the B-1 program because "under the

terms of the Impoundment Control Act of 1974 President is required by law to resume the expenditure of any funds withheld from obligation during a five-day period, unless the Congress acts to approve rescission of the funds." The legal grace period expired on October 6 without the funds having been obligated to the Defense Department.

Two days earlier, Defense Secretary Harold Brown stated at a press conference that "the Congress, deleting the FY '78 production money, in accordance with President Carter's recommendations, has made clear . . . that there will not be a B-1 production program." Contending that two additional B-1s would not contribute significantly to the technology base nor to US defense capabilities, Secretary Brown suggested that "the issue then becomes whether it makes sense to spend \$460 million. . . . I think the answer is clearly not. Nevertheless, he asserted that "we will follow the law . . . if Congress does not act at some point in the reasonably foreseeable future to de-appropriate or rescind the money. . . . That is why I am talking about . . . a waste of \$460 million."



USAF is studying the possibility of converting a wide-body transport aircraft type to the role of a standoff cruise-missile launcher and thus serve as a backup to the aging B-52 fleet.

The Air Force, firmly and without reservations, has supported rescission of the B-1 funds and punctiliously avoided the appearance of seeking resurrection of the B-1 production program. This position probably is dictated by political realism. It would take a two-thirds vote in the Senate to overrule a certain Administration vote of continued B-1 production funding. These votes simply aren't in sight. Enter the FB-111H, termed by MOD witnesses a pragmatic means of "maintaining a production option for a longer period of time than with B-1 R&D dollars." Few experts believe the Administration expects to ever again build a manned penetrating bomber; most are convinced that the Administration views its pledge of keeping the bomber option alive as atmospheric, a political counterweight to increasing congressional apprehension over sliding US strategic deterrence strength and possibly for leverage at SALT. (The Administration's astonishing ingenuousness of not using the scuttling of the B-1 as a bargaining chip at SALT caused considerable congressional headshaking.)

Air Force calculations indicate that maintaining the "B-1 insurance policy" over the next few years could cost up to \$2 billion, compared to as much as \$400 million for the FB-111H. Unit cost per aircraft, according to congressional testimony by USAF Deputy Chief of Staff for R&D Lt. Gen. Alton D. Slay, would be below \$50 million vs. more than \$100 million for the B-1. If no allowance for tanker costs is made, the Air Force could get two FB-111Hs for the price of one B-1, according to these calculations.

Further, cost-effectiveness of strategic weapons obviously is a numbers game that changes in response to changes in numbers or mission. If the air-breathing element of the Triad, in the main, is composed of a relatively large number of strategic bombers, the superior payload of the B-1, its high cost notwithstanding, is more cost-effective than that of a smaller aircraft. Conversely, when the cruise missile is envisioned as the principal air-breathing weapon and the manned penetrator performs augmentation involving a numerically limited force

assigned against a limited number of widely separated targets, the value of the smaller aircraft could exceed that of the larger vehicle, assuming equal investments. The reason is that a larger number of smaller-payload aircraft, under such conditions, can fly more sorties and cover more territory than a smaller number of larger-payload bombers.

The FB-111H proposal centers on upgrading the FB-111A, either through retrofit or reopening the production line. Modifications include stretching the fuselage about twelve feet, replacing the two TF30 engines with the more powerful GE F101 engines developed for the B-1, and enhancing the avionics. Such an aircraft, under study by General Dynamics for more than three years, could roughly match the B-1's range, speed, and penetration capabilities but not its payload. The design would be hardened against nuclear effects, although to a lesser degree than the B-1; its radar detectability, on the other hand, would be lower than that of the B-1.

Once the Air Force accepted the attractiveness that now accrues to the FB-111H from the cruise missile's new central role and recognized that a production option for that design can be kept open more economically and, therefore, longer than for the B-1, the service "reluctantly and with considerable trauma" ceased advocacy of the latter aircraft program. It was, as a senior Air Force official told AIR FORCE Magazine, "a matter of realizing that the B-1 option represents an insurance policy that we believe we will never be able to cash in on and that exacts a premium that we can't afford, while the FB-111H R&D program offers a slim but nevertheless real option with lower premiums."

The latest White House signals to its congressional allies suggest indeed that the chances for either program's being carried into production are "minuscule or less." So are the chances of sustaining House action in favor of the B-1 production program against a certain Administration veto that could only be overridden in the Senate, where the mood toward that system traditionally has been less sympathetic.

THE CRUISE MISSILE DILEMMA

Administration officials briefing pertinent congressional committees on the current round of SALT negotiations have indicated that consideration is being given to restricting air-launched cruise missiles to a range of 2,500 kilometers in spite of grave concern over such a limitation by the Defense Department. Apparently because of the objections by the Joint Chiefs of Staff and other military experts, the provision to limit ALCM, under one US proposal, would be covered by a separate protocol in force for a three-year period, rather than over the full eight-year duration envisioned for the SALT II accord. It is not known publicly how the 2,500-kilometer range is to be defined, especially with regard to such crucial questions as "Does this mean operational range including defense avoidance, low-altitude, terrain-following flight, wind factors, and other similar considerations?"

Another three-year provision to limit ground- and sea-launched cruise missiles, in terms of both testing and deployment, to a 600-kilometer range is also under consideration. In a recent nine-page "analysis and review" of the SALT II proposals, Rep. Sam Stratton (D-N. Y.),

Chairman of the House Armed Services Committee's Subcommittee on Investigations, and Rep. Robin Beard of Tennessee, the group's senior Republican member, made these points: "The Soviets are seeking in SALT to achieve three objectives with respect to cruise missiles: (1) to deny to the US any strategic cruise capability that could prevent the Soviets from having military superiority in the aftermath of a strategic exchange; (2) to deny to Western Europe any capability to counterbalance the Soviet SS-20 missile [a MIRVed, mobile, intermediate-range ballistic missile with a range of more than 2,500 miles, capable of covert conversion to a mobile ICBM]; and (3) to avoid restrictions that could reduce their own existing advantage in cruise missile capabilities. It is because of these objectives that the cruise missile has become a troublesome negotiating issue."

The importance of the ground-launched cruise missile, USAF's GLCM, to the US and NATO is major as long as SALT does not limit the weapon below an operational range of about 1,000 miles. GLCM could free for other target assignments both those Titan ICBMs currently

targeted against the Soviet medium-range and intermediate-range ballistic missiles, and a significant portion of NATO's nuclear-capable tactical aircraft detailed to nuclear alert missions.

The significance of ALCM's range goes up as the likelihood of a new penetrating bomber coming into being goes down. An operational range of about 3,500 kilometers appears essential if ALCM is to provide credible deterrence from standoff positions. Some of the most important targets in the USSR are located along the Transsiberian Railroad, including all ICBMs and many associated command and control facilities. As Defense Secretary Brown acknowledged, many of these couldn't be reached by ALCMs if the 2,500-kilometer provision were invoked. Further, the Soviet Union can be presumed to continue

extending outward from its shores the effective reach of its dense air defense capabilities. That range already in excess of 200 miles in many areas and could well be extended to more than 700 miles to thwart the U.S. ALCMs.

As the Beard/Stratton analysis has pointed out, "Cruise missiles do not fly in a straight line, thus reducing the operational range, and depending on the extent of U.S. carriers will have to launch outside the Soviet defense perimeter, to that extent our cruise missile target coverage would be degraded." An important political issue that could affect significantly the operational range of U.S. cruise missiles, according to Rep. Jack Kemp (R-N. Y.), depends on whether or not overflight rights over Sweden can be obtained.

NAVY DOMINATES JOINT CRUISE MISSILE PROGRAM MANAGEMENT

On September 30, 1977, Director of Defense Research and Engineering William J. Perry issued a memorandum to the Secretaries of the Air Force and the Navy concerning the cruise missile program structure that followed closely earlier Navy recommendations. The reaction among some senior Air Force leaders ranged from puzzlement to bitterness on grounds that USAF was made to look incapable of managing its own programs.

Dr. Perry's directive, while setting up a joint Executive Committee comprised of an equal number of Air Force and Navy executives and other senior Pentagon officials, and chaired by DDR&E, keeps the cruise missile program, including ALCM, under Navy management.

"It is a matter of highest national priority, especially in the light of the B-1 decision," Dr. Perry's directive asserts, "to develop an air-launched cruise missile (ALCM) with optimum performance and minimum cost and schedule delays. I believe we can best accomplish those program objectives by conducting a competitive flyoff between Boeing and General Dynamics to determine which of their missiles will be the ALCM to be flown on the B-52 and, as appropriate, other cruise missile carriers. During the course of the competition we want to continue to emphasize the component commonality between these two missiles and with SLCM [submarine-launched cruise missile] and GLCM [ground-launched cruise missile]. Therefore, you will keep the program management responsibility in a joint Air Force-Navy program office (JCMPO) until the competition is completed, a design selected, and a DSARC III [Defense Systems Acquisition Review Council meeting that okays production] has approved production of the ALCM. At that time, we plan to assign the ALCM and GLCM program management responsibility to the Air Force and the SLCM program management responsibility to the Navy."

Requesting that the joint program be assigned a "Brickbat" (top) priority, Dr. Perry ordered an expansion of the JCMPO, which entails the assignment of about 150 experts—mainly senior civilians whose expertise will be sorely missed by the Air Force—from the Air Force Systems Command's Aeronautical Systems Division as well as the allocation of the Air Force's "entire program element fund for ALCM, TALCM [tactical air-launched

cruise missile], and GLCM" to the Joint Cruise Missile Program Office. The directive pointedly asserts that "the ALCM competition will be conducted by the JCMPO and will include operational tests with SAC crews." A plausible explanation for this feature of the instruction is that it may reflect OSD's view of long standing: that the Air Force is suspect of bias against the Navy-General Dynamics Tomahawk (SLCM) and unduly favors its own Boeing-developed ALCM. This "third floor" perception is hotly denied by senior Air Force officials, many of whom favor development of both weapon systems for several reasons. A good case can be made for "competing" for large weapon programs—as opposed to a single-source approach—because of statistical evidence of lower costs. Further, SLCM and GLCM will be variations of one basic design, while ALCM, in spite of extensive subsystem commonality, unavoidably will reflect major differences from systems less constrained by volume. A two-team approach to cruise missile acquisition seems to be stalled since the relevant Presidential directive orders the Defense Department to select for production only one of the competing designs.

Dr. Perry's memorandum to the services states that the ALCM Source Selection Advisory Committee "will consist of an equal number" of senior officers from the Air Force and the Navy, and that it is to be chaired by the AFSC Commander. The Secretary of the Air Force was designated as the Source Selection Authority, but subject to subsequent OSD review. Limited operational capability of the ALCM weapon system, meaning one aircraft and six missiles, is sought for the first quarter of 1980. The JCMPO's contracting and engineering staffs are to be modeled after the Navy's Fleet Ballistic Missile program.

The decision on Navy predominance in managing the cruise missile program has caused surprise because recent US SALT proposals clearly relegate the Navy's cruise missile to secondary importance while increasing reliance on ALCM. (Just prior to press time, an important agreement between USAF and the US Navy on ALCM program management interfaces was taking shape. If approved by OSD, such an understanding could ameliorate Air Force concerns about ALCM management.)

MX IN MOTION

Possibly with an eye on congressional concerns about the long-term strategic posture of the US as well as about SALT, the Defense Department, on October 6, breathed new life into the Air Force's MX (highly survivable medium-size ICBM) program, for which USAF had requested about \$900 million last year. Instead, the Administration deferred full-scale development and the associated funding after reviewing the Ford-Rumsfeld budget request. But in August, Secretary Brown instructed the Air Force to "assume" full-scale development of MX for purposes of preparing the FY '79 USAF budget. It is reasonable to adduce from this action that the Defense Department is now willing to *countenance* going into full-scale development of MX. But as DoD's Assistant Secretary for Public Affairs Thomas B. Ross made clear, Secretary Brown reserved his actual ruling on the MX program until the budget review in November and December, with the final decision on go-ahead being up to the President. While he declined to cite specific figures, it is understood that the amount under con-

sideration for next year is about \$260 million. The FY '78 MX funding was \$134.4 million, while another \$159.4 million had been authorized for the program over the preceding five years.

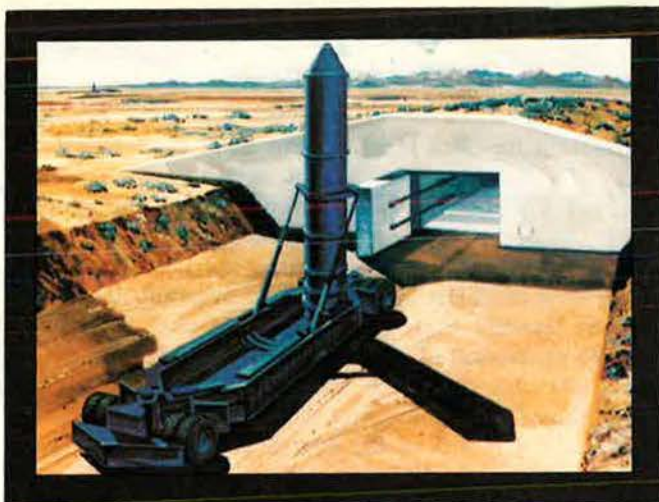
Presumably a key factor underlying this action is the high level of Soviet ICBM activity. Secretary Brown disclosed recently that the "Soviets are now deploying a fourth generation of ICBMs [SS-17s, SS-18s, and SS-19s] at a rate of between 100 and 150 a year. These missiles are, almost uniformly, first class in their accuracy and payload." On top of the fourth generation now being deployed, the Soviets "have four new ICBMs under development" whose advantages are not yet clear to US intelligence. The Soviets, Secretary Brown said, "have not gone far enough in development for me to be able to make a judgment. . . . It could well be that they would have more accuracy, but the present generation [is] accurate enough to pose a substantial threat to our land-based ICBMs in the early 1980s." In addition, Dr. Brown said, the Soviets are "continuing work on the SS-16, their

Except for USAF's aging Titans, Soviet ICBMs dwarf US weapons. Reports indicate that pending SALT II will allow the USSR up to 326 heavy modern ICBMs but none for the US.



U.S./U.S.S.R. INTERCONTINENTAL BALLISTIC MISSILES

QUANTITY DEPLOYED AS OF 1976	SS13	SS16	MX	SS17	SS17	SS18	SS9	TITAN	SS10	SS11	MINUTEMAN	QUANTITY DEPLOYED AS OF 1976
	86	1975	R&D MID 80's	50	100	50	203	54	170	410	540	450
	1965	1975		1975	1981	1976	1965	1961	1974	1965	1970	1965



MX, envisioned as slightly smaller than the new Soviet medium-sized SS-19 ICBM, should match the accuracy of the improved Minuteman III but will far exceed the latter's survivability. Two MX basing modes, a hardened trench (right) and hardened shelters (left) are being explored.

mobile ICBM," which is, in effect, the SS-20 with a third stage added to increase the missile's payload and range.

MX, even though it has undergone a series of metamorphoses since 1973, remains a tentative design, according to the Defense Department: Preliminary estimates are that it will weigh about 190,000 pounds [more than twice Minuteman III's weight]; that it will have about four times the throw-weight, more MIRVs (independently targetable warheads); and will be at least as accurate as the improved Minuteman III. It may cost between \$20 to \$30 billion to deploy from 200 to 300 MX ICBMs. At the earliest, initial operational capability could be realized by the mid-1980s.

Two basing modes are under consideration for the encapsulated MX: a shelter system and a buried trench, with the latter now considered to have the upper hand. In February 1978, the Air Force will begin building two prototype trenches, one 1,500 feet long and the other 20,000 feet long, near Yuma, Ariz., to conduct two breakout tests with dummy missiles and to validate technical feasibility and construction cost estimates. A series of tests to establish the proposed system's survivability in the face of nuclear effects is planned.

The effects of the pending SALT agreements (SALT II, the ancillary three-year Protocol, and the Statement of Principles for a post SALT II agreement) on the MX program are as yet not quite clear but appear ominous.

THE MINUTEMAN III SHOWDOWN

In August, while presenting to Congress DoD's Supplemental Authorization for FY '78—that reflects adjustments resulting from the B-1 cancellation—Secretary Brown discussed the possibility of producing additional quantities of Minuteman III ICBMs "to be retrofitted into Minuteman II silos. In terms of our present plans, such a course of action would quickly run into the 1,320 [SALT] limit on MIRV launchers. This course could give us some increased capability in the near-term, but the advantage would be transient at best, in the face of the growing number and accuracy of Soviet ICBMs." For this reason, the Administration sought to rescind \$105 million, the unused portion of funds allocated last year

According to Congressman Beard, the US SALT proposal would prohibit all testing of new ICBM systems "not tested and [rule out] deployment of systems not deployed at the time of agreement. The Soviets take the position that there should be no testing or deployment of new MIRVed systems. With regard to mobile systems, the language will permit the testing of a mobile system and a mobile launcher, but not a mobile system from a mobile launcher; moreover, the deployment would be prohibited" during the three-year period the Protocol is in effect. Of itself, the latter prohibition is not significant since MX would not be ready for deployment within that period.

But extension of the Protocol's provisions to the formal SALT II treaty (to be in effect for eight years) fostered by US willingness to "trade" MX for a Soviet commitment to forego deployment of the mobile SS-16, as has been suggested by press reports, would, of course, spell the end of the MX program. As a straight *quid pro quo*, such a trade would seem quite disadvantageous to the US, since the SS-16 is not in the MX's league and because it would rob the US of the chance to modernize its ICBM force and offset, in limited fashion, the Soviet lead in throw-weight. These crucial questions, presumably, will be settled one way or another by October 1978 when the MX program is scheduled for DSARC II, the time when the Defense Department will decide formally whether or not there is to be full-scale engineering development.

by Congress for the acquisition of additional Minuteman III missiles. The amount equates only to about twenty-five missiles because of the disintegrating subsystems supply base. On September 28, the House Appropriations Committee voted down the Administration's rescission request and declined to report out the proposal to the full House.

Immediately on the heels of the House action came a telegram to the White House from twelve influential senators, including the Senate's majority and minority leaders, urging President Carter to direct the Defense Department to issue an immediate "start-work order on this vital national defense program." The Air Force does not stand to gain from this White House vs. Congress

altercation. With 123 spare Minuteman IIIs sitting on the shelf and lacking nuclear warheads for most of them, USAF's requirement for spare weapons is assured well into the 1990s. Even the unlikely possibility that additional quantities of MIRVed Minuteman IIIs could be

deployed—beyond the US's self-imposed limit of 550, by replacing some of the 450 single-RV Minuteman IIs—lacks appeal for most senior Air Force planners. Air Force witnesses already have conveyed this lack of enthusiasm to Congress.

THE SPACE THREAT

PRM-23, a document dealing with national security matters relating to space, was greeted with little enthusiasm by the Pentagon's civilian and military leaders. Although rewritten several times to make it more palatable, it expressed preference for avoiding both active and passive space defense capabilities. If accepted, further hardening of US satellites and the development, test, and deployment of both conventional interceptors using terminal seekers and high-energy laser space defense systems would have been ruled out. Neither policy was accepted. At a press conference on October 4, Secretary Brown disclosed that the Soviet Union has an "operational" space warfare capability that "could be used against . . . some of our satellites." The US, on the other hand, he pointed out, lacks such an operational capability because its activities are confined to "a preliminary exploration and design effort." This imbalance, he said, is of concern because the US relies on military spacecraft for early warning, surveillance, communications, intelligence, and other "legitimate" military purposes that contribute to deterrence.

The supreme irony of the present situation, Secretary Brown said, lies in the fact that the Soviet press recently accused the US "of violating an agreement not to have antisatellites by doing experiments. That is not the same as having an operational capability, which they [the Soviets] do have. . . . If there were an agreement not to have antisatellites, they would be in violation of it." He expressed the hope that space can be kept "from becoming an area of active hostilities."

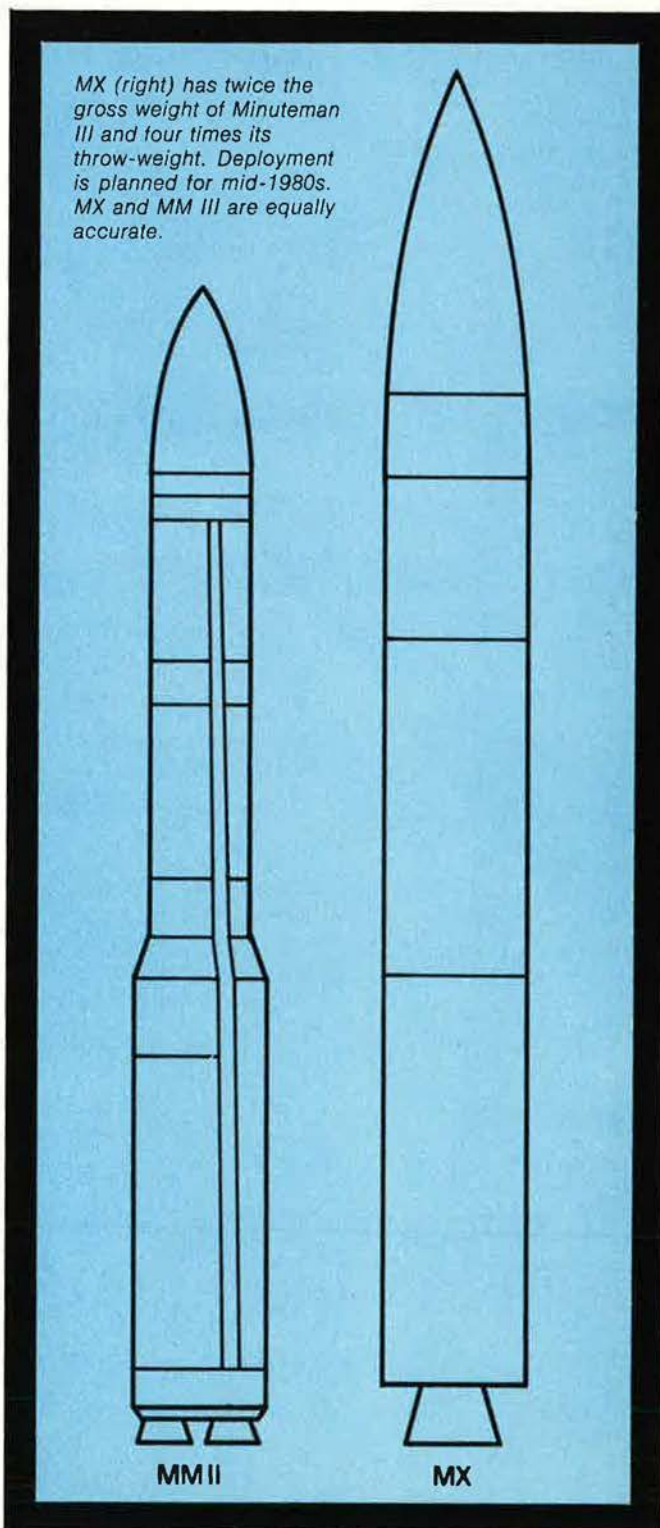
The best way of achieving this, just like deterring a Soviet first strike against US strategic forces, is to make such an action thoroughly unattractive in military terms. There is a wide body of evidence to suggest that the US is capable of deterring space hostility, both by passive and active means. These include deep space systems, various forms of concealment, application of such advanced technologies as the HALO (High Altitude Large Optics) program to obtain advanced, highly interference-resistant early warning satellites, and, finally, the development of space-based laser defense weapons.

These capabilities, as much as the explicit strategic deterrence that resides in cruise missiles, bombers, ICBMs, and SLBMs, would seem required for "essential equivalence," which Secretary Brown defines as the "achievement of these four general conditions:

- "First, that the Soviets do not see their strategic nuclear forces as usable instruments for political leverage, diplomatic coercion, or military superiority;
- "Second, that nuclear stability, especially in a crisis, is maintained;
- "Third, that any advantages in force characteristics enjoyed by the Soviets are offset by other US advantages; and
- "Fourth, that the US posture is not in fact, and is

not seen as, inferior in performance to the forces of the Soviet Union."

Congress now seems determined to make sure that these goals are met. ■



Characteristics of the General Dynamics FB-111A and FB-111H

	FB-111A	FB-111H
DIMENSIONS		
Wingspan, spread	70 ft.	70 ft.
Wingspan, fully swept	33 ft. 11 in.	44 ft. 10.2 in.
Length	73 ft. 6 in.	88 ft. 2.5 in.
Height	17 ft. 1.4 in.	22 ft.
WEIGHT		
Weight, empty	47,445 lb.	51,832 lb.
Max. takeoff weight	116,115 lb.	140,000 lb.
Max. weight in flight	122,900 lb.	155,000 lb.
Fuel capacity	More than 32,000 lb.	More than 64,000 lb.
PERFORMANCE		
Max. speed at altitude	Mach 2.2	Mach 1.75
Max. speed, penetration on deck	Mach 1.1	Mach 0.95+
Service ceiling	Above 50,000 ft.	Above 50,000 ft.
Takeoff distance	7,400 ft.	6,650 ft.
Landing distance	2,750 ft.	3,200 ft.
Refueled mission	5,300 n.m. with 1,200 n.m. high-speed, low-level dash.	44% greater range for same sea-level dash distance and same payload, or more than 3 times the payload for the same total mission distance.
ENGINES		
	2 Pratt & Whitney TF30-P-7	2 General Electric F101 GE-100.
Bypass ratio	0.73	2.01.
Thrust class	20,000 lb.	30,000 lb.
Self-start capability	(none)	Simultaneous engine self-start capability.
WING		
Type	Cantilever shoulder	Cantilever shoulder
Area	550 sq. ft.	550 sq. ft.
Sweep	16° to 72°	16° to 60°
FUSELAGE		
	Semimonocoque structure, largely aluminum alloy with honeycomb sandwich skin, some steel, and titanium.	Fuselage stretched 104 in. and enlarged to accommodate F101 engines, additional fuel, and avionics.
CREW MODULE		
	Zero speed/zero altitude emergency escape module.	Zero speed/zero altitude emergency escape module.
INLET		
	Quarter-circle, variable geometry.	Circular, fixed-geometry, normal shock inlet.
ARMAMENT		
Internal	Weapons bay capacity for two nuclear weapons.	Weapons bay enlarged to carry up to five nuclear weapons.
External	Weapons mounted on four attachment points under each wing. The two inboard on each side pivot as the wings are swept.	Weapons mounted on four attachment points under each wing. The two inboard on each side pivot as the wings are swept. Weapons can also be carried conformally at six stations on the fuselage.
Nuclear weapons	6	15
ELECTRONICS		
Attack radar	APQ-114	APQ-144 (Advanced APQ-114)
Radar altimeter	ANP-167	APN-194
Terrain-following radar	APQ-134	APQ-134M
Doppler radar	APQ-185	APN-200
Astrocompass	ASQ-119	(not required)
INS	AJN-16	AJN-16 with SKN-16 added for dual capability.
Computer	CP-2	CP-2A (twice the memory capacity and processing speed).
SATCOM	Collins Radio	Collins Radio
Transponder	APZ-78	APZ-78
Communication	ARC-109, ARC-123, AIC-25, APY-64V, ARN-52V, ARN-58A.	ARC-109, ARC-123, AIC-25, APY-64V, ARN-52V, ARN-58A.

"DAIS" PUTS PILOTS ON TOP OF TECHNOLOGY

More and more military aircraft use onboard computers to monitor engine performance and flight controls... automate weapons delivery... control countermeasures... and do instant navigation.

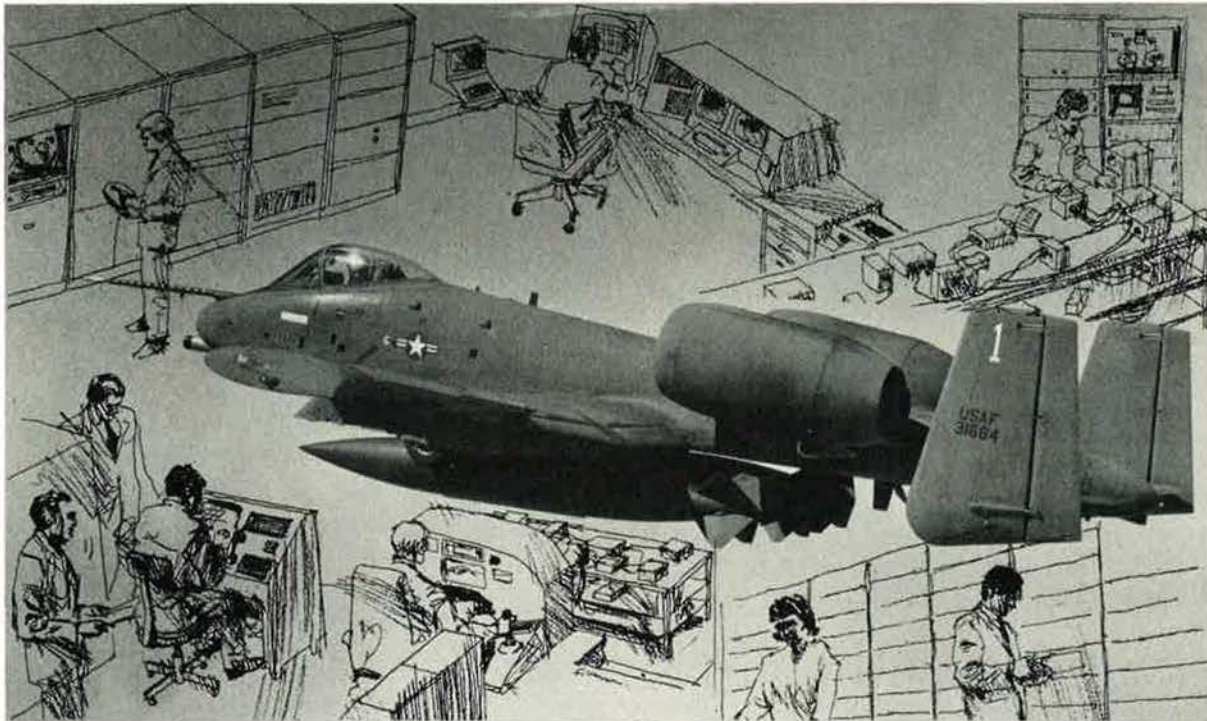
All mission functions have to be thought out in advance, therefore, and programmed into the computers. This leaves the air crew free to think and act in emergencies. That's what DAIS, the Air Force's Digital Avionics Information System, is all about.

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Reflections on a Year in Vietnam

Scant attention has been paid to the lessons that may be learned from the record of Air Force ground combat units in Southeast Asia. Direction of those and other support units on which the flying force depends was different from, but as demanding as air operations. But for any unit, in peace or war, effectiveness depends on an appropriate blending of . . .

Leadership, Followership, and Unit Spirit

BY CAPT. DONALD M. BISHOP, USAF

EIGHT years ago, as a green second lieutenant with eleven months in the service, I walked off a C-130 at Phu Cat Air Base, Vietnam. Waiting for me was the commander of the squadron I'd been assigned to as administrative officer. He cast a doubtful eye on my brown bars and spanking new fatigues, and wondered aloud whether I was good enough for his unit. I somehow managed to convince him, and I was thus to spend a year in one of the finest Air Force units to fight in Southeast Asia. Despite overcommitment in an environment of continuous stress and fatigue, the 37th Security Police Squadron had an enviable combat record and fine morale. For above all, it was a *well-led* unit.

The majority of Air Force people in Vietnam did not fly in combat. Rather, they served and fought in support roles on the ground. Their motivation, adherence to duty, endurance under stress, discipline, and efficient performance were prerequisite, however, to the conduct of air operations. Despite this fact, the literature on the ground Air Force in combat is thin. Successful leadership of ground support airmen, especially in the special conditions of combat, is as demanding and challenging as the flying mission, but it is little studied and discussed, except in broad "management" terms. One learns instead by doing, relying on the three intangible but vital factors—leadership, followership, and unit spirit.

Combat: The Security Police as an Example

The key difference between peace and conflict for a military unit is the degree of sustained *stress* it endures in the course of operations. Sources of stress include fatigue, austere base facilities, family separation and "culture shock," climatic extremes, vulnerability to attack, fear, and the physical and moral strain of battle itself. Every Air Force unit in Vietnam endured these stresses in varying degree.

The security police combat experience is instructive primarily because the Air Force's security specialists were exposed to more actual fighting and endured significantly higher levels of stress than all but a few members of other Air Force support fields. Indeed, the thousands of security police NCOs and officers who served in Southeast Asia now form the largest pool of combat experience (with the possible exception of aircrews and combat controllers) in the Air Force.

Our air bases in Vietnam and Thailand were complexes of sophisticated, expensive, and largely immobile support facilities for maintaining modern aircraft systems—some as delicate as Swiss watches—in operation. Early in the war it became evident the bases were distressingly vulnerable to ground attacks. In the insurgency environment, the security police became responsible for base defense. To this new task they applied considerable expertise and ingenuity. Airmen exchanged white hats for steel pots, pickup trucks for armored personnel carriers, and shotguns for grenade launchers and recoilless rifles.

In 1969, the 450 men and sixty-one dogs of the 37th Security Police protected two squadrons of F-4D Phantoms, two of C-7 Caribous, one of EC-47s, an AC-119 detachment, small HH-43 and O-1 outfits, millions of dollars of munitions and equipment, and, most impor-

tant, the 4,000 men and three women (two nurses and the librarian) assigned to the base.

There were two major threats. The first was standoff attacks. The Viet Cong and the North Vietnamese regulars, armed with mortars, recoilless rifles, or 122-mm Soviet rockets, would set up their weapons at concealed positions some distance from the base, fire a few quick rounds, and disappear. It took extreme alertness, careful planning, and instant responses (with liberal good luck) to frustrate such attacks. A watchful sentry could provide thirty seconds of warning if he saw the exhausts of the rockets in flight; mortar crews could fire on the launch sites using data painstakingly calculated weeks or months in advance; an intelligence observer flying the daily "rocket run" in the HH-43 or the O-1 might spot preparations for an attack. Fortunately, standoff attacks were infrequent.

The second, more formidable, threat was the sapper, a North Vietnamese demolitions expert. These ingenious and dedicated men would strip to the waist, smear themselves with coal oil to deceive our dogs, and slither through barbed wire and grass, hoping to place satchel charges or grenades on the aircraft. To protect against the sapper threat, security policemen strung miles of concertina, emplaced mines and trip flares, built towers and bunkers, laid yards of telephone wire, preplotted mortar firing data for hundreds of attack locations, buried elaborate electronic sensor systems, placed an electric generation and lighting system on the perimeter, controlled gunships and artillery, maintained a huge vehicle fleet, and utilized a full range of infantry weapons. In 1969 and 1970, while the Viet Cong were still recovering from the effects of the 1968 Tet offensive, the 37th repulsed three attacks, killing at least eight enemy penetrators with small arms and mortar fire and wounding others who were able to withdraw. The sappers were repulsed, the base remained secure, and air operations were never impaired.

Motivations in Combat

I have often asked myself what made the individual security policeman face the danger of an unexpected attack at a remote bunker or tower? What made him endure the loneliness of the night shift? What sustained his watchfulness through trying hours of solitary sentry duty?

Patriotism wore thin after ten hours on the perimeter with that cold, sickly combination of C-ration ham and limas, mixed with six cups of coffee, eating at the walls of his stomach. The daily headlines in the *Pacific Stars and Stripes* about demonstrations and deserters did little to persuade him that the nation appreciated his exertions or sacrifices. Our security policemen were surely patriotic, but patriotism alone failed to explain their consistent effectiveness and devotion to duty.

Humor has always sustained the American in combat. In the 37th, everyone looked forward to the sudden shriek over the tac radios of "Chicken Ma-a-a-n! He's everywhere! He's everywhere!" The shrill call, recorded from the AFVN radio series, broke out on the net between 0200 and 0300 every night. Despite the best efforts of the comm plotters and the flight chief, who got mad-

der every night, the culprit was never identified, much to the delight of everyone else on the perimeter!

In retrospect, though, I have come to feel that the binding motivations of the security police at Phu Cat were unit spirit and leadership. Neither has received enough attention in the Air Force.

Unit spirit in the 37th was both *abstract*—a subconscious pride in the accomplishment of the whole squadron—and *personal*. Each airman and officer became emotionally linked to the others in his flight or section. There evolved an unwillingness to let the others down and a consequent commitment to maintain the integrity of the base defense. Once these emotional links are

Leaders need to be recognized and advanced in the Air Force, and the need is crucial if we are to meet future challenges. Gadgets and statistics don't win wars — people do.

forged, a unit possesses a great *synergy*. Its total effectiveness is much greater than the sum of its parts.

In nine years in the Air Force, I have known and worked with many officers and airmen. I have observed eight commanders at first hand. Looking back, I remember many fine fellow workers, but only one group of *comrades*—the officers and NCOs of the 37th. I have forgotten the names of many associates at McGuire, Maxwell, and Kwang Ju, but my comrades of the 37th are fixed in my mind. Living together, solving problems together, facing the risks in the same unit, I came to know their strengths and weaknesses, and they knew mine. Unconsciously we adjusted to make the most of everyone's strengths, and the squadron became a fighting team. Those emotional ties which join together men in battle remain with a man for life.

My uncoached perception that men fight for a unit agrees, I found out later, with the findings of many students of motivation in combat. Robert Leckie has said that "discipline yoked to the love of comrades is beyond defeat," and Glenn Gray convincingly demonstrates in *The Warriors* that comradeship is one of the highest emotions gripping men in war. Sociologists call the unit spirit "cohesion" and understand that it rests on emotional ties with a primary group. In other words, teamwork is why people fight.

In this regard, a recent study noted that in World War II the primary Army group was the platoon, and soldiers established strong links with their whole basic unit, which trained, deployed, and fought together. In Korea and

Vietnam, however, these links were more tenuous because of the rotation policy and because soldiers linked in two-man "buddy groups." I believe that the security police at Phu Cat possessed wider squadron links because of a fortunate combination of circumstances—a single, separate squadron billeting area, an extremely strong formal chain of command and definite flight organization, a distinct uniform (camouflaged fatigues with the Quanh Canh insignia), a strong sense of unique mission, the lack of a "strip" near the base to take men away from the unit, and an unusual (for Vietnam) leaven of airmen and NCOs on extended or second tours with the 37th. The presence of those real veterans did much to establish the unit's emotional continuity and heritage in spite of the one-year tour policy. This combination of factors, it is worth noting, was fortuitous rather than planned.

Attributes of Leadership

The second motive in the development of combat spirit was leadership. The great captains of history are unanimous in declaring that the performance of the men in any unit is directly proportionate to the zeal and energy of its leaders. In the 37th, that zeal and energy had to focus on the individual sentry on the perimeter. He was young, 8,000 miles from home, and worked steadily for up to twelve hours a day for a year. He ate cold rations every night while more fortunate airmen enjoyed three hot squares daily. He had to sleep during Vietnam's hot and humid days. He faced the darkness in an environment totally devoid of any aural or visual stimuli (except the fatiguing drone of AGE generators on the perimeter) to relieve the total tension and monotony.

Motivation in such adverse circumstances could be provided only by officers and NCOs who honestly demonstrated concern for the problems of the men, high personal standards, and a sharing of hardships. It could not be done from behind a desk, nor could it be delegated to the first sergeant, the orderly room, or the CBPO. It had to spring naturally from the respect each leader felt for the men entrusted to him, and it had to be strongest and closest at the *lowest* level of command. Good leadership thus took a great deal of sacrifice, time, and energy. Finally, at the moment of combat, leadership required the physical presence of the leader at the point of contact with the enemy.

Security police leadership was not soft and easy-going. Rather, it was tough and demanding. The sentry who cleaned his rifle carelessly one night might have it jam the next. Smoking on post might betray a position. Infractions of discipline had to be corrected. The duty was unpleasant, but necessary; the discipline hard, but fair.

The officers of the 37th avoided one danger—eroding the chain of command. Perhaps because the ratio of officers to enlisted men was so small in the security police, the officers knew they could never replace NCOs. Officers made their presence felt on the line, and they were concerned with problems at every level. They avoided, however, substituting their judgments for those of the NCOs who knew their men and their defense sectors better than anyone. In turn, they expected the NCOs to perform both as technicians and as leaders.

When the NCOs were held to a high standard and given the authority they needed, there were no leadership lapses or "cop-outs."

Another aspect of leadership I observed was an intensely personal loyalty to superiors. I was so struck by the phenomenon of loyalty that I have been thinking about it ever since I left Phu Cat. Having seen the development of strong ties of loyalty in Vietnam, I can better understand what a medieval knight felt for his king, and why men in ancient times fought and died to advance the position of their clan chief or samurai lord. They had bound their lives to their leaders. Though we are remote in time from those eras, and though society has evolved different forms of social organization, the human personality can still respond to the same emotions. I believe Air Force officers can elicit willing performance from their men based on personal loyalty.

That so few officers do is a sign that managerial and bureaucratic models of supervision have become predominant in our service. We should, however, seek to rediscover how these ties of loyalty can be established. We should seek the human emotions which lie latent in the personality, to be awakened by a leader.

I recall seeing a very tough NCO, a man who drove his men mercilessly on the perimeter, awaken strong emotions of loyalty by the simple act of visiting a sick airman in the hospital. The same NCO won over another airman with a kind word as the junior departed on emergency leave. Such things happened all the time. I noted, however, that they rarely happened during duty hours, and some NCOs forfeited similar opportunities because it was inconvenient. The most effective leaders knew intuitively how to respond at a critical moment.

The ties of loyalty developed somewhat differently between commanders and junior officers. From time to time junior officers would venture to express a heartfelt idea to a superior or to the commander during discussions of unit problems, career irritants, or proposals for operational changes. The superior's response could either sour or encourage other advances in the future. Regardless of the ultimate decision, commanders could establish emotional links with their junior officers through understanding and frank discussion. Officers who know that their commander genuinely values the thoughts of his subordinates will expend great energies on his behalf.

Understanding Followership

Maintaining effective leadership is not, however, a concern only for commanders. Junior officers and NCOs must do their part. When I left the 37th in March of 1970, I had an impression that the unit was neither so *taut* nor so happy as it had been when I arrived a year earlier. Searching my memory as to why the spirit faded, I am convinced it was due to a deficient understanding of *followership* among the squadron's junior officers. A leadership crisis forced the problem to the surface.

A new officer came into the squadron, filling a key leadership position. He had at times an abrupt manner. He was a perfectionist, impatient with any effort that did not meet his own demanding standards. His method of precise operation and correction of "lax areas" soon discouraged many individuals in the squadron.

After administrative and information officer tours at US and overseas bases, Capt. Donald M. Bishop now serves as an Assistant Professor of History at the USAF Academy, Colo. His by-line has appeared in several publications including the Journal of Social Sciences and Humanities. He has a 1967 BA in history from Trinity College, Hartford, Conn., and a 1974 MA in Middle East affairs from Ohio State University, Columbus, Ohio.

The junior officers supported him for about two months. We unconsciously adjusted to utilize his strengths and to insulate our own people from his harsher side. While we maintained that positive attitude, the squadron operated efficiently. After a time, however, his behavior became the topic of discussion among the lieutenants and captains at informal gatherings. So long as we had never expressed our feelings to one another, the squadron followership remained intact. But when we started to talk about the shortcomings we perceived, the fabric of followership began to unravel. We fed each other's discouragement, and we soon began to communicate our feelings to our NCOs. It took a month, but soon the dissatisfaction with that officer was evident throughout the squadron. It soured the unit and the effect became evident in daily operations.

I hold the officer free of the primary blame. I now regret those indiscreet conversations about his faults. I realize now that officers can infect their units with "bad vibes" and diminish morale and performance. Conversely, they can do much to hold a unit together in spite of internal problems. I have thus come to consider it a rule of followership never to speak disparagingly of a superior to others, no matter how deserved the criticism might be. It is a leader's job to make a unit work in spite of problems, not to accentuate them.

At the same time, it is a junior's duty to speak plainly to a superior if he perceives that certain actions are hurting the unit. Fear of reprisal should not deter such action. Every superior should consider a junior's viewpoint if it is rendered respectfully and is based on genuine concern for the unit, no matter how distasteful such a discussion might be.

Some General Thoughts

Air Force people work in many different environments. I have no illusions that an avionics shop, finance office, or fighter squadron can be led in exactly the same manner as a security police squadron. I do believe, however, that the Air Force would benefit from wider attention to the problems and challenges that the security police experience demonstrates. All Air Force units must come to grips with stress and the possibility of actual combat. Specific organizations and challenges may differ, but good leadership has *universal* applicability. Likewise, a sound sense of followership and strong unit spirit can strengthen *any* organization. Based, then, on the experiences and convictions I have described, a few general conclusions seem to have wider pertinence.

Military Behavior

Air Force officers and NCOs cannot be ashamed to be military. Technical skills may differ, but everyone in

the Air Force serves the nation. Every airman must possess a reserve of common military values, whatever his AFSC. Security policemen are proud to be military, and they develop military pride by setting high standards of bearing and performance. And they are frankly vexed by supervisors who consider the profession "just a job," who believe their routine duties are tough enough without the "extra hassle over haircuts and uniforms," and who lack the fiber to enforce standards of behavior and adherence to duty. It is obvious, too, that an officer or NCO who fails to exemplify every standard can enforce none.

Style

There can be no magic formula for leadership, because there are as many styles of effective leadership as there are effective officers. That is why leadership is the most challenging and most personal of all military arts.

The Air Force, however, has developed mental stereotypes of what a perfect officer should be, and various success models—the "TAC wing commander," the "below-the-zone major," or the "effective manager," to name a few—evoked the image of certain leadership traits in the mind's eye. Such stereotyping is dangerous. On the one hand, few men match these models. On the other, it violates the principle that leadership is measured by the performance of the led, *not* by the attitude or bearing of the leader.

At Phu Cat, I recall our commander as spare of build and speech, a former enlisted man, older than his contemporaries, who seemed to have little "flair." He was, however, a confident tactician and an energetic innovator, and he had a fine touch with enlisted men. On the other hand, the squadron operations officer was an aggressive individual, full of strut and bravado, who talked of "impaling Charles on the wire" and engaging the enemy in face-to-face combat. I thought the commander the better officer, but both men were effective leaders. Their separate styles were honest reflections of different personalities. Both had the same concern for zealous leadership. Both proved themselves in combat at close quarters, and both inspired hard work and professional dedication. From them I learned not to judge a leader only by his style.

Unit Spirit

Building unit cohesion needs attention in the Air Force. We focus our loyalties on major commands and wings, high and remote levels in the chain of command, instead of squadrons. Few support units are maintained with illustrious histories. Centralized base recreational facilities receive priority over squadron areas. We often deploy individuals, not units, to war. Barracks have become "dormitories," rather than foci of unit spirit. All these areas need concerted attention by Air Force leaders if the Air Force is to operate in combat with the additional strength imparted by unit cohesion.

In Vietnam, when the mission was the twenty-four-hour concern of everyone, it was easy to develop unit emotions. In the United States, however, family obligations and off-base social ties detract from attention to this matter. Many airmen know their leaders only on

the job. After work, the married supervisors and single airmen go separate ways. It is no wonder that, for some, Air Force life has become a "job," not a calling. And it is not surprising that many Air Force people have weak ties of loyalty to their squadrons. Deployed hurriedly into combat, such squadrons would lack the intangible synergy that unit spirit provides.

Leadership

The lieutenants and captains at Phu Cat would respond, I know, to the thoughts S. L. A. Marshall expressed in *The Armed Forces Officer*:

To the officer who discovers that he is especially suited by temperament and liking to the leading of combat forces, it comes almost as a personal charge that he will let nothing dissuade him from the conviction that his post of duty is with the line.

To the normal young officer it comes as something of a delightful surprise to learn that when he speaks other men will listen, when he reasons they will become convinced, and when he gives an order his authority is accepted.

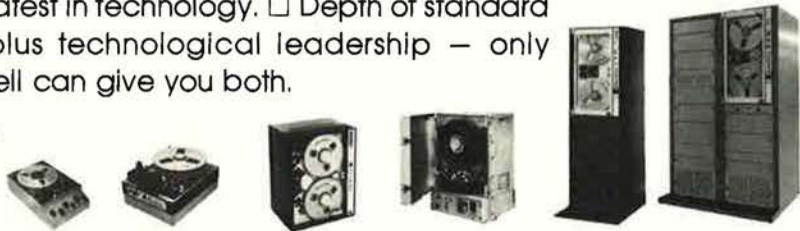
The natural leader is the real specialist of the Armed Services. He is as prodigious, and as much a man apart, as the wizard who has mastered supersonic speeds and taken a walk on the moon. The man or woman who resolves to develop the qualities of leadership is moved by the worthiest of all ambitions, for he has undertaken one of the most complex tasks within human reach.


Leaders need to be recognized and advanced in the Air Force, and the need is crucial if we are to meet future challenges. Gadgets and statistics don't win wars—people do. If young officers and NCOs are to develop leadership skills, we need fewer on-base college programs in "business administration," "management," and "foundations of education." Men and women who aspire to be leaders should study instead such subjects as behavioral science and military history. We need to encourage the best leaders to serve in units, where the people and the problems are, not on staffs. We need to practice daily the leadership skills already being taught at our service schools.

Memories of Vietnam should form a reservoir of professional experience leading to dedication and improvement all through the Air Force. I find, however, that many are too involved in day-to-day humdrum to spend much time remembering the past. When I speak to them of leadership, followership, or the intangible spirit of a unit in combat, their responses are detached. Vietnam has become a place and a war well worth forgetting. It is for this reason that I have written of my own experiences in one very fine, well-led squadron, to awaken a spirit of reflection in others. To the degree that Air Force people turn their backs on their Vietnam experiences—good or bad, combat or support, exciting or routine—and to the degree that we fail to constantly improve our leadership, our followership, and our squadrons, weeds are growing in our minds. Their roots may entangle us in the next conflict. ■

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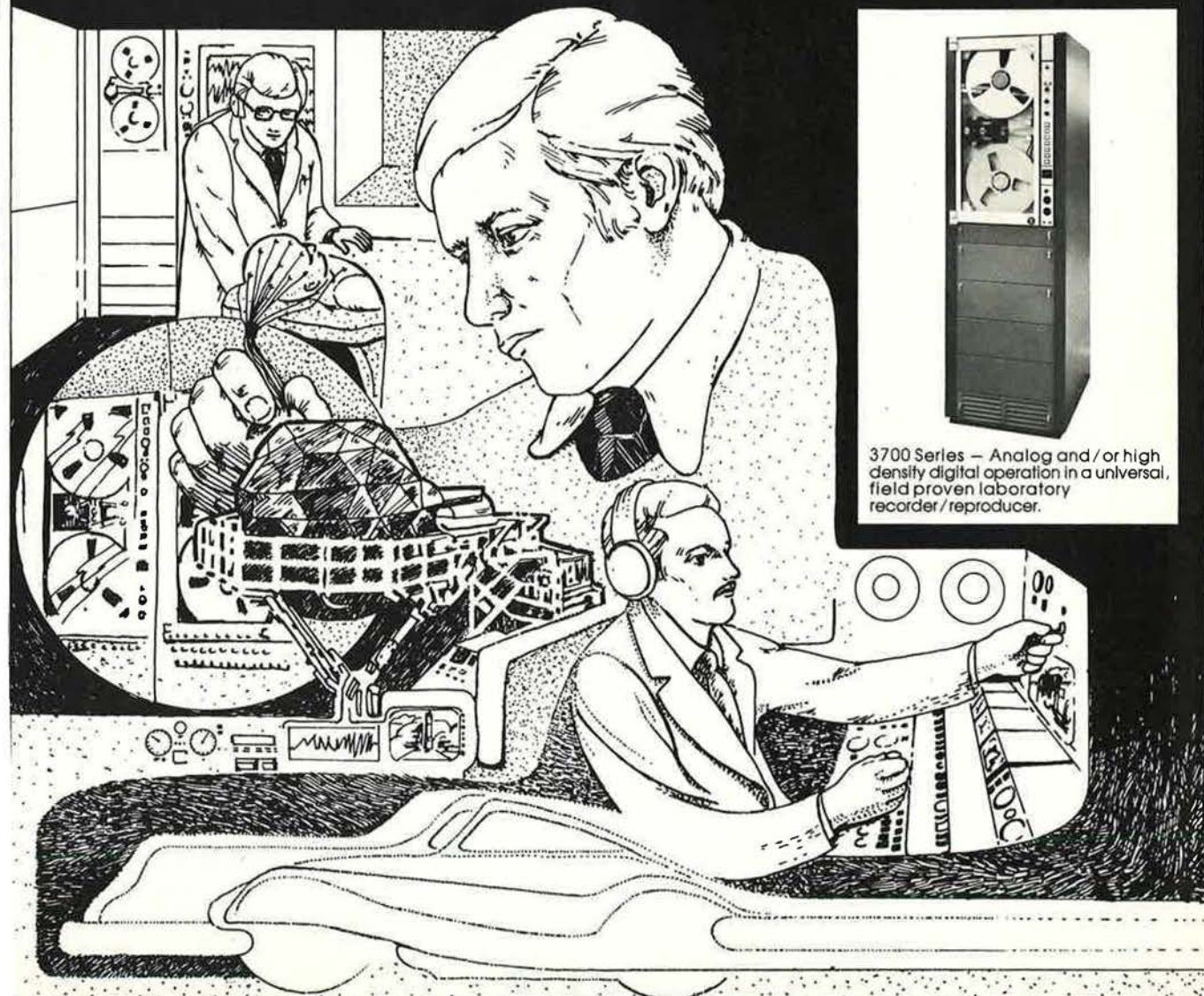
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The Military Balance 1977/78

As Compiled by The International Institute for Strategic Studies, London

FOREWORD

AIR FORCE Magazine is privileged again this year to present "The Military Balance," an exclusive feature of each December issue since 1971.

"The Military Balance," an annual quantitative assessment of the military forces and defense expenditures of the major nations, is compiled by The International Institute for Strategic Studies, London, England. The Institute, an independent center for research and discussion in defense-related areas, is universally recognized as the leading authority in its field.

The national entries that follow are grouped geographically, with special reference to the principal defense pacts and alignments. A short description of multilateral and bilateral pacts and military agreements introduces each of the regional sections. The section on the US and USSR includes an assessment of the changing strategic and general-purpose force balances between the two superpowers. There is a separate section analyzing the European theater balance between NATO and the Warsaw Pact and summarizing the forces and weapons in Europe that are involved in mutual force reduction negotiations.

As in past years, space limitations make it necessary for us to exclude some tabular material, including naval ship construction programs; arms agreements that have been negotiated since the last issue of "The Balance"; and force structures of smaller countries that maintain only minimal defense forces.

In preparing "The Military Balance 1977/78" for our use, we have retained the Institute's system of abbreviating military weapons and units as well as British spelling and usage. A list of the abbreviations found in the text appears on the following page.

"The Military Balance" examines the facts of military power as they existed in July 1977. No projections of force levels or weapons beyond that date have been provided, except where explicitly stated. The study should not be regarded as a comprehensive guide to the balance of military power, since it does not reflect the facts of geography, vulnerability, or efficiency, except where these are touched on in the essays on balances.

Figures for defense expenditures are the latest available. Those for the USSR and the People's Republic of China are estimates. Notes on the difficulties of estimating Soviet and PRC defense expenditures appear at the end of the sections on forces of those countries. Because estimates of defense expenditures have been amended in the case of certain countries, figures in Table 4 on page 115 will not in all cases be directly comparable with those in previous editions of "The Balance." Where a \$ sign appears, it refers to US dollars unless otherwise stated.

GNP figures are usually quoted at current market prices (factor cost for East European countries). Where figures are not currently available from published sources, estimates have been made, and Table 2 uses both published and estimated GNP figures. Wherever possible, the United Nations System of National Accounts has been used, rather than national figures, as a step toward greater com-

parability. For the Soviet Union, GNP estimates are made in roubles, following R. W. Campbell, "A Shortcut Method for Estimating Soviet GNP" (*Association for Comparative Economic Studies*, Vol. XIV, No. 2, Fall 1972). East European GNPs at factor cost are derived from Net Material Product, using an adjustment parameter from T. P. Alton, "Economic Growth and Resource Allocation in Eastern Europe," *Reorientation and Commercial Relations of the Economies of Eastern Europe*, Joint Economic Committee, 93d Congress, 2d Session (Washington: USGPO, 1974). For the People's Republic of China, two estimates of GNP have been given in a note on page 98.

In order to make comparison easier, national currency figures were converted by the Institute into US dollars at the rate prevailing during the second quarter of the relevant year. An exception is the Soviet Union, where the official exchange rate is unsuitable for converting rouble estimates to GNP. The official rate is given in the country section. Further exceptions are certain East European countries that are not members of the International Monetary Fund and Romania (which is), for which conversion rates used are those described in Alton's study cited above. The conversion rates used in the country entries may not always be applicable to commercial transactions.

ABBREVIATIONS

AA	Anti-aircraft	GDP	Gross Domestic Product	n.a.	Not available
AAM	Air-to-air missile(s)	GNP	Gross National Product	NATO	North Atlantic Treaty Organization
AB	Airborne	GP	General purpose		
ABM	Anti-ballistic missile	Gp	Group	OCU	Operational Conversion Unit
Ac	Aircraft	GW	Guided weapon(s)		
AD	Air defence			Para	Parachute
AEW	Airborne early warning	Hel	Helicopter(s)	Pdr	Pounder
AFV	Armoured fighting vehicle(s)	How	Howitzer(s)		
ALBM	Air-launched ballistic missile(s)	HQ	Headquarters	RCL	Recoilless rifle(s)
ALCM	Air-launched cruise missile(s)	Hy	Heavy	Recce	Reconnaissance
Amph	Amphibious			Regt	Regiment
APC	Armoured personnel carrier(s)	ICBM	Inter-continental ballistic missile(s)	RL	Rocket launcher(s)
Armd	Armoured	Incl	Including	RV	Re-entry vehicle(s)
Arty	Artillery	Indep	Independent		
ASM	Air-to-surface missile(s)	Inf	Infantry	SAM	Surface-to-air missile(s)
ASW	Anti-submarine warfare	IRBM	Intermediate-range ballistic missile(s)	SAR	Search and rescue
ATGW	Anti-tank guided weapon(s)			Sig	Signal
ATK	Anti-tank	KT	Kiloton (1,000 tons TNT equivalent)	SLBM	Submarine-launched ballistic missile(s)
AWACS	Airborne warning and control system	LCT	Landing craft, tank	SLCM	Sea-launched cruise missile(s)
AWX	All-weather fighter	LHA	Amphibious general assault ship(s)	SP	Self-propelled
Bbr	Bomber	Log	Logistic	Spt	Support
Bde	Brigade	LPH	Landing platform, helicopter	Sqn	Squadron
Bn	Battalion or billion	LRCM	Long-range cruise missile(s)	SRAM	Short-range attack missile(s)
Bty	Battery	LST	Landing ship, tank	SRBM	Short-range ballistic missile(s)
Cav	Cavalry	Lt	Light	SSBN	Ballistic-missile submarine(s), nuclear
Cdo	Commando	M	Million	SSM	Surface-to-surface missile(s)
CENTO	Central Treaty Organization	MARV	Manoeuvrable re-entry vehicle(s)	SSN	Submarine(s), nuclear
CEP	Circular error probable	MCM	Mine counter-measures	Sub	Submarine
COIN	Counter-insurgency	Mech	Mechanized	Tac	Tactical
Comd	Command	Med	Medium	Tk	Tank
Comms	Communications	MGB	Motor gunboat	Tp	Troop
Coy	Company	MICV	Mechanized infantry combat vehicle(s)	Tpt	Transport
Det	Detachment	MIRV	Multiple independently-targetable re-entry vehicle(s)	Trg	Training
Div	Division	Mk	Mark	UN	United Nations
ECM	Electronic counter-measures	Mor	Mortar(s)	UNDOF	United Nations Disengagement Observation Force
Engr	Engineer	Mot	Motorized	UNEF	United Nations Emergency Force
Eqpt	Equipment	MR	Maritime reconnaissance	UNFICYP	United Nations Force in Cyprus
EW	Early warning	MRBM	Medium-range ballistic missile(s)	UNTSO	United Nations Truce Supervisory Organization
FB	Fighter-bomber	MRV	Multiple re-entry vehicle(s)		
Fd	Field	Msl	Missile		
FGA	Fighter, ground-attack	MT	Megaton (1 million tons TNT equivalent)	Veh	Vehicle(s)
Flt	Flight	MTB	Motor torpedo boat(s)	V(/S)TOL	Vertical (/short) take-off and landing
FPB	Fast patrol boat(s)				
FPBG	Fast patrol boat(s), guided-missile				

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Colombia	108	Mongolia	103	Uganda	96
Congo	93	Morocco	91	United Arab Emirates	92
Cuba	108	Mozambique	94	United States	62
Czechoslovakia	72	NATO	74	Uruguay	109
Denmark	80	Nepal	103	Venezuela	109
Dominican Republic	108	Netherlands	82	Vietnam: Socialist Republic	105
Ecuador	108	New Zealand	103	Warsaw Pact	71
Egypt	88	Nigeria	94	Yemen: Arab Republic (North)	92
Eire	84	Norway	83	Yemen: People's Democratic Republic (South)	92
Ethiopia	94	Oman	91	Yugoslavia	86
Finland	85	Pakistan	104	Zaire Republic	96
France	80	Paraguay	109	Zambia	96
Germany: Democratic Republic (East)	72	Peru	109		
Germany: Federal Republic (West)	81	Philippines	104		
Ghana	94				

The manpower figures given are, unless otherwise stated, those of active regular and conscript forces. An indication of the size of militia, reserve, and paramilitary forces is also included in the country entry where appropriate and in Table 3, page 114. Paramilitary forces are here taken to be forces whose equipment and training go beyond that required for civil police duties and whose organization and control suggest that they may be usable in support of, or in lieu of, regular forces.

Equipment figures in the country entries cover total holdings, with the exception of combat aircraft, where front-line squadron strengths are normally shown. Except where the contrary is made clear, naval vessels of less than 100 tons of structural displacement have been excluded. The term "combat aircraft" used in the country entries includes only bomber, fighter-bomber, strike, interceptor, reconnaissance, counterinsurgency, and armed trainer aircraft (*i.e.*, aircraft normally equipped and configured to deliver ordnance or to perform military reconnaissance). It does not include helicopters.

Where the term "mile" is used when indicating the range or radius of weapon systems, it means a statute mile.

The Institute assumes full responsibility for the facts and judgments contained in the study. The cooperation of the governments that are covered was sought and, in many cases, received. Not all countries were equally cooperative, and some figures were necessarily estimated.

Photographs and captions have been added by AIR FORCE Magazine, and we assume responsibility for them.

—THE EDITORS

The Military Balance 1977/78

The United States And the Soviet Union

STRATEGIC FORCES

As negotiations to limit offensive forces continued at the Strategic Arms Limitations Talks (SALT), the two superpowers modernized, and in some areas expanded, their capabilities within the limits imposed by the 1972 five-year Interim Agreement and the guidelines for a second accord reached at Vladivostok in 1974. The Interim Agreement, which set ceilings on numbers of sea and land-based missile launchers, is scheduled to lapse on 3 October 1977.

The United States concentrated on improvements to the existing triad of ICBM, SLBM, and bombers and continued to fund development programmes for new systems for deployment in the 1980s. The size of the ICBM force—550 *Minuteman* III (each with 3 MIRV), 450 single-warhead *Minuteman* II, and 54 single-warhead *Titan* II—did not change. Plans to improve *Minuteman* III yield and accuracy with procurement of the 370KT Mk 12A MIRV warhead and NS-20 guidance system went ahead. These programmes, together with improvements to *Minuteman* software, would increase accuracy (measured in CEP) from about 0.25 nautical miles (nm) to 700 feet by the end of the decade and significantly enhance the ability to destroy hardened targets. Development of MARV proceeded, and component development began on an 8–10-MIRV mobile ICBM, the MX, to replace parts of the *Minuteman* force in the 1980s and further enhance hard-target capability.

At sea, the SLBM force of 496 *Poseidon*, each with 10–14 MIRV, in 31 submarines and 160 *Polaris*, each with 3 MRV, in 10 submarines remained in operation. Construction of the first ten 24-tube *Trident* boats continued (initial funding has been approved for others), and testing began on the 4,000nm-range C4 *Trident* I missile. When operational in 1978, the C4, armed with 8 × 100KT MIRV, will almost double the effective range of American SLBM and increase their accuracy to a CEP of less than 1,500ft. A second-generation SLBM for the *Trident* class, the 6,000nm D5, reportedly with a 14 × 150KT MIRV warhead and possibly able to manoeuvre, was under early development.

In the air, structural and avionics improvements were made to the B-52G/H bomber force. Flight testing continued on three B-1 bomber prototypes, and a fourth began construction, but plans to procure further aircraft were cancelled.

Flight testing proceeded of versions of the air-launched cruise missile (ALCM) for deployment aboard the B-52 and possibly other aircraft. The terminally-guided version for possible deployment in the early 1980s would have a maximum range of 1,500nm. Cruise missiles were also tested from other platforms. The *Tomahawk* sea-launched cruise

missile (SLCM) was fired successfully from surface vessels and submarines, and feasibility studies were begun for adapting this 2,000nm-range missile for ground launch.

American ICBM, SLBM, and long-range bombers totalled 2,083, more than 200 fewer than in 1967. However, this force had the capability to deliver more than 11,000 warheads, almost twice as many as a decade earlier. With the introduction of the *Trident* submarine force, warhead totals will approach 14,000 (10,000 on ICBM and SLBM) in the early 1980s.

The improvement of strategic defensive forces continued at a slower pace. Interceptor aircraft continued to be phased out, but a new interceptor was planned. Development of an advanced bomber and missile attack radar went on, but the *Seafarer* submarine communications system met political obstacles. Several programmes to enhance satellite survivability began, including satellite 'hardening', manoeuvrability and, possibly, development of an anti-satellite capability.

The Soviet Union proceeded with broad modernization of ICBM, SLEM, and bomber capabilities. Although total ICBM numbers fell to 1,477 (as older ICBM were replaced by new SLBM), at least 80 new ICBM—SS-17, SS-18, and SS-19—were deployed in MIRV and single-warhead modes. These were said to be notably more accurate than the SS-9 and SS-11, SS-19 accuracy reportedly approaching that of existing US systems. The mobile SS-X-16 remained under development, but an intermediate-range MIRV version, the SS-20, began deployment (with reloads) in the Western USSR. A new ICBM family for possible late 1980s deployment was reported in the early development stage.

Soviet SLBM increased to 909 in 82 submarines. Four *Delta*-II-class submarines were launched, each with 16 4,800nm-range SS-N-8. Two new SLBM were tested during the year: the SS-NX-17, a solid-propellant replacement for the SS-N-6, and the SS-NX-18, a 3-MIRV replacement for the SS-N-8. Development of a longer-range replacement for the SS-N-3 SLCM continued.

Deployment of the *Backfire* B bomber continued at a rate of approximately 25 per year, and development proceeded on new ASM.

Compared with 837 in 1967, Soviet ICBM, SLBM, and long-range bombers numbered 2,521. This force can deliver roughly 3,800 warheads against the United States. With the replacement of the remainder of the ICBM force with the new MIRV-equipped missiles, this total would rise to more than 7,500 in the early 1980s, individual warheads having significantly higher yields than US ones.

Both air defence interceptors and SAM were modernized. The 64 ABM launchers around Moscow remained in

operation, and tests were reported of new transportable radars and endo-atmospheric missiles. Civil defence activities and satellite interceptor tests continued, and there were reports of work on a charged-particle beam for use in ballistic missile defense.

GENERAL-PURPOSE FORCES

Numbers in the American and Soviet armed forces remained at last year's levels of 2.09 million and 3.67 million respectively, compared with roughly 3 million for each in the mid 1960s. Both steadily improved conventional capabilities. By reducing support personnel, the United States added one to her 13 army divisions and proceeded with plans to raise two more by 1978; two infantry divisions were also being mechanized. Programmes concentrated on new direct- and indirect-fire anti-armour weapons. The procurement of 30,000 TOW missiles was completed, and *Dragon* procurement continued. Cannon-launched guided projectiles and scatterable mines were under development, as were new precision-guided munitions for helicopters, and procurement of new surveillance and target-acquisition aids began. Tank production was increased, but the number of medium tanks (around 10,000) was roughly the same as in 1967. The XM-1 tank and the Mechanized Infantry Combat Vehicle (MICV) were under development. Modernization of the theatre nuclear weapon stockpile began, with development under way on enhanced-radiation weapons for use on the battlefield.

The Soviet Union continued to increase holdings of BMP MICV and T-62 and T-72 tanks, and tank numbers rose to some 43,000 compared with some 34,000 in 1967. The deployment of helicopters, SAM, ATGW, and self-propelled artillery also continued.

In the US Navy plans were made to reverse the decline in major surface combatants from more than 300 to less than 200 in a decade. The building of a new nuclear-powered carrier was cancelled, however, and planning concentrated

on a new class of smaller, conventionally-engined carrier. Two 688-class attack submarines were delivered, and funding for a further three was approved. Development continued of the *Aegis* ship defence system (to be deployed aboard a new strike cruiser), the *Harpoon* anti-shiping missile and a tactical version of the *Tomahawk* SLCM. Research also accelerated on the development of a new generation of naval VTOL aircraft.

The Soviet Navy continued its gradual growth in size and quality. The first of three *Kiev*-class aircraft carriers became operational, construction continued of *Kara*- and *Kresta-II*-class missile cruisers, and development of a class of missile cruiser for the 1980s was also reported. Procurement of V- and T-class nuclear and F-class diesel attack and C-II-class cruise-missile submarines proceeded. New anti-shiping and anti-submarine missiles were under development and being deployed, and the naval air force received *Forger* VTOL and *Backfire* aircraft.

The United States continued deployment of the Air Force F-15 and the Navy F-14 fighters, and development of the less costly F-16 and F-18 continued in order to enable combat aircraft force levels to be kept above 2,500 as older aircraft are retired. Production of the A-10 close air support aircraft began and is to be completed by the early 1980s. Procurement of at least 16 E-3A AWACS aircraft was approved (but no decision to buy it was taken by NATO). Modification of the F-4C for electronic warfare roles proceeded, as did development work on converting the F-111A for this.

The deployment of new Soviet fighters with improved range, payload, and avionics continued, including the Su-17 *Fitter* C, MiG-23 *Flogger* B, and Su-19 *Fencer*. With the introduction of more multi-role aircraft, the Soviet Union has more than twice as many fighters suitable for ground-attack missions as in the 1960s, many nuclear-capable. There were reports of new air-to-air and air-to-surface missiles under development, and of work on ECM equipment to enhance aircraft penetration.

THE UNITED STATES

Population: 217,030,000.
 Military service: voluntary.
 Total armed forces: 2,088,000 (119,600 women).
 Estimated GNP 1976: \$1,692.4 bn.
 Defence expenditure 1977-78: \$109.7 bn.
 (Budget Authority for FY 1978 is tentatively \$113.7 bn.)

Strategic Nuclear Forces:

Offensive:

- (a) Navy: 656 SLBM in 41 subs.
 31 SSBN (*Lafayette*-class), each with 16 *Poseidon* C3.
 10 SSBN (5 *Washington*-, 5 *Allen*-class, each with 16 *Polaris* A3.
 (2 *Trident*-class SSBN, each with 24 *Trident* C4, building.)
 (b) Strategic Air Command (SAC): some 644 combat aircraft.
 ICBM: 1,054.
 450 *Minuteman* II, 550 *Minuteman* III, 54 *Titan* II.

Aircraft:

Bombers: 441, in 24 sqns.
 68 FB-111A in 4 sqns } with
 226 B-52G/H in 15 sqns } 1,500 SRAM
 75 B-52D in 5 sqns }
 Training: 72 B-52D/F.
 Storage or reserve: 153, incl B-52D/F/G.
 Tankers: 519 KC-135 in 32 sqns.



USAF plans to buy 729 F-15 air-superiority fighters as part of its force-modernization program. One wing of F-15s has been deployed to Europe. Israel also is buying F-15s.

Strategic Reconnaissance and Command: 18 SR-71A in 2 sqns; U-2C/K; 4 E-4A/B; 28 RC/EC-135.

Defensive:

North American Air Defense Command (NORAD), HQ at Colorado Springs, is a joint American-Canadian organization. US forces under NORAD are in Aerospace Defense Command (ADCOM).

ABM: Safeguard system (missiles deactivated).

Aircraft (excluding Canadian and tac units): Interceptors: 331

(i) Regular: 6 sqns with 141 F-106A.

(ii) Air National Guard (ANG): 3 sqns with 80 F-101B, 1 with 20 F-4D, 6 with 90 F-106A.

AEW aircraft: 1 reserve sqn with 8 EC-121.

Warning Systems:

(i) **Satellite-based early-warning system:** 3 DSP satellites, 1 over Eastern Hemisphere, 2 over Western; surveillance and warning system to detect launchings from SLBM, ICBM, and Fractional Orbital Bombardment Systems (FOBS).

(ii) **Space Detection and Tracking System (SPADATS):** USAF *Spacetrack* (7 sites), USN *SPASUR*, and civilian agencies. Space Defense Center at NORAD HQ: satellite tracking, identification, and cataloging control.

(iii) **Ballistic Missile Early Warning System (BMEWS):** 3 stations (Alaska, Greenland, England); detection and tracking radars with ICBM and IRBM capability.

(iv) **Distant Early Warning (DEW) Line:** 31 stations roughly along the 70°N parallel.

(v) **Pinetree Line:** 24 stations in Central Canada.

(vi) **474N:** 3 stations on US East, 1 on Gulf, 3 on West coast (to be replaced by *Pave Paw* phased-array radars: 1 on East, 1 on West coast); SLBM detection and warning net.

(vii) **Perimeter Acquisition Radar (PAR):** 1 north-facing phased-array 2,000-mile system (at inactive ABM site in North Dakota).

(viii) **Back-up Interceptor Control (BUIC):** system for AD command and control (all stations but 1 semi-active).

(ix) **Semi-Automatic Ground Environment (SAGE):** 6 locations (2 in Canada); combined with BUIC and Manual Control Centre (MCC) in Alaska (to be replaced by Joint Surveillance System (JSS) with 7 Region Operations Control Centres, 4 in US, 1 in Alaska, 2 in Canada); system for co-ordinating surveillance and tracking of objects in North American airspace.

(x) **Ground radar stations:** some 51 stations manned by ANG, augmented by the Federal Aviation Administration (FAA) stations (to be replaced as surveillance element of JSS).

Army: 789,000 (51,900 women).

4 armd divs.

5 mech divs.

5 inf divs.

(One National Guard bde is incorporated in 1 mech and 3 inf divs. Two of the divs will not achieve deployment until 1978.)

1 airmobile div.

1 AB div.

1 armd bde.

1 inf bde.

3 armd cav regts.

1 bde in Berlin.

2 special mission bdes in Alaska and Panama.

Army Aviation: 1 air cav combat bde, indep bns assigned to HQ for tac tpt and medical duties.

1 *Honest John*, 3 *Pershing*, 8 *Lance* SSM bns.

Tanks: some 10,000 med, incl 3,300 M-48,

6,700 M-60 (M-60A2 with *Shillelagh* ATGW); 1,600 M-551 *Sheridan* lt tks with *Shillelagh*.

AFV: some 22,000 M-577, M-114, M-113 APC.

Arty and Msls: some 5,000 175mm SP guns and 105mm, 155mm, and 203mm SP how; 105mm, 155mm towed guns/how; 3,000 81mm, 3,000 107mm mor; 6,000 90mm and 106mm RCL; *TOW*, *Dragon* ATGW; *Honest John*, *Pershing*, *Lance* SSM.

AA arty and SAM: some 600 20mm, 40mm towed and SP AA guns; some 20,000 *Redeye* and *Chaparral/Vulcan* 20mm AA msl/gun systems; *Nike Hercules* and *HAWK* SAM. (*Roland* SAM on order.)

Aircraft/Hel: about 500 ac, incl 300 OV-1/10, 200 U-8/-21; 8,000 hel, incl 1,000 AH-1G/S, 4,000 UH-1/-19, 500 CH-47/-54, 2,500 OH-6A/-58, H-13. Trainers incl 100 T-41/-42 ac; 700 TH-55A hel.

Deployment:

Continental United States

Strategic Reserve: (i) 1 armd, 1 mech, 3 inf, 1 air-mobile, 1 AB divs. (ii) To reinforce 7th Army in Europe: 1 armd, 2 mech divs, 1 armd cav regt. (One armd div, 1 mech div, 1 armd cav regt have by eqpt stockpiled in W. Germany.)

Europe: 198,400.

(i) Germany: 189,000. 7th Army: 2 corps, incl 2 armd, 2 mech divs, 3 mech bdes plus 2 armd cav regts; 3,000 med tks. (Includes those stockpiled for the strategic reserve formations.)

(ii) West Berlin: 4,400. HQ elements and 1 inf bde.

(iii) Greece: 800.

(iv) Italy: 3,000.

(v) Turkey: 1,200.

Pacific:

(i) South Korea: 30,000. 1 inf div, 1 AD arty bde.

(ii) Hawaii: 1 inf div less 1 bde.

Reserves: 591,000

(i) Army National Guard: 379,000; capable after mobilization of manning 2 armd, 1 mech, 5 inf divs, 20 indep bdes (3 armd, 6 mech, 11 inf), and 3 armd cav regts, plus reinforcements and support units to fill regular formations. (There are, in addition, 4 indep bdes incorporated in active army divs.)

(ii) Army Reserves: 212,000 in 12 trg divs,

3 indep combat bdes; 49,000 a year do short active duty.

Marine Corps: 192,000 (3,900 women).

3 divs.

2 SAM bns with *HAWK*.

575 M-60 med tks; 950 LVTP-7 APC; 175-mm SP guns; 105mm, 155mm how; 155-mm, 203mm SP how; 230 81mm and 107mm mor; 106mm RCL; *TOW*, *Dragon* ATGW.

3 Air Wings: 365 combat aircraft.

12 FGA sqns with 144 F-4N/S with *Sparrow* and *Sidewinder* AAM.

13 FGA sqns: 3 with 80 AV-8A *Harrier*, 5 with 60 A-4E/F/M, 5 with 60 A-6A/E.

2 recce sqns with 21 RF-4B, 2 AEW sqns with 17 EA-6A (to be replaced by EA-6B).

3 observation sqns with 54 OV-10A.

3 assault tpt/tanker sqns with 36 KC-130F.

3 attack hel sqns with 54 AH-1J.

4 lt hel sqns with 84 UH-1E/N.

9 med hel sqns with 162 CH-46F.

6 hy hel sqns with 126 CH-53D.

Deployment:

(i) **Continental United States:** 2 divs, 2 air wings.

(ii) **Pacific:** 1 div, 1 air wing.

Reserves: 33,500.

1 div and 1 air wing: 2 fighter sqns with F-4B, 5 attack sqns with A-4E, 1 observation sqn with OV-10A, 1 tpt/tanker sqn with KC-130, 7 hel sqns (1 attack with AH-1G, 2 hy with CH-53, 3 med with CH-46, 1 lt with UH-1E), 2 tk bns, 1 assault amph bn, 1 SAM bn with *HAWK*, 1 fd arty gp.

Navy: 536,000 (23,800 women); 175 major combat surface ships, 78 attack submarines.

Submarines, attack: 68 nuclear, 10 diesel.

Aircraft carriers: 13; 2 nuclear-powered (*Nimitz*, 96,000 tons, *Enterprise*, 91,000 tons).

8 *Forrestal/Kitty Hawk*-class 78/87,000 tons).

3 *Midway*-class (64,000 tons).

These normally carry 1 air wing (85-95 ac, 75 in *Midway* class) of 2 fighter sqns with F-14A or F-4B/J, 3-4 attack sqns (1 AEW) with A-7 or A-6; RA-5C



The US Army now has eight battalions of *Lance* surface-to-surface missiles, some deployed to Europe. *Lance* can carry either a nuclear or a conventional warhead.



Twelve of the US Navy's fighter squadrons now have F-14s. The Iranian Air Force operates two squadrons of F-14s with more on order.

recce; 2 ASW sqns (1 with S-3A, 1 with SH-3A/D/G/H hel); 1 ECM sqn with EA-6B; 1 AEW sqn with E-2B/C; EA-3B/KA-6 tankers and other specialist ac.

Other surface ships:

- 5 nuclear-powered GW cruisers with SAM, ASROC.
- 19 GW cruisers with SAM, ASROC.
- 2 GW It cruisers with SAM.
- 38 GW destroyers with SAM, ASROC.
- 34 gun/ASW destroyers, most with SAM or ASROC.
- 6 GW frigates with SAM, ASROC.
- 58 gun frigates.
- 7 patrol gunboats with SAM.
- 62 amph warfare ships, incl 7 LPH, 1 LHA.
- 3 MCM ships.
- 110 log and operations support ships.
- (13 SSN, 2 nuclear-powered carriers, 3 nuclear-powered GW cruisers, 17 destroyers, 1 GW frigate, 4 LHA, 1 patrol msl hydrofoil building.)

Missiles:

Standard SSM/SAM, Tartar, Talos, Terrier, Sea Sparrow SAM, ASROC, SUBROC ASW.

Ships in reserve:

- 4 subs, 6 aircraft carriers, 4 battleships, 10 cruisers, 10 amph warfare, 9 MCM ships, 46 log support and 41 troop, cargo, and tanker ships. (239 cargo ships, 162 tankers could be used for auxiliary sea-lift.)

Aircraft: 13 attack carrier air wings; some 1,200 combat aircraft.

- 26 fighter sqns: 12 with F-14A, 14 with F-4.
- 39 attack sqns: 12 with A-6, 27 with A-7.
- 10 recce sqns with RA-5C, RF-8.
- 24 land-based MR sqns with 216 P-3A/B/C.
- 11 ASW sqns each with 10 S-3A.
- 12 AEW sqns each with E-2B/C.
- 11 ASW hel sqns with 8 SH-3A/D/G/H.
- 17 misc support sqns with 20 C-1, 15 C-2, 8 C-9B, 12 C-130F/LC-130, 12 CT-39, 7 C-118, 26 C-131, 6 C-117, 36 EA-6B ac; 21 RH-53D, CH-46, SH-3, SH-2B/C hel.
- 20 trg sqns with T-1A, T-2B/C, T-28/-29B/-34/-38/-44, TA-4J/F, TA-7C, TS-2A, TE-2 ac; TH-1, UH-1D, TH-57A hel.

Deployment (average strengths of major combat ships; some in Mediterranean and

Western Pacific based overseas, rest rotated from US):

Second Fleet (Atlantic): 5 carriers, 62 surface combatants.

Third Fleet (Eastern Pacific): 4 carriers, 65 surface combatants.

Sixth Fleet (Mediterranean): 2 carriers, 15 surface combatants, 1 Marine Amphibious Unit (MAU). (Marine Amphibious Units are 5-7 amph ships with a Marine bn embarked. Only 1 in Mediterranean and 1 in Pacific are regularly constituted. 1 Battalion Landing Team (MAU less hel) also deployed in the Pacific; 1 occasionally formed for the Atlantic.)

Seventh Fleet (Western Pacific): 2 carriers, 20 surface combatants, 1 MAU, 1 Marine Bn Landing Team.

Reserves: 98,000. Ships in commission with the Reserve include 30 destroyers, 7 patrol gunboats, 3 amph warfare, 22 MCM ships.

- 2 carrier wings: 6 A-7, 1 A-4E/L attack, 4 F-4N fighter, 2 RF-8G recce, 2 KA-3B tanker, 2 E-1B/-2B AEW, 3 EA-6A/EKA-3 ECM sqns.

- 13 MR sqns: 11 with P-3A, 2 with SP-2H.
- 3 tpt sqns with C-9/C-118.
- 7 hel sqns: 4 with SH-3A/G, 2 with HH-1K, 1 SAR with HH-3.

Air Force: 571,000 (40,000 women); about 3,400 combat aircraft. (Excluding ac in SAC and NORAD; incl ac in ANG and Air Force Reserve.)

80 fighter/attack sqns: 49 with F-4, 2 with F-105G (to be replaced by F-4G), 13 with F-111E/F, 6 with F-15, 6 with A-7D, 1 with A-10A, 3 with F-5E.

- 9 tac recce sqns with RF-4C.
- 1 AWACS sqn with 1 E-3A (15 on order).
- 1 ECM sqn with EB-57 (2 with 42 EF-111A due).

11 tac air control sqns: 6 with OV-2/-10, 1 with C-130E, 1 with EC-135 ac, 3 with CH-3/-53 hel.

5 special operations sqns: 4 with C/AC-130 ac, 1 with CH-3, UH-1 hel.

1 tac drone sqn with DC-130.

15 tac airlift sqns with 272 C-130.

17 hy tpt sqns: 4 with 77 C-5A, 13 with 271 C-141.

- 5 SAR sqns with 32 HC-130 ac, 79 HH-3/-53, 11 HH-1 hel.
- 1 medical tpt sqn with 23 C-9.
- 2 weather recce sqns with 14 WC-130.

Hel incl some 300 UH-1N, HH-3E, HH-43, HH-53B/C.

Trg sqns with some 1,600 T-37/-38/-39/-41/-43.

Deployment:

Continental United States (incl Alaska):

- (i) Tactical Air Command (TAC): 82,000; 9th and 12th Air Forces. 42 fighter sqns, 5 tac recce sqns.
- (ii) Military Airlift Command (MAC): 64,500; 21st and 22nd Air Forces.

Europe: US Air Force, Europe (USAFE): 76,000. 3rd Air Force (Britain), 16th Air Force (Spain; units in Italy, Greece, and Turkey), 17th Air Force (Germany and Netherlands). 1 AD sqn in Iceland. 24 fighter sqns (plus 4 in US on call) with 400 F-4C/D/E, 72 F-15, 156 F-111E/F; 3 tac recce sqns (plus 3 in US on call) with 60 RF-4C; 2 tac airlift sqns (plus 6 in US on call) with 32 C-130.

Pacific: Pacific Air Forces (PACAF): 31,100; 5th Air Force (Japan, Okinawa, 1 wing in Korea), 13th Air Force (Philippines, Taiwan). 9 fighter sqns, 1 tac recce sqn.

Reserves: 148,000.

- (i) Air National Guard: 94,000; about 900 combat aircraft.

10 interceptor sqns (under ADCOM, see p. 64); 29 fighter sqns (13 with F-100C/D, 3 with F-105B/D, 2 with F-4C, 9 with A-7, 2 with A-37B); 8 recce sqns (1 with RF-101, 7 with RF-4C); 18 tac tpt sqns (17 with C-130A/B/E, 1 with C-7); 6 tac air spt gps with O-2A; 13 tanker sqns (10 with KC-135, 3 with KC-97); 3 ECM sqns with 8 C/EC-121 (ADC), 18 EB-57B; 2 SAR sqns with HC-130/HH-3.

- (ii) Air Force Reserve: 54,000; about 200 combat aircraft.

3 fighter sqns with F-105D; 4 attack sqns with A-37B; 18 tac tpt sqns (12 with C-130A/B, 4 with C-123K, 2 with C-7); 1 AEW sqn with EC-121 (ADC); 2 tanker sqns with KC-135; 2 special operations sqns with AC-130, CH-3; 4 SAR sqns (2 with HC-130, 2 with HH-1H/-3); 1 weather recce sqn with WC-130. 18 Reserve Associate Military Airlift sqns (personnel only): 4 for C-5A, 13 for C-141A, 1 aero medical for C-9A.

- (iii) Civil Reserve Air Fleet: 225 long-range commercial ac (131 cargo/convertible, 94 passenger).

digital

11



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THE SOVIET UNION

Population: 257,890,000.

Military service: Army and Air Force 2 years, Navy and Border Guards 2-3 years.

Total armed forces: 3,675,000. (Excludes some 750,000 uniformed civilians.)

Estimated GNP 1976: 490 bn roubles. (Official exchange rate 1976, \$1 = 0.75 rouble.)

Estimated defence expenditure 1977: see p. 70.

Strategic Nuclear Forces:

Offensive:

(a) Navy: 909 SLBM in 82 subs.

8 D-II-class SSBN, each with 16 SS-N-8. (One may be a new D-III class.)

13 D-I-class SSBN, each with 12 SS-N-8.

34 Y-class SSBN, each with 16 SS-N-6 Sawfly.

7 H-class SSBN, each with 3 SS-N-5 Serb.

11 G-II-class diesel, each with 3 SS-N-5.

9 G-I-class diesel, each with 3 SS-N-4 Sark.

(These 60 G-class launchers are not considered strategic missiles under the terms of the Strategic Arms Limitation (Interim) Agreement.)

(b) Strategic Rocket Forces (SRF): 375,000.

(The SRF and PVO-Strany, separate services, have their own manpower.)

ICBM: 1,477.

109 SS-7 Saddler and SS-8 Sasin (being phased out).

238 SS-9 Scarp (being replaced).

840 SS-11 Sego (being replaced).

60 SS-13 Savage.

40 SS-17.

50 SS-18.

140 SS-19.

IRBM and MRBM: some 620 deployed (most in Western USSR, rest east of Urals).

100 SS-5 Skean IRBM.

20 SS-20 IRBM (mobile).

500 SS-4 Sandal MRBM.

(c) Long-Range Air Force (LRAF): 741 combat aircraft. About 75 per cent based in the European USSR, most of the remainder in the Far East; there are also



The USSR's Air Transport Force, together with the Soviet airline, Aeroflot, provides a formidable airlift capability. This Il-76 is roughly comparable to USAF's C-141.

staging and dispersal points in the Arctic.)

Long-range bombers: 135.

100 Tu-95 Bear.

35 Mya-4 Bison.

Medium-range bombers: 476.

305 Tu-16 Badger.

136 Tu-22 Blinder.

35 Backfire B.

Tankers: 53.

9 Tu-16 Badger.

44 Mya-4 Bison.

ECM: 94.

94 Tu-16 Badger.

Recce: 36.

4 Tu-95 Bear.

22 Tu-16 Badger.

10 Tu-22 Blinder.

Defensive:

Air Defence Force (PVO-Strany): 550,000; early warning and control systems, with 6,000 early warning and ground control intercept (EW/GCI) radars; interceptor sqns and SAM units.

Aircraft: about 2,650.

Interceptors: incl some 80 MiG-17 (Fresco

D), 170 MiG-19 (Farmer B/E), 650 Su-9

Fishpot B, Su-11 Fishpot C, 320 Yak

28P Firebar, 150 Tu-28P Fiddler, 850

Su-15 Flagon A/D/E, 110 MiG-23

Flogger, 300 MiG-25 Foxbat A.

Airborne Warning and Control Aircraft: 5

modified Tu-126 Moss.

ABM: 64 Galosh, 4 sites around Moscow

with Try Add engagement radars. Target

acquisition and tracking by phased-array

Dog House and Chekov, early warning by

phased-array Hen House radar on Soviet

border. Range of Galosh believed over

200 miles; warheads nuclear, presumably

in megaton range.

SAM:

Fixed-site Systems: 12,000 launchers, a

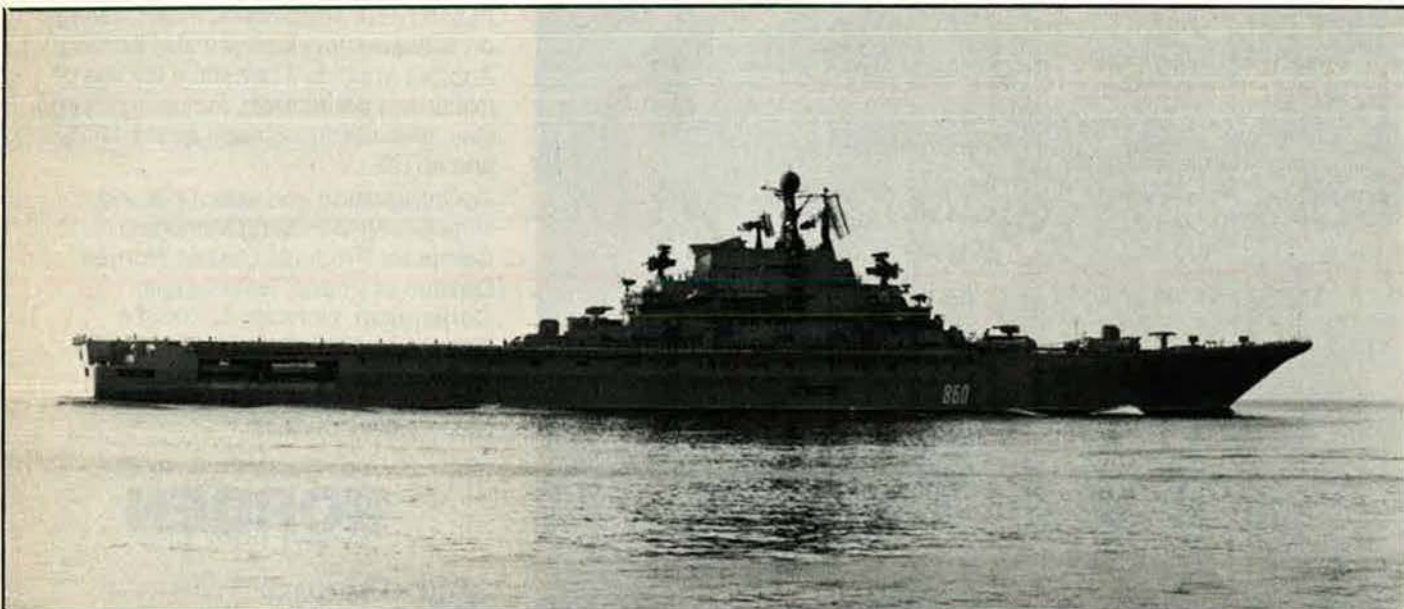
more than 1,000 sites.

SA-1 Guild: HE warhead, med/high alti-

tude, obsolescent.

SA-2 Guideline: 3,500, HE warhead, slant

range about 25 miles, effective 1,000-



The USSR's first aircraft carrier, the Kiev, shown here, is a significant expansion of Russia's ability to project force globally.

85,000 ft.

SA-3 *Goa*: 1,500, HE warhead, slant range 15 miles, low-altitude, effective 500-60,000 ft.

SA-5 *Gammon*: slant range 50-150 miles, high-altitude (100,000 ft).

Mobile Systems:

SA-4 *Ganef*: Twin mounted, tracked carrier, med-/long-range.

SA-6 *Gainful*: Triple mounted, tracked carrier, short-/med-range.

SA-7 *Grail*: man-portable, short-range, low-altitude.

SA-8 *Gecko*: 4 msls, mounted on 6-wheeled vehicle with fire-control radar.

SA-9 *Gaskin*: 4 msls, mounted on BRDM, short-range, low-altitude.

Army: 1,825,000.

45 tk divs.

115 motor rifle divs.

8 AB divs.

Tanks: 43,000: IS-2/-3, T-10, T-10M hy, T-54/-55/-62/-72 med, PT-76 lt (most tks fitted for deep wading).

AFV: 47,000: BRDM scout cars; BMP MICV; BTR-40/-50/-60/-152, GT-T/M-1970, BMD APC.

Artillery: 19,000 100mm, 122mm, 130mm, 152mm, 180mm, and 203mm fd and SP guns/how; 7,200 82mm, 120mm, 160mm, and 240mm mor; 2,700 122mm, 140mm, 200mm, 240mm, 250mm, and 280mm multiple RL; 10,800 ASU-57 and ASU-85 SP, 76mm, 85mm, and 100mm ATK guns; Swatter, Sagger ATGW.

AA Artillery: 9,000 23mm and 57mm, 100mm towed, ZSU-57-2, ZSU-23-4 SP guns.

SSM (nuclear capable): about 1,200 launchers (units organic to formations), incl FROG (range 10-45 miles), Scud B (range 185 miles), Scaleboard (range 500 miles).

Deployment and Strength:

Central and Eastern Europe: 31 divs: 20 (10 tk) in East Germany, 2 tk in Poland, 4 (2 tk) in Hungary, 5 (2 tk) in Czechoslovakia; 10,500 med and hy tks. (Excluding tks in reserve, replaced by new ones but not withdrawn from the area.)

European USSR (Baltic, Byelorussian, Carpathian, Kiev, Leningrad, Moscow, and Odessa Military Districts (MD): 64 divs (about 20 tk).

Central USSR (Volga, Ural MD): 6 divs (1 tk).

Southern USSR (North Caucasus, Trans-Caucasus, Turkestan MD): 24 divs (3 tk).

Sino-Soviet border (Central Asian, Siberian, Transbaikal, and Far East MD): 43 divs (about 5 tk), incl 3 in Mongolia.

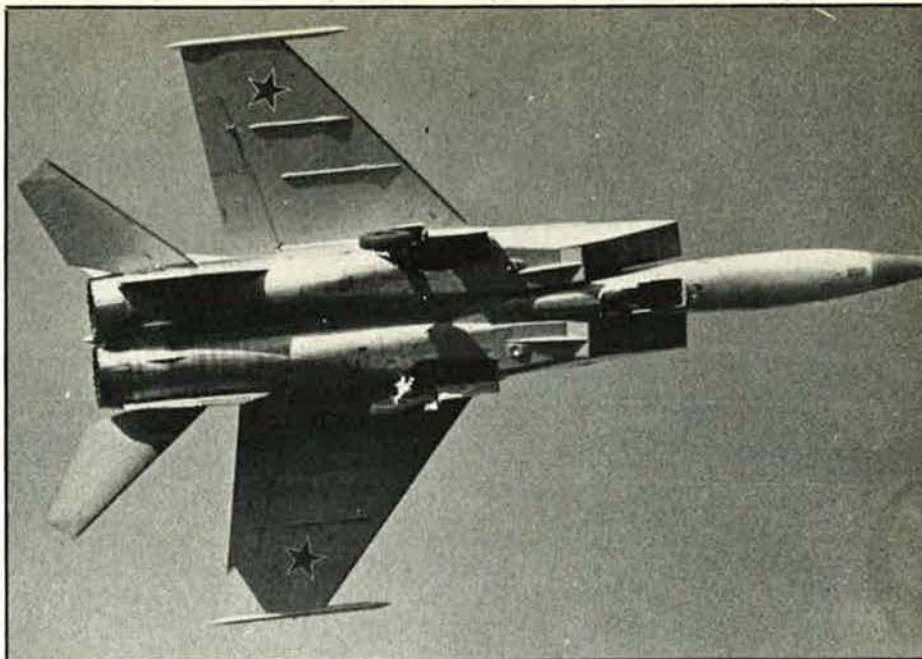
Soviet divs have three degrees of combat readiness: Category 1, between three-quarters and full strength, with complete eqpt; Category 2, between half and three-quarters strength, complete with fighting vehicles; Category 3, about one-third strength, possibly complete with fighting vehicles (some obsolescent).

The 31 divs in Eastern Europe are Category 1. About half those in European USSR and the Far East are in Category 1 or 2. Most of the divs in Central and Southern USSR are likely to be Category 3. Tk divs in Eastern Europe have 325 med tks, motor rifle divs up to 266, but elsewhere holdings are lower.

Navy: 450,000, incl 50,000 Naval Air Force, 12,000 Naval Infantry, and 10,000 Coast Arty and Rocket Troops; 230 major surface combat ships, 234 attack and cruise-missile subs (82 nuclear, 152 diesel).

Submarines:

Attack: 39 nuclear (13 N-, 17 V-I, 3 V-II, 5 E-I, 1 A-class), 128 diesel (56 F-, 10 R-, 10 Z-, 40 W-, 4 B-, 3 T-class, 5 coastal Q-class).



This is the all-weather interceptor version of the USSR's Mach 3.2 MiG-25 Foxbat. A variant of the Foxbat is used for aerial reconnaissance.

Cruise Missiles: 43 nuclear:

1 P-class.

13 C-class, each with 8 SS-N-7.

29 E-II-class, each with 8 SS-N-3 Shaddock.

24 diesel:

16 J-class, each with 4 SS-N-3.

6 W-Long Bin class, each with 4 SS-N-3.

2 W-Twin Cylinder class, each with 2 SS-N-3.

Surface Ships:

1 Kiev-class carrier (40,000 tons) with SSM, SAM, 12 VTOL ac, 20 hel (2 building).

2 Moskva-class ASW hel cruisers, each with 2 twin SAM, about 20 Ka-25 hel.

5 Kara-class ASW cruisers with SAM, 1 hel.

4 Kresta-I-class ASW cruisers with SSM, SAM, 1 hel.

9 Kresta-II-class ASW cruisers with SAM, 1 hel (2 building).

4 Kynda-class cruisers with SSM, SAM.

10 Sverdlov-class cruisers (3 with SAM, 2 with hel).

1 trg cruiser (Chapaev-class).

14 Krivak-class ASW destroyers with SSM, SAM.

8 Kanin-class ASW destroyers with SAM.

4 Kildin-class ASW destroyers with SSM.

19 Kashin-class ASW destroyers with SAM (5 with SSM).

8 modified Kotlin-class destroyers with SAM.

38 destroyers, 18 Kottlin-, 20 Skory-class.

103 frigates: 20 Mirka, 45 Petya, 35 Riga, 3 Kola.

17 Nanuchka-class msl patrol ships with SSM, SAM.

244 sub chasers (25 Turya, 25 Pchela hydrofoils, 25 Grisha, 64 Poti 65 Stenka, 65 SO-1).

120 Osa- and 5 Komar-class FPBG with Styx SSM.

100 MTB (Shersten and P-6/-8/-10 classes).

About 330 minesweepers (150 coastal). About 100 amph ships, incl 14 Alligator, 7 Ropucha LST, 60 Polnocny LCT.

90 landing craft (incl MP-4).

60 oilers, 80 supply ships.

20 depot, 30 repair ships.

54 intelligence collection vessels (AGI).

Ships in reserve: 90 W-, 15 Q-class subs, 2 cruisers, 15 Skory-, 10 Riga-class destroyers.

Naval Air Force: some 662 combat aircraft.

280 Tu-16 Badger med bbrs with ASM.

30 Backfire B med bbrs with ASM.

48 Tu-22 Blinder med bbrs, MR, ECM ac.

10 Il-28 Beagle lt bbrs.

Some 10 Yak-36 Forger VTOL FGA, 10 Fitter FGA.

39 Tu-16 Badger E/F recce, 30 Tu-16 ECM ac.

205 MR ac: 45 Tu-95 Bear D, 15 Bear F, 55 Il-38 May, 90 Be-12 Mail amphibians.

80 Tu-16 Badger tankers.

260 ASW hel: Mi-4 Hound, Mi-14 Haze, Ka-25A/B Hornone.

270 misc tpts and trainers.

Naval Infantry (Marines):

5 naval inf regts, each of 3 inf, 1 tk bn, one assigned to each of Northern, Baltic, and Black Sea fleets, two to Pacific fleet.

T-54/-55 med, PT-76 lt tks, BTR-60P series APC; BM-21 122mm RL; ZSU-23-4 SP AA guns; SA-9 SAM.

Coastal Artillery and Rocket Troops:

Hy coastal guns, Samlet, and SS-C-1B Sepal SSM (similar to SS-N-3) to protect approaches to naval bases and major ports.

Deployment (average strengths only, excl SSBN):

Northern Fleet: 110 subs, 50 major surface combat ships.

Baltic Fleet: 35 subs, 50 major surface combat ships.

Black Sea Fleet (incl Caspian Flotilla and Mediterranean Squadron): 20 subs, 60 major surface combat ships.

Pacific Fleet: 70 subs, 60 major surface combat ships.

Air Force: 475,000; about 4,600 combat aircraft. (Excluding PVO-Strany and Long-Range Air Force.)

Tactical Air Force: aircraft incl 175 Il-28 Beagle, Yak-28 Brewer, 220 MIG-17 Fresco, 500 Su-7 Fitter A, 1,100 MiG-23/-27 Flogger, about 1,450 MiG-21 Fishbed, 300 Su-17 Fitter C, 120 Su-19 Fencer A FGA; about 250 Beagle, Brewer, 115 MiG-25 Foxbat B, 300 Fishbed recce; 45 Brewer E, 6 An-12 Cub ECM ac; 250 tpts; 3,000 lt, med, and hy hel; 1,050 tac trg ac.

Air Transport Force: 1,500 aircraft: An-14 lt, 50 An-8, 780 An-12, 180 An-24/-26, 235 Il-14, 15 Il-18, Il-62, 35 Il-76, 100 Li-2, 10 Tu-104, 5 Tu-134 med, Tu-114, 50 An-22 hy, 3,660 hel, incl 800 Mi-1/-2, 410 Mi-4, 490

Mi-6, 1,610 Mi-8, 10 Mi-10, 310 Mi-24 Hind A, 1,300 Civil Aeroflot med- and long-range ac available to supplement military airlift.

Deployment:

16 Tactical Air Armies: 4 (1,700 ac) in Eastern Europe and 1 in each of 12 MD in the USSR.

Reserves (all services):

Soviet conscripts have a Reserve obligation to age 50. Total reserves could be 25,000,000, of which some 4,200,000 have served in last five years.

Para-Military Forces: 450,000.

200,000 KGB border troops, 250,000 MVD security troops. Border troops equipped with tks, SP guns, AFV, ac, and ships MVD with tks and AFV. Part-time military training organization (DOSAAF) conducts such activities as athletics, shooting, parachuting, and pre-military training given to those of 15 and over in schools, colleges and workers' centres. Claimed active membership 80 million, with 5 million instructors and activists; effectives likely to be much fewer.

SOVIET DEFENCE EXPENDITURE

No single figure for Soviet defence expenditure can be given, since precision is not possible on the basis of present knowledge. The declared Soviet defence budget is thought to exclude a number of elements such as military R&D, stockpiling, and civil defence—indeed some contend that it covers only the operating and military construction costs of the armed forces. The problem of arriving at a correct budgetary figure was discussed in the essay on p. 67 of the December '73 issue of AIR FORCE Magazine and on pp. 49–50 of the December '76 issue.

Furthermore, Soviet pricing practices are quite different from those in the West. Objectives are set in real terms with no requirement for money prices to coincide with the real costs of goods and services. The rouble cost of the defence effort may thus not reflect the real cost of alternative production foregone and, in turn, a rouble value of defence expressed as a percentage of Soviet GNP measured in roubles may not reflect the true burden.

If rouble estimates are then converted into dollars to facilitate international comparisons, the difficulties are compounded, because the exchange rate chosen should relate the purchasing power of a rouble in the Soviet Union to that of a dollar in the USA. The official exchange rate is considered inadequate for this purpose, and there is no consensus on an alternative.

An alternative approach—estimating how much it would cost to produce and man the equivalent of the Soviet defence effort in the USA—produces the index number problem: faced with the American price structure, the Soviet Union might opt for a pattern of spending different from her present one. This particular method tends to overstate the Soviet defence effort relative to that of the USA.

Accordingly, the estimates produced by a number of methods are given below, both in roubles and dollars, together with official figures for the defence budget published by the Soviet Union. Estimates produced by China are also given but their basis is not known.

Source	Price base	Defence expenditure		1970–1976	
		1970	1976	% annual growth rate	Burden (% of GNP)
Billions of Roubles					
CIA (1)	1970	40–45	52–59	4.5	11–13
Lee (2)	1970	43–50	75–84	—	—
Lee (2)	Current	43–50	73–82	—	—
China (3)	Current	49	79	8.26	15+
USSR (4)	Current	17.9	17.43	—	—
Billions of Dollars					
CIA (5)	1975	90	120	4.47	—
CIA (6)	Current	66–99	127–128	—	—
Lee (7)	Current	80–105	103–140	5	—

(1) *Estimated Soviet Defense Spending in Roubles*, CIA SR 76-10121U, May 1976. Extrapolation to 1976 using CIA growth rate.

(2) Figures for 1970 from W. T. Lee, *Soviet Defense Expenditure for 1955–1975*, Tempo GE75 TMP-42, Washington, DC, 31 July 1975; 1976 figures from W. T. Lee, 'Soviet Defense Expenditures in the 10th FYP' (to appear in *Osteuropa Wirtschaft*, No. 4, 1977).

(3) *Peking Review*, November 1975, January 1976.

(4) Official declared budget.

(5) *A Dollar Cost Comparison of Soviet and US Defense Activities 1966–1976*, CIA SA 77-1000U, January 1977. 1970 figures taken from diagram.

(6) *Ibid.*; 1975 price series converted to current prices using wholesale price index.

(7) W. T. Lee, 'Soviet Defense Expenditures' in W. Schneider and F. P. Hoerber (eds), *Arms, Men & Military Budgets, Issues for Fiscal Year 1977* (New York: Crane Russak, 1976).

The Military Balance 1977/78

The Warsaw Pact

TREATIES

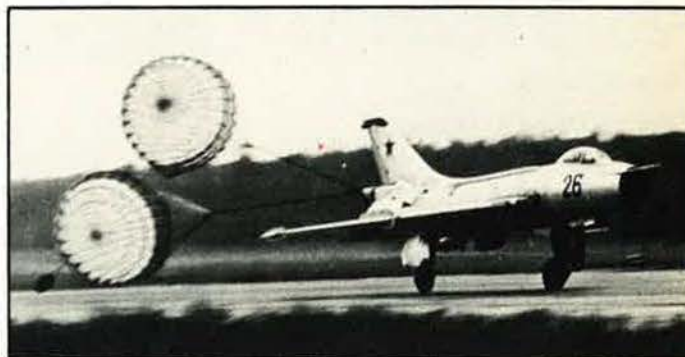
The Warsaw Pact is a multilateral military alliance formed by the 'Treaty of Friendship, Mutual Assistance and Co-operation' which was signed in Warsaw on 14 May 1955 by the Governments of the Soviet Union, Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania; Albania left the Pact in September 1968. The Pact is committed to the defence only of the European territories of the member states.

The Soviet Union is also linked by bilateral treaties of friendship and mutual assistance with Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. Members of the Warsaw Pact have similar bilateral treaties with each other. The essence of East European defence arrangements is not therefore dependent on the Warsaw Treaty as such. The Soviet Union concluded status-of-forces agreements with Poland, East Germany, Romania, and Hungary between December 1956 and May 1957 and with Czechoslovakia in October 1968; all remain in effect except the one with Romania, which lapsed in June 1958 when Soviet troops left Romania.

ORGANIZATION

The Political Consultative Committee consists, in full session, of the First Secretaries of the Communist Party, Heads of Government, and the Foreign and Defence Ministers of the member countries. The Committee has a Joint Secretariat, headed by a Soviet official and consisting of a representative from each country, and a Permanent Commission, whose task is to make recommendations on general questions of foreign policy for Pact members. Both are located in Moscow.

Since the reorganization of the Pact in 1969 the non-Soviet Ministers of Defence are no longer directly subordinate to the Commander-in-Chief of the Pact but, together with the Soviet Minister, form the Council of Defence Ministers, which is the highest military body in the Pact. The second military body, the Joint High Command, is required by the Treaty to 'strengthen the defensive capability of the Warsaw Pact, to prepare military plans in case of war, and to decide on the deployment of troops'. The Command consists of a Commander-in-Chief and a Military Council. This Council meets under the chairmanship of the C-in-C and includes the Chief-of-Staff and permanent military representatives from each of the allied armed forces. It seems to be the main channel through which the Pact's orders are transmitted to



The Mach 1.2 Su-7, long the USSR's standard fighter-bomber, is still in several Pact and other Soviet-supplied air forces.

its forces in peacetime and through which the East European forces are able to put their point of view to the C-in-C. The Pact also has a Military Staff, which includes non-Soviet senior officers. The posts of C-in-C and Chief-of-Staff of the Joint High Command have, however, always been held by Soviet officers, and most of the key positions are still in Soviet hands.

In the event of war, the forces of the other Pact members would be operationally subordinate to the Soviet High Command. The command of the air defence system covering the whole Warsaw Pact area is now centralized in Moscow and directed by the C-in-C of the Soviet Air Defence Forces. Among the Soviet military headquarters in the Warsaw Pact area are the Northern Group of Forces at Legnica in Poland; the Southern Group of Forces at Budapest; the Group of Soviet Forces in Germany at Zossen-Wünsdorf, near Berlin; and the Central Group of Forces at Milovice, north of Prague. Soviet tactical air forces are stationed in Poland, East Germany, Hungary, and Czechoslovakia.

The Soviet Union has deployed short-range surface-to-surface missile (SSM) launchers and nuclear-capable aircraft in Eastern Europe. Most East European countries also have short-range SSM launchers, but there is no evidence that nuclear warheads for their missiles have been supplied. Longer-range Soviet SSM and aircraft are based in the Soviet Union.

All East European Warsaw Pact divisions are of three categories with different manning (and hence readiness) levels. Category 1 formations are at up to three-quarters of establishment strength; Category 2 at up to half; Category 3 little more than cadres. See also p. 118.

BULGARIA

Population: 8,833,000.
 Military service: Army and Air Force 2 years,
 Navy 3 years.
 Total regular forces: 148,500 (93,000 con-
 scripts).
 Estimated GNP 1976: \$21.1 bn.
 Defence expenditure 1976: 645 m leva
 (\$537.6 m).
 \$1 = 1.2 leva.

Army: 115,000 (75,000 conscripts).
 8 motor rifle divs.
 5 tk bdes.
 1 AB regt.
 3 SSM bdes with *Scud*.
 4 arty, 3 AA arty regts.
 1 mountain bn.
 2 recce bns.
 100 T-34, 1,800 T-54/-55 med tks; 290
 BTR-40/BRDM AFV; 1,500 BTR-60, 35
 OT-62 (TOPAS) APC; 200 85mm, 400
 122mm, 95 152mm guns/how; 350 120mm
 mor; BM-21 122mm RL; 36 FROG, 20
Scud SSM; 76mm ATK guns; 76mm, 130
 82mm RCL; *Sagger*, *Snapper* ATGW;
 37mm, 57mm, 85mm, 100mm towed, 200
 ZSU-57-2 SP AA guns; SA-6/-7 SAM.

Reserves: 200,000.

Navy: 8,500 (5,000 conscripts).
 4 submarines (2 R-, 2 W-class, ex-Soviet).
 2 *Riga*-class escorts.
 2 *Kronstadt*- and 6 SO-1-class coastal es-
 corts.
 3 *Osa*-class FPBG with *Styx* SSM.
 4 *Shershen*- and 8 P-4-class MTB.
 6 MCM ships (2 T-43, 4 *Vanya*-class).
 24 PO-2-class small patrol/minesweeping
 boats.
 19 landing craft (10 *Vydra*-, 9 MFP-class).
 2 Mi-1, 6 Mi-4 hel.

Reserves: 15,000.

Air Force: 25,000 (13,000 conscripts); 270
 combat aircraft.
 6 FGA sqns with 72 MiG-17, some MiG-27.
 10 interceptor sqns: 4 with 48 MiG-21, 1
 with 19 MiG-19, 5 with 60 MiG-17.
 3 recce sqns with 10 MiG-21, 24 MiG-15.
 1 tpt regt with 6 Il-14, 4 An-24, 2 Tu-134.
 1 hel regt with 30 Mi-4, 30 Mi-2 and Mi-8.
 Operational trainers incl 27 MiG-15, 10 MiG-
 21; other trg ac incl 100 L-29, Yak-11/18,
 109 MiG-15/-17/-21UTI.
 26 SA-2, 8 SA-3 SAM bns.
 1 para regt.

Reserves: 20,000.

Para-Military Forces: 16,000 border guards
 with AFV; 12,000 construction troops;
 12,000 security police; 150,000 volunteer
 People's Militia.

CZECHOSLOVAKIA

Population: 14,949,000.
 Military service: 2 years.
 Total regular forces: 181,000 (110,000 con-
 scripts).
 Estimated GNP 1976: \$45.7 bn.
 Defence expenditure 1977: 18.24 bn koruny
 (\$1.61 bn).
 \$1 = 11.3 koruny.

Army: 135,000 (95,000 conscripts).
 5 tk d'vs.
 5 motor rifle divs.
 1 AB regt.
 3 SSM bdes with *Scud*.
 1 ATK bde.
 2 arty bdes.

2 AA arty bdes.
 3,400 T-54/-55 med tks; 680 OT-65/-66
 scout cars; 300 BMP, 2,000 OT-62/-64/
 -810 APC; 600 122mm, 50 130mm, 120
 152mm guns/how; 122mm SP guns; M-51
 130mm RL; 40 FROG, 27 *Scud* SSM; 125
 82mm ATK guns; 110 82mm RCL; 110
Sagger, *Snapper* ATGW; 200 57mm towed
 and ZSU-23-4, ZSU-57-2 SP AA guns;
 SA-3/-4/-6/-7 SAM.

Reserves: 300,000.

Air Force: 46,000 (15,000 conscripts); 558
 combat aircraft.
 12 FGA sqns with 80 Su-7, 36 MiG-17, 42
 MiG-21.
 18 interceptor sqns with 250 MiG-21, MiG-
 15, L-29.
 6 recce sqns with 36 MiG-21R, 36 L-29, 11
 Il-14.
 About 6 An-24, 42 Il-14, 1 Tu-134 tpts.
 Hel incl 90 Mi-1/-2, 130 Mi-4, 20 Mi-8.
 Operational trainers incl 6 Su-7B, 10 MiG-
 15, 19 MiG-21, 32 L-29; other trg ac incl
 15 MiG-15, 24 MiG-21, 60 L-29, 24 L-39.
 28 SA-2/-3 SAM battalions.



All Pact armies are equipped with FROG surface-to-surface missiles. This obsolescent FROG-3 is dual-capable and has a range of about forty kilometers.

Reserves: 50,000.

Para-Military Forces: 10,000 border troops,
 some AFV, ATK guns; about 120,000 part-
 time People's Militia, 2,500 Civil Defence
 Troops.

GERMAN DEMOCRATIC REPUBLIC

Population: 17,264,000.
 Military service: 18 months.
 Total regular forces: 157,000 (92,000 con-
 scripts).
 Estimated GNP 1976: \$48 bn.
 Defence expenditure 1977: 11.02 bn Ost-
 marks (\$2.89 bn).
 \$1 = 3.8 Ostmarks.

Army: 105,000 (67,000 conscripts).
 2 tk divs.
 4 motor rifle divs.
 1 SSM bde with *Scud*.
 2 arty bdes.
 2 AA arty regts.
 1 AB bn.
 2 ATK bns.
 About 2,400 T-54/-55, 600 T-34 (in storage)

med tks; about 120 PT-76 lt tks; 880
 BRDM, FUG-70 scout cars; 1,500 BMP,
 BTR-50P/-60P/-152 APC; 335 122mm,
 100 130mm, 72 152mm guns/how; 225
 120mm mor; 108 BM-21 122mm RL; 24
 FROG-7, 16 *Scud* B SSM; 100mm ATK
 guns; *Sagger*, *Snapper* ATGW; 400 23mm,
 57mm, 100mm towed and ZSU-23-4, ZSU-
 57-2 SP AA guns; SA-4/-7 SAM.

Reserves: 200,000.

Navy: 16,000 (10,000 conscripts).
 2 *Riga*-class escorts.
 4 SO-1 and 13 *Hai*-class submarine
 chasers.
 15 *Osa*-class FPBG with *Styx* SSM.
 70 MTB (15 *Shershen*-, 40 20-ton *Illis*-, 15
Libelle-class).
 26 coastal patrol craft (coastguard).
 52 *Kondor*-class coastal minesweepers.
 6 *Robbe*-class, 12 *Labo*-class landing craft.
 1 hel sqn with 8 Mi-4, 5 Mi-8.

Reserves: 25,000.

Air Force: 36,000 (15,000 conscripts); 416

combat aircraft.
 3 FGA sqns with 35 MiG-17.
 18 fighter sqns with 270 MiG-21.
 1 recce sqn with 12 MiG-21, 4 Il-14.
 2 fighter/trg wings with 45 L-29, 50 MiG-21.
 2 tpt sqns with 20 Il-14, 3 Tu-124, 8 Tu-134,
 some An-24.
 46 Mi-1, 18 Mi-4, 40 Mi-8 hel.
 20 MiG-15UTI, 41 MiG-21UTI trainers.
 5 AD regts with 120 57mm and 100mm AA
 guns.
 2 SAM bns with 22 SA-2, 4 SA-3.
 2 para bns.

Reserves: 30,000.

Para-Military Forces: 73,000. 48,000 border
 guards, some tks, AFV, 22 coastal craft;
 25,000 security troops, 500,000 Workers'
 Militia.

HUNGARY

Population: 10,551,000.
 Military service: 2 years (incl Border Guard).
 Total regular forces: 103,000 (60,000 con-
 scripts).
 Estimated GNP 1976: \$23.1 bn.
 Defence expenditure 1977: 13.15 bn forints

(\$590 m).
\$1 = 22.3 forints.

Army: 83,000 (52,000 conscripts).
1 tk div.
5 motor rifle divs.
1 SSM bde with *Scud*.
3 arty regts.
3 AA arty regts.
1 AB bn.
Danube Flotilla: 2 MCM units, 1 AA gunboat unit.
About 1,000 T-34/-54/-55 med, 100 PT-76 lt tks; about 600 scout cars; 1,500 BTR-40/-50/-60/-152 APC; 100 85mm, 250 122mm, 36 152mm guns/how; 300 82mm, 100 120mm mor; 75 122mm RL; 22 *FROG*, 8 *Scud* SSM; 200 57mm, 76mm ATK guns; 75 *Sagger*, *Swatter* ATGW; 200 57mm and 100mm towed, 100 ZSU-23-4 and ZSU-57-2 SP AA guns; SA-6/-9 SAM; 10 100-ton patrol craft (MCM and AA), 6 landing craft.

Reserves: 130,000.

Defence expenditure 1977: 57.28 bn zloty (\$2.44 bn).
\$1 = 23.5 zloty.

Army: 220,000 (166,000 conscripts).
5 tk divs.
8 motor rifle divs.
1 AB div.
1 amph assault div.
4 SSM bdes with *Scud*.
3 arty bdes.
6 AA arty regts.
3 ATK regts.
3,500 T-34, T-54/-55/-62 med, 300 PT-76 lt tks; 2,000 FUG-65/-70, BRDM scout cars; 2,200 OT-64, 104 BTR-40/-50/-60/-152 APC; 400 85mm, 700 122mm, 130mm, 150 152mm guns/how; 550 82mm, 120mm mor; 250 122mm, 140mm RL; 46 *FROG*-3/-7, 36 *Scud* SSM; 76mm, 85mm, 100mm towed, ASU-57/-85 SP ATK guns; 82mm RCL; *Sagger*, *Snapper* ATGW; 400 23mm, 57mm, 85mm, 100mm towed, ZSU 57-2 SP AA guns; SA-6/-7/-9 SAM.

Su-7, 1 with 28 Su-20.
33 interceptor sqns with 100 MiG-17, 340 MiG-21.
6 recce sqns with 72 MiG-15/-21, 5 Il-28, 4 Il-14.
Some 60 tpts, incl An-12/-24/-26, Il-14/-18/-62, Tu-134, Yak-40.
165 Mi-1/-2, 19 Mi-4, 26 Mi-8 hel.
385 trainers, incl *Iskra*, MiG-15/-17/-21UTI, Il-28.
36 SA-2, 12 SA-3 SAM bns.

Reserves: 60,000.

Para-Military Forces: 97,000: 18,000 Border Troops, 58,000 Internal Security and Territorial Defence, some tanks, AFV, ATK guns; 34 small boats operated by coast-guard; 21,000 Construction troops; 350,000 Citizens' Militia.

ROMANIA

Population: 21,600,000.
Military service: Army and Air Force 18 months, Navy 2 years.
Total regular forces: 180,000 (110,000 conscripts).
Estimated GNP 1976: \$45.3 bn.
Defence expenditure 1977: 11.3 bn lei (\$824 m).
\$1 = 13.7 lei.

Army: 140,000 (95,000 conscripts).

2 tk divs.
8 motor rifle divs.
3 mountain regts.
1 AB regt.
2 SSM bdes with *Scud*.
2 arty bdes.
4 arty regts.
2 ATK regts.
2 AA arty regts.
1,500 T-34, T-54/-55 med, PT-76 lt tks; 1,600 OT-65 scout cars and BTR-50/-60/-152, OT-62/-64/-810, TAB-70/-72 (BTR-60) APC; 50 76mm, 50 85mm, 600 122mm, 150 152mm guns/how; 1,000 82mm, 120mm mor; 122mm, 150 130mm RL; 30 *FROG*, 20 *Scud* SSM; 57mm ATK guns; 260 76mm and 82mm RCL; 120 *Sagger*, *Snapper*, *Swatter* ATGW; 300 30mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-57-2 SP AA guns.

Reserves: 300,000.

Navy: 10,000 (5,000 conscripts).
6 coastal escorts (3 *Poti*-, 3 *Kronstadt*-class).
5 *Osa*-class FPBG with *Styx* SSM.
19 MTB (13 P-4-class, 6 *Hu Chwan*-class hydrofoils).
14 *Shanghai*-class MGB.
26 patrol craft (16 coastal, 10 river).
22 MCM craft (4 coastal, 10 inshore, 8 river).
4 Mi-4 helicopters.

Reserves: 20,500.

Air Force: 30,000 (10,000 conscripts); 327 combat aircraft.
5 FGA sqns with 75 MiG-15/-17.
12 interceptor sqns with 27 MiG-15/-19, 210 MiG-21.
1 recce sqn with 15 Il-28.
2 tpt sqns with some 20 Il-14, 4 Il-18, 1 Il-62, 10 An-24, 2 An-26, 12 Li-2, 1 Boeing 707.
6 Mi-4, 20 Mi-8, 20 *Alouette* III hel.
Trainers incl 60 L-29, 55 MiG-15, 18 MiG-21.
108 SA-2 *Guideline* at about 18 SAM sites.

Reserves: 25,000.

Para-Military Forces: 37,000; 17,000 border, 20,000 security troops with AFV, ATK guns. About 700,000 Patriotic Guard.



The MiG-19 interceptor dates from the 1950s. Those in air forces of the front-line Pact countries, like this one with Czech markings, have been replaced with MiG-21s.

Air Force: 20,000 (8,000 conscripts); 176 combat aircraft.
4 fighter sqns with 30 Su-7, 30 MiG-17/-19.
6 interceptor sqns with 116 MiG-21.
About 50 An-2/-24/-26, Il-14, and Li-2 tpts.
About 30 Mi-1/-2, 35 Mi-8 hel.
53 MiG-15UTI, 11 MiG-21UTI, Yak-11/-18, 20 L-29 trainers.
14 SAM bns with SA-2.

Reserves: 13,000.

Para-Military Forces: 20,000 border guards (11,000 conscripts) with AFV, ATK guns; 60,000 part-time Workers' Militia (with regular officers).

POLAND

Population: 34,609,000.
Military service: Army, internal security forces, Air Force 2 years; Navy, special services 3 years.
Total regular forces: 307,000 (190,000 conscripts).
Estimated GNP 1976: \$68.1 bn.

Deployment: Egypt (UNEF): 865; Syria (UNDOF): 88.

Reserves: 500,000.

Navy: 25,000, incl Marines and 6,000 conscripts.
4 W-class submarines.
1 *Kotlin*-class destroyer with 2 *Goa* SAM.
12 *Osa*-class FPBG with *Styx* SSM.
26 large patrol craft.
12 MTB (9 *Wisla*-, 3 P-6-class).
24 *Krogulec*-, T-43-class ocean minesweepers, 20 K-8-class minesweeping boats.
30 *Polnocny*-class landing ships and 20 landing craft.
1 Naval Aviation Regt (60 combat aircraft):
1 lt bbr/recce sqn with 10 Il-28.
4 fighter sqns with 12 MiG-15, 38 MiG-17.
2 hel sqns with some 25 Mi-1/-2/-4.

Reserves: 45,000.

Air Force: 62,000 (18,000 conscripts); 745 combat aircraft.
1 lt bbr sqn with 6 Il-28.
15 FGA sqns; 14 with 160 MiG-17 and 30

The Military Balance 1977/78

The North Atlantic Treaty

TREATIES

The North Atlantic Treaty was signed in 1949 by Belgium, Britain, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, and the United States; Greece and Turkey joined in 1952, and West Germany in 1955. The Treaty unites Western Europe and North America in a commitment to consult together if the security of any one member is threatened, and to consider an armed attack against one as an attack against all, to be met by such action as each of them deems necessary, 'including the use of armed force, to restore and maintain the security of the North Atlantic area'.

The Paris Agreements of 1954 added a Protocol to the Treaty aimed at strengthening the structure of NATO and revised the Brussels Treaty of 1948, which now includes Italy and West Germany in addition to its original members (Benelux countries, Britain, and France). The Brussels Treaty signatories are committed to give one another 'all the military and other aid and assistance in their power' if one is the subject of 'armed aggression in Europe'.

Since 1969 members of the Atlantic Alliance can withdraw on one year's notice; the Brussels Treaty was signed for 50 years.

ORGANIZATION

The Organization of the North Atlantic Treaty is known as NATO. The governing body of the Alliance, the North Atlantic Council, which has its headquarters in Brussels, consists of Ministers from the fifteen member countries, who normally meet twice a year, and of ambassadors representing each government, who are in permanent session.

In 1966 France left the integrated military organization, and the 14-nation Defence Planning Committee (DPC) was formed, on which France does not sit. It meets at the same level as the Council and deals with questions related to NATO integrated military planning and other matters in which France does not participate. Greece has announced her intention to leave the integrated military organization; her status is under discussion, but she left the DPC in autumn 1974.

Two permanent bodies for nuclear planning were established in 1966. The first, the Nuclear Defence Affairs Committee (NDAC), is open to all NATO members (France, Iceland, and Luxembourg do not take part); it normally meets at Defence Minister level once a year to associate non-nuclear members in the nuclear affairs of the alliance. The Secretary-General is Chairman of the NDAC.

The second, the Nuclear Planning Group (NPG), derived from and subordinate to the NDAC, has seven or eight members and is intended to go further into the details of topics raised there. The composition consists, in practice, of Britain, Germany, Italy, and the United States, plus three or four other member countries serving in rotation, each for a term of 18 months. On 1 July 1977 there were four such members: Canada, Greece, the Netherlands, and Norway. The Secretary-General also chairs the NPG.

The Eurogroup, which was set up by West European member states of the Alliance (with the exception of France, Portugal, and Iceland) in 1968, is an informal consultative body acting to co-ordinate and improve the West European military contribution to the Alliance. Its activities have included the European Defence Improvement Programme (1970) and agreement on principles of co-operation in the fields of armaments (1972), training (1973), and logistics (1975). (Discussion in Eurogroup of the need to extend European armaments co-operation led to the formation in 1976 of the European Programme Group, open to all European members of the Alliance but independent of it. Its membership now includes France and ten member countries of Eurogroup.)

The Council and its Committees are advised on politico-military, financial, economic, and scientific aspects of defence planning by the Secretary-General and an international staff. The Council's military advisers are the Military Committee, which gives policy direction to NATO military commands. The Military Committee consists of the Chiefs-of-Staff of all member countries except France, which maintains a liaison staff, and Iceland, which is not represented; in permanent session the Chiefs-of-Staff are represented by Military Representatives, who are located in Brussels together with the Council. The Military Committee has an independent Chairman and is served by an integrated international military staff. The major NATO commanders are responsible to the Committee, although they also have direct access to the Council and heads of Governments.

The principal military commands of NATO are Allied Command Europe (ACE), Allied Command Atlantic (ACLANT), and Allied Command Channel (ACCHAN).

The NATO European and Atlantic Commands participate in the Joint Strategic Planning System at Omaha, Nebraska, but there is no Alliance command specifically covering strategic nuclear forces. The United States has, however, committed a small number of ballistic-missile submarines (and Britain all hers) to the planning control of SACEUR and a larger number to SACLANT.

The Supreme Allied Commander Europe (SACEUR) and the Supreme Allied Commander Atlantic (SACLANT) have always been American officers and the Commander-in-Chief Channel (CINCCCHAN), Deputy SACEUR, and Deputy SACLANT British (a second Deputy SACEUR is to be appointed, who will be German). SACEUR is also Commander-in-Chief of the United States Forces in Europe.

(I) ALLIED COMMAND EUROPE (ACE) has its headquarters, known as SHAPE (Supreme Headquarters, Allied Powers in Europe), at Casteau, near Mons, in Belgium. It is responsible for the defence of all NATO territory in Europe except Britain, France, Iceland, and Portugal, and for that of all Turkey. It also has general responsibility for the air defence of Britain.

The European Command has some 7,000 tactical nuclear warheads in its area. The number of delivery vehicles (aircraft, missiles, and howitzers) is more than 3,000, spread among all countries excluding Luxembourg. The nuclear explosives, however, are maintained in American custody, with the exception of certain British weapons (there are also



US-built HAWK surface-to-air missiles, effective at altitudes from 30 to 11,000 meters, are used by seven NATO military forces.

French nuclear weapons in France). There is a large number of low-yield weapons, but the average yield of bombs is about 100 kilotons, and of missile warheads, 20 kilotons.

About 66 division equivalents are available to SACEUR in peacetime. The Command has some 3,100 tactical aircraft, based on about 200 standard NATO airfields, backed up by a system of jointly financed storage depots, fuel pipelines, and signal communications. Most land and air forces stationed in the Command are assigned to SACEUR, while naval forces are normally earmarked.

The 2nd French Corps of two divisions (which is not integrated in NATO forces) is stationed in Germany under a status agreement reached between the French and German

Governments. Co-operation with NATO forces and commands has been agreed between the commanders concerned.

The following Commands are subordinate to Allied Command Europe:

(a) *Allied Forces Central Europe* (AFCENT) has command of both the land forces and the air forces in the Central European Sector. Its headquarters are at Brunssum in the Netherlands, and its Commander (CINCENT) is a German general.

The forces of the Central European Command include 26 divisions, assigned by Belgium, Britain, Canada, West Germany, the Netherlands, and the United States, and about 1,400 tactical aircraft.

The Command is sub-divided into Northern Army Group (NORTHAG) and Central Army Group (CENTAG). NORTHAG, responsible for the defence of the sector north of the Göttingen-Liège axis, includes the Belgian, British, and Dutch divisions and four German divisions and is supported by 2nd Allied Tactical Air Force (ATAF), composed of Belgian, British, Dutch, and German units. (One newly-formed American brigade is being stationed in the NORTHAG area.) American forces, seven German divisions, and the Canadian battle group are under CENTAG, supported by the 4th ATAF, which includes American, German, and Canadian units and an American Army Air Defense Command. Allied Air Force, Central Europe (AIRCENT) was set up in 1974 to provide centralized control of air forces in the sector.

(b) *Allied Forces Northern Europe* (AFNORTH) has its headquarters at Kolsaas, Norway, and is responsible for the defence of Denmark, Norway, Schleswig-Holstein, and the Baltic Approaches. The commander (CINCNORTH) has always been a British general. Most of the Danish and Norwegian land, sea, and tactical air forces are earmarked for it, and most of their active reserves assigned to it. Germany has assigned one division, two combat air wings, and her Baltic fleet. Apart from exercises and some small units, US naval forces do not normally operate in this area.

(c) *Allied Forces Southern Europe* (AFSOUTH) has its headquarters at Naples, and its commander (CINCSOUTH) has always been an American admiral. It is responsible for the defence of Italy, Greece, and Turkey and for safeguarding communications in the Mediterranean and the Turkish territorial waters of the Black Sea. The formations in the area include 22 divisions from Turkey, 13 from Greece, and 8 from Italy, as well as the tactical air forces of these countries. Other formations have been earmarked for AFSOUTH, as have the United States Sixth Fleet and naval forces from Italy. The ground-defence system is based upon two separate commands; the Southern, comprising Italy and the approaches to it, under an Italian commander, and the South-Eastern, comprising Greece and Turkey, under an American commander. There is, however, an overall air command (AIRSOUTH), and there are two naval commands (NAVSOUTH and STRIKEFORSOUTH), responsible to AFSOUTH, all with headquarters in Naples.

A maritime air patrol unit with aircraft from Southern Region nations, Britain, and the United States operates in the Mediterranean, co-ordinated by Maritime Air Forces Mediterranean (MARAI RMED), a functional command of NAVSOUTH. French aircraft participate. The MARAI RMED commander is an American rear-admiral.

The Allied Naval On-Call Force for the Mediterranean (NAVOCFORMED) has consisted of at least five destroyers, contributed by Southern Region nations, Britain, and the United States, and three smaller ships provided according to the area of operation.

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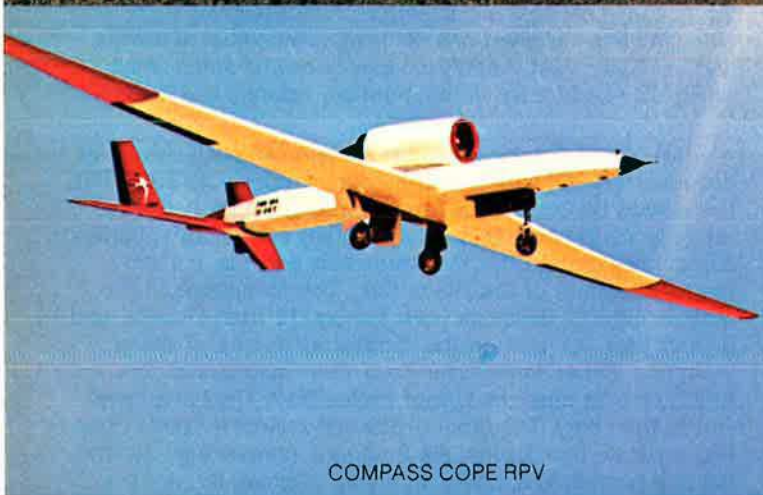
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(d) *United Kingdom Air Forces* (UKAIR) has its headquarters at High Wycombe, England.

(e) *ACE Mobile Force* (AMF), with headquarters at Seckenheim, Germany, has been formed with particular reference to the northern and south-eastern flanks. Formed by seven countries, it comprises seven infantry battalion groups, an armoured reconnaissance squadron, six artillery batteries, helicopter detachments, and ground-support fighter squadrons, but has no air transport of its own.

(II) *ALLIED COMMAND ATLANTIC* (ACLANT) has its headquarters at Norfolk, Virginia, and is responsible for the North Atlantic area from the North Pole to the Tropic of Cancer, including Portuguese coastal waters. The commander is an American admiral.

In the event of war, its duties are to participate in the strategic strike and to protect sea communications. There are no forces assigned to the command in peacetime except *Standing Naval Force Atlantic* (STANAVFORLANT), which normally consists, at any one time, of four destroyer-type ships. However, for training purposes and in the event of war,

forces which are predominantly naval are earmarked for assignment by Britain, Canada, Denmark, Germany, the Netherlands, Portugal, and the United States. There are six subordinate commands: *Western Atlantic*, *Eastern Atlantic*, *Iberian Atlantic*, *Striking Fleet Atlantic*, *Submarine Command* and *STANAVFORLANT*. The nucleus of the *Striking Fleet Atlantic* has been provided by the United States 2nd Fleet with some five attack carriers; carrier-based aircraft share the nuclear strike role with missile-firing submarines.

(III) *ALLIED COMMAND CHANNEL* (ACCHAN) has its headquarters at Northwood, near London. The commander (CINCCCHAN) is a British admiral. The wartime role of Channel Command is to exercise control of the English Channel and the southern North Sea. Many of the smaller warships of Belgium, Britain, and the Netherlands are earmarked for this Command, as are some maritime aircraft. There are arrangements for co-operation with French naval forces. A *Standing Naval Force, Channel* (STANAVFORCHAN) was formed in 1973 to consist of mine counter-measures ships from Belgium, Germany, the Netherlands, and Britain; other interested nations might participate on a temporary basis.

BELGIUM

Population: 9,919,000.
Military service: 8 or 10 months. (Conscripts serve 8 months if posted to Germany, 10 months if serving in Belgium.)
Total armed forces: 85,650 (26,850 conscripts).
Estimated GNP 1976: \$66.5 bn.
Defence expenditure 1977: 66.47 bn francs (\$1.82 bn).
\$1 = 36.6 francs (1977), 39.0 francs (1976).

Army: 62,050, incl Medical Service and 22,700 conscripts.
1 armd bde.
3 mech inf bdes.
3 recce bns.
2 mot inf bns.
1 para-cdo regt.
3 arty bns.
2 SSM bns with 8 *Honest John*.
2 SAM bns with 24 *HAWK*.
5 engr bns (3 fd, 1 bridge, 1 eqpt).
4 aviation sqns.
334 *Leopard*, 74 *M-47* med, 136 *Scorpion*, 60 *M-41* lt tks; 154 *Scimitar* AFV; 1,236 *M-75*, *AMX*, and 73 *Spartan* APC; 22 105mm, 15 203mm how; 96 *M-108* 105mm, 25 *M-44*, 41 *M-109* 155mm, 11 *M-110* 203mm SP how; 12 *Honest John* SSM (being replaced by *Lance*); 80 *JPK C-80* SP ATK guns; *ENTAC*, *Milan* ATGW; 41 *Striker* AFV with *Swingfire* ATGW; 119 20mm, 40mm, 57mm AA guns; 60 *HAWK* SAM; 6 *Piper Super Cub*, 12 *BN Islander* ac, 74 *Alouette II* hel; 38 *Epervier* RPV. (193 *Spartan* APC, 55 *Gepard* SP AA guns, 5 *Lance* SSM on order.)

Deployment: Germany: 27,000; 1 corps HQ, 2 div HQ, 1 armd bde, 2 mech inf bdes.

Reserves: 50,000: 10,000 train every year, 1 mech, 1 mot inf bde train every two years.

Navy: 4,200 (950 conscripts).
2 frigates with *Sea Sparrow* SAM, *Exocet* SSM (2 building).
6 ocean minesweepers, 2 minehunters (ex-US).
9 coastal minesweepers/minehunters.
12 inshore minesweepers.
2 log support and cmd ships (for MCM).
6 river patrol boats.
1 *HSS-1*, 3 *Alouette III* hel.

Reserves: 5,500.

Air Force: 19,400 (3,200 conscripts); 144 combat aircraft.
2 FB sqns with 36 *F-104G*.
3 FB sqns with 54 *Mirage VBA/BD*.
2 AWX sqns with 36 *F-104G*.
1 recce sqn with 18 *Mirage VBR*.
2 tpt sqns with 12 *C-130H*, 3 *HS-748*, 6 *Merlin IIIAS*, 2 *Falcon 20*, 2 *Boeing 727-QC*.
1 SAR sqn with 4 *HSS-1*, 5 *Sea King* 48 hel.
18 *Magister*, 34 *SF-260*, 15 *T-33* trainers.
8 SAM sqns with 21 *Nike Hercules*.
(116 *F-16*, 33 *AlphaJet* ac, 40 *BDX* APC on order.)

Para-Military Forces: 16,000 *Gendarmerie* with 62 FN armd cars, 5 *Alouette II*, 3 *Puma* hel.

Estimated GNP 1976: \$224.5 bn.
Defence expenditure 1977-78: £6.33 bn (\$10.88 bn).
\$1 = £0.582 (1977), £0.544 (1976).

Strategic forces:

SLBM: 4 SSBN, each with 16 *Polaris A-3* missiles.
Ballistic Missile Early Warning System (BMEWS) station at Fylingdales.

Army: 175,250 (5,800 women and 7,900 enlisted outside Britain).
14 armd regts (3 converting to armd recce)
5 armd recce regts.
47 inf bns.
3 para bns (1 in para role).
5 Gurkha bns.
1 special air service (SAS) regt.
1 msl regt with *Lance* SSM.
3 AD regts with *Rapier* SAM.
1 hy, 13 field, 1 GW, 1 cdo, 1 locating arty regts.
10 engr regts.
6 army aviation regts.
910 *Chieftain* med, 271 *FV101 Scorpion* l tks; 243 *Saladin* armd cars; 290 *Scimitar*, 178 *FV438/FV712* AFV; 1,804 *Ferret*, 125

BRITAIN

Population: 56,600,000.
Military service: voluntary.
Total armed forces: 339,150 (14,500 women and 8,800 enlisted outside Britain).



The Anglo-French Jaguar, a light tactical-support aircraft, has been operational since late 1973. The RAF and French Air Force each plan to have eight Jaguar squadrons.

Fox scout cars; 2,338 FV432, 600 Saracen, 60 Spartan APC; 92 105mm pack how and lt guns; 155 Abbot 105mm, 50 M-109 155mm, 31 M-107 175mm, 16 M-110 203mm SP guns/how; Lance SSM; 84mm Carl Gustav, 120mm RCL; Vigilant, Swing-fire ATGW; FV102 Striker with ATGW; L/70 40mm AA guns; Blowpipe, Rapier/Blindfire, Thunderbird SAM; 30 Beaver lt ac; 113 Scout, 8 Alouette II, 118 Sioux, 145 Gazelle hel. (Lance SSM, FH70 155mm guns, Milan ATGW, 100 Lynx, 13 Gazelle hel on order.)

Deployment and Organization:

The army organization is being changed, eliminating the brigade. BAOR is to have 1 Corps HQ, 4 armd, 1 arty divs., and a new inf formation (5th Field Force). By April 1978 UKLF (excluding Northern Ireland) will consist of 6th, 7th, and 8th Field Forces. Units in Hong Kong form the Gurkha Field Force and those in Berlin the Berlin Field Force.

United Kingdom: United Kingdom Land Forces (UKLF): United Kingdom Mobile Force (UKMF): 1 div of 2 bdes (to become 6th Field Force with 5 inf bns by April 1978); 1 para bde (to become 7th Field Force, with regular and TAVR units, by April 1978); 8th Field Force (regular and TAVR for Home Defence); 1 bn gp (for ACE Mobile Force (Land)); 1 SAS regt less one sqn; 1 Gurkha inf bn. HQ Northern Ireland: 3 inf bde HQ, 1 armd recce regt and 3 sqns, a variable number of major units in inf role (some nine drawn from BAOR on short tours), 1 SAS, 3 engr, 2 army aviation sqns.

Germany: British Army of the Rhine (BAOR): 55,000; 1 corps HQ, 1 armd div, 2 div HQ, 4 armd bdes, 1 field force, 2 arty bdes. Berlin: 3,000; Berlin Field Force.

Brunei: 1 Gurkha bn.

Hong Kong: 7,500; Gurkha Field Force with 1 British, 3 Gurkha inf bns, 1 engr sqn, and support units.

Cyprus: 1 inf bn less 2 coys, 1 armd recce sqn, 1 flt of hel, and log support with UNFICYP; 1 inf bn plus 2 inf coys, 1 armd recce sqn in garrison at Sovereign Base Areas.

Oman: Trg team and engr det.

Gibraltar: 1 inf bn.

Belize: 1 reinforced inf bn gp with hel.

Reserves: 110,000 Regular reserves. 60,100 Territorial Army and Volunteer Reserve (TAVR): 2 armd recce regts, 38 inf bns, 2 SAS, 2 med, 3 lt AD, 7 engr regts. 7,600 Ulster Defence Regiment: 11 bns.

Navy: 76,700, incl Fleet Air Arm, Royal Marines, 3,950 women, and 500 enlisted outside Britain; 75 major combat surface vessels.

Submarines, attack:

9 nuclear, 18 diesel.

Surface ships:

1 aircraft carrier (30 ac, 6 hel).
2 ASW carriers with Seacat SAM, 9 hel.
2 assault ships with Seacat SAM (1 trg).
2 cruisers each with 4 Sea King hel, Seacat SAM.
11 destroyers (7 County-class with Seaslug, Seacat SAM, ASW hel, 4 with Exocet SSM; 1 Type 82 with Sea Dart SAM, Ikara ASW; 3 Type 42 with Sea Dart SAM, ASW hel).

57 frigates: 48 GP (48 with 1 hel, most with Seacat SAM, 8 with Ikara ASW, 1 with Exocet SSM, 1 with Seawolf SAM), 3 ASW (1 trg), 2 AA, 3 aircraft direction (2 with Seacat), 1 trg.

38 coastal minesweepers/minehunters (4 trg).

5 inshore minesweepers (trg).

5 coastal patrol, 4 FPB, seaward defence boats (trg).

2 offshore patrol vessels.

12 survey, 1 ice patrol, 1 Royal Yacht/hospital, 6 depot/support ships.

6 landing ships (log), 41 landing craft.

2 hovercraft (SRN-6, BH-N7).

Included above are 4 nuclear, 3 diesel subs, 1 ASW carrier, 1 assault ship, 2 destroyers, 13 frigates, 4 minesweepers in reserve or undergoing refit. (2 ASW cruisers, 3 SSN, 6 destroyers, 6 frigates, 1 FPB, 1 MCM, 3 offshore patrol vessels building; Sub-Harpoon, Sea Skua ASM on order.)

The Fleet Air Arm:

1 strike sqn with 14 Buccaneer S2 (Martel ASM).

1 FGA sqn with 12 Phantom FG1.

1 AEW sqn and 1 flt with 7 Gannet AEW3.

7 ASW hel sqns embarked: 5 with 29 Sea King, 1 of 40 Wasp flts, 1 of 7 Wessex 3 flts.

2 cdo assault sqns with 16 Wessex 5.

4 SAR flts with Wessex HAS-1.

1 utility hel sqn with Wessex 5.

4 trg sqns with Sea King, Wasp, Wessex 3/5, Gazelle, and Lynx.

(25 Sea Harrier VTOL ac, 21 Sea King, 60 Lynx hel on order.)

The Royal Marines: 7,700.

1 cdo bde with 4 cdo gps, 1 lt hel sqn, spt units.

120mm RCL; SS-11 ATGW; Scout, Gazelle hel. (Milan ATGW, Blowpipe SAM on order.)

Deployment:

Malta: 1 indep cdo coy gp (to be withdrawn by April 1979).

Falkland Islands: 1 det.

Reserves (naval and Marines): 30,600 regular and 6,700 volunteers.

Air Force: 87,200 (4,750 women and 300 enlisted outside Britain); about 550 combat aircraft.

6 strike sqns with 50 Vulcan B2.

4 strike sqns with 56 Buccaneer S2.

3 close support sqns with 48 Harrier GR3.

6 attack and close support sqns with 72 Jaguar GR1.

9 interceptor sqns: 2 with 24 Lightning F6, 7 with 84 Phantom FG1/FGR2.

5 recce sqns: 1 with 10 Vulcan SR2, 2 with 24 Jaguar GR1, 2 with 24 Canberra PR7/9.

1 AEW sqn with 12 Shackleton (being replaced by Nimrod).

5 MR sqns with 43 Nimrod MR1.

1 ECM sqn with 3 Nimrod SR1, 4 Canberra B6.

2 tanker sqns with 24 Victor K2.

1 strategic tpt sqn with 11 VC-10.

4 tac tpt sqns with 45 C-130.

3 lt comms sqns with HS-125, Andover, Pembroke, Devon, Whirlwind hel.

Operational conversion units with some 90 combat aircraft, incl Vulcan, Buccaneer, Canberra, Phantom, Jaguar, Lightning, Harrier, Nimrod; trg units with Hunter, Hawk, Gnat, Bulldog, Jet Provost, C-130 ac, Wessex, Whirlwind, Puma, Gazelle hel.
8 hel sqns: 2 tac tpt with 26 Puma HC-1, 3 with 45 Wessex HC-2, 3 SAR with Whirlwind HAR-10.

2 SAM sqns with Bloodhound.

(Jaguar, 24 Harrier FGA, 11 Nimrod AEW, 175 Hawk, Bulldog trg ac, Sidewinder AAM on order.)

Royal Air Force Regiment:

7 fd and AD sqns: 5 with Rapier SAM, 2 with L/70 40mm AA guns.

1 flt with Tigercat SAM.

Deployment:

The Royal Air Force includes an operational home command (Strike Command), responsible for the UK Air Defence Region and the Near and Far East, and 1 overseas command (RAF Germany: 8,600). Sqns are deployed overseas as follows:

Germany: 2 Phantom FGR2, 2 Buccaneer, 5 Jaguar, 2 Harrier, 1 Wessex, 1 Bloodhound, 4 Rapier, 1 fd sqn RAF Regt.

Gibraltar: Hunter det.

Cyprus: 1 Whirlwind (4 ac with UNFICYP); periodic dets of other ac; 1 sqn RAF Regt.

Malta: 1 Nimrod, 1 Canberra PR7 (to be withdrawn 1979).

Hong Kong: 1 Wessex; 1 RAF Regt det.

Belize: 6 Harrier FGA ac, Puma hel, RAF Regt det.

Reserves: 33,300 regular; about 300 volunteer.

CANADA

Population: 23,370,000.

Military service: voluntary.

Total armed forces: 80,000 (2,700 women).

Estimated GNP 1976: \$US 175.3 bn.

Defence Expenditure 1977-78: \$Can 3.79 bn (\$US 3.61 bn).

\$US1 = \$Can 1.05 (1977), \$Can 0.98 (1976).

Army: (Land Forces): 28,500. (The Canadian Armed Forces were unified in 1968; the strengths shown here for army, naval, and air forces are only approximate.)

Mobile Command (About 17,700 land and air. Mobile Command commands army combat forces, and Maritime Command all naval forces. Air Command commands all air forces but Maritime Command has operational control of maritime air forces, and HQ 4 ATAF in Europe operational control of 1 CAG; Air Defence Group is part of NORAD. There are also a Communications Command and a Canadian Forces Training System.)

3 bde gps each comprising:

3 inf bns.

1 armd regt.

1 lt arty regt of 2 close support, 1 AD btys. support units.

1 special service force comprising:

1 armd regt.

1 inf bn.

1 AB regt.

1 arty regt of 2 close support btys. support units.

1 sigs regt.

32 Leopard (leased until tanks on order are delivered), 223 Centurion med tks; 121 Ferret scout cars, 174 Lynx AFV; 827 M-113 APC; 58 105mm pack, 159 105mm how, 50 M-109 155mm SP how; 810 Carl Gustav RL; TOW ATGW; CL-89 drones; 57 40mm AA guns; 103 Blowpipe SAM. (128 Leopard med tks, 152 Mowag armd cars, 180 Mowag APC, TOW on order.)

Deployment:

Europe: One mech bde gp of 2,800 with 32 Leopard A2 med tks, 375 M-113 APC/recce, 18 M-109 155mm SP how. 14 CH-136 (Kiowa) hel.

Cyprus (UNFICYP): 505.

Egypt (UNEF): 871.

Syria (UNDOF): 164.

Other UN: 33.

Reserves: about 15,200 Militia; 99 combat arms units plus support units (all in Mobile Command).

Navy (Maritime): 13,400.

Maritime Command (about 9,000).

3 submarines (Oberon-class).

4 ASW hel destroyers each with 2 CH-124



This 175mm self-propelled gun, developed by the US Army, is used by the UK, Turkey, the Netherlands, and Germany. It fires only HE rounds and has a range of 32,700 meters.

(Sea King) hel and 2 Sea Sparrow SAM.
19 ASW frigates (8 with 1 CH-124 hel, 4 with ASROC, 3 in reserve).
3 support ships with 3 CH-124 hel.
6 coastal patrol trg ships.
5 reserve trg vessels.
1 hydrofoil (in reserve).

Deployment:

Atlantic: 3 subs, 13 surface (1 in reserve), 2 spt ships.
Pacific: 10 surface (2 in reserve), 1 spt ship.

Reserves: about 3,200.

Air Force (Air): 36,600; some 210 combat aircraft.

Air Command (22,800).

Air Defence Group:

- 4 main, 17 auxiliary sites of Distant Early Warning (DEW) Line.
- 24 long-range radar sites (Pine Tree Line).
- 3 AWX sqns with 48 CF-101 Voodoo.
- 1 ECM sqn with 9 CF-100 and 15 T-33.
- 1 trg sqn with 8 CF-101.

Air Transport Group:

- 4 tpt sqns: 2 with 24 C-130E/H, 1 with 5 CC-137 (Boeing 707), 1 with 7 Cosmopolitan, 7 Falcon 20.
- 4 tpt/SAR sqns with 14 CC-115 Buffalo, 8 CC-138 Twin Otter ac, 6 CH-113 Labrador, 8 CH-113A Voyageur hel.

Maritime Air Group:

- 4 maritime patrol sqns with 30 CP-107 Argus.
- 1 MR sqn with 26 CP-121 (Tracker).
- 2 ASW hel sqns with 26 CH-124 (Sea King).
- 2 sqns with 9 T-33, 3 CP-121 ac, 2 CH-135 (UH-1N) hel.
- 1 trg sqn with 2 CP-121 ac, 6 CH-124 hel.
- 1 proving and evaluation sqn with 2 CP-107. (18 CP-140 (Orion) on order.)

10 Tactical Air Group (10 TAG):

- 2 fighter sqns with 24 CF-5 (plus 25 in storage).
- 5 hel sqns with 30 CH-135, 36 CH-136 (Kiowa).
- 1 tpt sqn with 7 CH-147 hel.
- 1 Canadian Air Group (1 CAG):
- 3 fighter sqns with 48 CF-104D.
- 1 hel sqn with 12 CH-136.

Deployment:

Europe: 1 Canadian Air Group (1 CAG).

Reserves: 700. Air Reserve Group: 4 wings with Otter, Twin Otter, and Dakota.

DENMARK

Population: 5,091,000.
Military service: 9 months.

Total armed forces: 34,700 (12,270 conscripts).

Estimated GNP 1976: \$34.2 bn.

Defence expenditure 1977-78: kr 6.32 bn (\$1.08 bn).

\$1 = 5.85 kroner (1977), 6.05 kroner (1976).

Army: 21,800 (9,000 conscripts).

- 3 mech inf bdes, each with 1 tk, 2 mech, 1 arty bn, 1 recce sqn, 1 engr coy, spt units.
- 2 mech inf bdes, each with 1 tk, 2 mech, 1 arty bn, 1 engr coy, spt units.
- 1 indep recce bn.
- Some indep mot inf bns.

120 Leopard 1 (being delivered), 200 Centurion med, 48 M-41 lt tks; 630 M-113, 68 M-106 mortar-armed APC; 24 155mm guns; 144 105mm, 96 155mm, 12 203mm how (dual-capable; no nuclear warheads on Danish soil); 72 M-109 155mm SP how; 120mm mor; 252 106mm RCL; TOW ATGW; 224 L/60 and L/70 40mm AA guns; Redeye (Hamlet) SAM; 9 Saab T-17 lt ac; 12 Hughes OH-6A hel.

Deployment: Cyprus (UNFICYP): 360.

Reserves: 4,500 Augmentation Force, subject to immediate recall; 41,000 Field Army Reserve, comprising 12,000 Covering Force Reserve (to bring units to war strength and add 1 mech bn to each bde), and 29,000 other reserve units to provide combat and log support; 24,000 Regional Defence Force, with 21 inf, 7 arty bns, ATK sqns, support units; 54,400 Army Home Guard.

Navy: 5,800 (1,900 conscripts).

- 6 coastal submarines.
- 2 frigates with Sea Sparrow SAM.
- 5 fishery-protection frigates, each with 1 hel.
- 3 coastal escorts (corvettes).
- 10 FPB, 4 FPBG.
- 6 minelayers (2 coastal, 1 coastal on order).
- 8 coastal minesweepers.
- 23 large patrol craft.
- 8 Alouette III hel.
- (3 corvettes, 6 FPBG, Harpoon SSM on order.)

Reserves: 4,500, Navy Home Guard 4,800.

Air Force: 7,100 (1,370 conscripts); 116 combat aircraft.

- 1 FB sqn with 20 F-35XD Draken.
- 2 FB sqns with 40 F-100D/F.
- 2 interceptor sqns with 40 F-104G.
- 1 recce sqn with 16 RF-35XD Draken.
- 1 tpt sqn with 8 C-47, 3 C-130H.
- 1 SAR sqn with 8 S-61A hel.
- 23 Saab T-17 trainers.
- 8 SAM sqns: 4 with 36 Nike Hercules, 4 with

24 HAWK.
(58 F-16, 5 TF-35 on order.)

Reserves: 8,000; Air Force Home Guard 12,000.

FRANCE

Population: 53,777,000.

Military service: 12 months.

Total armed forces: 502,100 (273,600 conscripts).

Estimated GNP 1976: \$353.2 bn.

Defence expenditure 1977: fr 58.41 bn (\$11.72 bn).

\$1 = 4.98 francs (1977), 4.69 francs (1976).

Strategic Forces:

SLBM: 4 SSBN: 2 with 32 MSBS M-1, 1 with 16 M-2, 1 with 16 M-20 msls.

IRBM: 2 sqns, each with 9 SSBs S-2 msls.

Aircraft:

Bombers: 6 sqns with 32 Mirage IVA.

Tankers: 3 sqns with 11 KC-135F.

Reserve: 18 Mirage IVA bombers.

Reconnaissance: 4 Mirage IVA.

Army: 330,000, incl Army Aviation and 214,300 conscripts. (The army is being re-

organized to combine the Force de Manoeuvre and the DOT and to form 8 arm'd, 6 inf, 1 para, and 1 Alpine divs, plus corps troops incl 5 SSM and 4 SAM regts. An additional 14 divs will be formed on mobilization. The divisions will be smaller than now, arm'd divs consisting of 8,200 men, 2 tk, 2 mech inf, and 1 arty regts; inf divs having 6,500 men, 3 mo: inf, 1 arm'd car, and 1 arty regts.)

5 mech divs.

2 inf divs.

1 alpine div.

1 air-portable mot div (Marines).

1 para div of 2 bdes.

10 arm'd car regts.

1 mot inf regt.

2 para bns.

8 inf bns.

4 SSM regts with 24 Pluton.

3 SAM regts with 54 HAWK.

1,060 AMX-30 med, 1,120 AMX-13 lt tks some 950 AFV, incl 720 Panhard EBR hy and AML lt arm'd cars; 442 AMX-10, AMX-VCI APC; Model 56 105mm pack, 155mm how; AMX 105mm and 155mm SP how; Pluton SSM; 120mm mor; 105/6mm RCL; SS-11/-12, Milan, ENTAC ATGW; 40mm towed, 30mm SP AA guns; HAWK SAM. (HOT ATGW, Roland SAM on order.)

Army Aviation (ALAT): 5,500.

2 groups, 6 divisions, and 7 regional commands.

200 light fixed-wing aircraft.

190 Alouette II, 72 Alouette III, 150 SA-330 Puma, 140 SA-341 Gazelle hel (40 Gazelle on order).

Deployment and Organization (incl Navy and Air Force):

Manoeuvre Forces (Forces de Manoeuvre):

First Army: 140,000, 2 mech divs in Germany (48,000); 3 mech divs in support in France; Berlin: 2,000.

Territorial Defence Forces (Défense Opérationnelle du Territoire—DOT): about 52,000, incl 2 inf, 1 alpine divs, 8 indep inf, 1 mot inf, 2 arm'd car regts.

Strategic Reserve (Force d'Intervention): 1 para div (2 bdes); 1 air-portable mot div.

Overseas Commands:

There are six overseas commands (Antilles-Guyane, West Africa, Djibouti, South Indian Ocean, New Caledonia, Polynesia), an indep comd in the Ivory Coast, and a

naval comd. Some 22,000 from all services are deployed overseas (numbers can vary according to local circumstances); equipment includes: 130 AFV, 36 hel, 9 frigates, 2 FPB, 2 lt tpt ships, 12 combat and 16 tpt ac.

Reserves: about 400,000.

Navy: 68,500, incl Naval Air and 18,500 conscripts; 53 major surface combat vessels.

21 submarines.
2 lt attack aircraft carriers (each with 40 ac).
2 cruisers: 1 with *Exocet* SSM and *Masurca* SAM, 1 with 4 hy ASW hel.
20 destroyers: 2 with *Masurca* SAM and *Malaŕon* ASW msls, 3 with *Exocet* SAM and *Malaŕon*, 6 ASW with *Malaŕon*, 4 with *Tartar* SAM, 5 GP (1 with *Exocet* and ASW hel, 3 building).
22 frigates (11 building).
26 patrol craft.
6 FPBG.
38 ocean and coastal MCM.
2 landing ships, 5 LCT, 46 landing craft.

Naval Air Force: 13,000; 111 combat aircraft.
2 attack sqns with 24 *Etendard* IVM.
2 interceptor sqns with 20 F-8E(FN) *Crusader*.
2 ASW sqns with 24 *Alizé*.
4 MR sqns with 25 *Atlantic* and 10 SP-2H *Neptune*.
1 recce sqn with 8 *Etendard* IVP.
3 ASW hel sqns with 12 *Super Frelon*, 12 HSS-1, 8 *Alouette* III.
1 assault hel sqn with 12 HSS-1.
2 SAR sqns with 9 *Alouette* II, 11 *Alouette* III.
1 hel sqn with 4 *Alouette* II, 2 *Super Frelon*.
9 comms sqns with DC-6, C-47 ac, 16 HSS-1, *Alouette* II/III, *Super Frelon* hel.
3 trg sqns with Nord 262, C-47, Fouga CM-175, *Etendard*, *Alizé*, *Rallye*.
(36 *Super Etendard* fighters, 26 *Lynx* hel on order.)

Marines: 1 bn.

Reserves: about 50,000.

Air Force: 103,600 (40,800 conscripts); 557 combat aircraft.

Air Defence Command (CAFDA): 9,000.
8 interceptor sqns. 1 with 15 *Mirage* IIIC, 6 with 90 *Mirage* F1, 1 with 15 *Super Mystère* B2 (re-equipping with *Mirage* F1).

10 SAM bns with *Crotale*.
Automatic *STRIDA II* air-defence system.
Tactical Air Force (FATAC): 14,200.

16 FB sqns: 7 with 140 *Mirage* IIIE, 2 with 48 *Mirage* VF, 1 with 10 F-100D (to be replaced with *Jaguar* 1978), 6 with 120 *Jaguar* A/E.
2 lt bbr sqns with 16 *Vautour* IIB/N (being withdrawn).
3 recce sqns with 58 *Mirage* IIIR/RD.
2 OCU: 1 with 30 *Mirage* IIIB/BE/C, 1 with 15 *Jaguar* A/E.

Air Transport Command (COTAM): 7,400.

7 tac tpt sqns: 3 with 47 *Transall* C-160, 4 with 72 *Noratlant*.
4 tpt sqns with 5 DC-8F, 18 *Frégate*, 8 *Mystère* 10/20, 1 *Caravelle* ac, 3 *Alouette* II, 2 *Puma* hel.
1 liaison sqn with 24 *Paris*, 12 *Broussard*, 1 *Rallye*.
6 hel sqns with 130 *Alouette* II/III, 20 *Puma* hel.

Training Command (CEAA): Some 700 aircraft, incl 300 *Magister*, T-33, *Mystère* IV, 34 *Flamant*, *Noratlant*.

Para-Military Forces: 76,200 Gendarmerie (4,700 conscripts).

GERMANY: FEDERAL REPUBLIC OF

Population: 63,160,000 (incl West Berlin).
Military service: 15 months.
Total armed forces: 489,000 (235,000 conscripts).
Estimated GDP 1976: \$449.1 bn.
Defence expenditure 1977: DM 32.9 bn (\$13.76 bn)
\$1 = DM 2.39 (1977), DM 2.53 (1976).

Army: 341,000 (180,000 conscripts). (The army is being reorganized to form 16 armd bdes (each with 3 tk, 1 armd inf, 1 armd arty bns), 17 armd inf/Jäger bdes (each with 2 tk, 2 armd inf, 1 Jäger, 1 armd arty bns), and 3 AB bdes.)

16 armd bdes (2 tk, 1 armd inf, 1 armd arty bns).
12 armd inf bdes (1 tk, 2 armd inf, 1 armd arty bns).
3 mot inf bdes.
2 mountain bdes.
3 AB bdes.

(Organized in 3 corps: 12 divs (4 armd, 4 armd inf, 2 Jäger, 1 mountain, 1 AB)).

15 SSM bns: 11 with *Honest John*, 4 with *Lance*.

3 army aviation comds, each with 1 lt, 1 med tpt regt.

Territorial Army: peacetime strength 63,000, incl 30,000 conscripts; mobilization strength 504,000. 3 Territorial Commands

of 5 Military Districts; 6 Home Defence bde-sized units being formed. In support are 4 service support comds, 1 sig bde, 2 sig, 2 engr regts. The Territorial Army provides defensive, comms, police, and service units on mobilization.

1,400 M-48A2, 2,437 *Leopard* 1 med tks; 500 SPZ HS-30, 1,100 *Hotchkiss*, 2,136 *Marder* MICV; 300 SPZ-2 recce; 3,700 M-113 APC; 280 105mm, 80 155mm how; 600 155mm, 150 175mm towed, 80 203mm SP gun/how; 210 LARS 110mm multiple RL; 70 *Honest John*, 20 *Sergeant*, 26 *Lance* SSM; 770 JPZ 4-5 SP ATK guns; 106mm RCL; *Cobra*, *Milan*, *TOW*, *HOT* ATGW; 350 RJPZ-2 SP ATGW; 2,000 20mm, 800 40mm towed, 150 *Gepard* 30mm SP AA guns; 1,400 *Redeye* SAM; 18 Do-27, 35 OV-10Z ac; 200 UH-1D, 240 *Alouette* II/III, 110 CH-53G hel; CL-89 drones. (1,000 *Leopard* 2 tks, 500 M-113 APC, 2,500 ATGW, 300 *Gepard* SP AA, 143 *Roland* II SAM on order.)

Reserves: 1,056,000; 615,000 field army, 441,000 Territorial Army.

Navy: 38,000, incl Naval Air Arm and 11,000 conscripts.

24 coastal submarines.
3 GW destroyers.
14 destroyers/escorts.
5 ASW coastal escorts.
11 fast combat spt ships.
57 MCM ships (18 coastal, 21 fast, 18 in-shore)



The European NATO allies have a total of some 130 submarines, many of them, however, suitable only for coastal patrol. At top is a Dutch sub. Air forces of NATO allies operate nearly 400 F-5 and RF-5 aircraft. Those shown here, lower photo, belong to one of Norway's three F-5 tactical fighter squadrons.

10 FPB, 30 FPBG with *Exocet* SSM.
18 landing craft.
(150 *Exocet* SSM on order.)

Naval Air Arm: 6,000; 139 combat aircraft.
3 FB sqns with 96 F-104G.
1 recce sqn with 25 RF-104G.
2 MR sqns with 18 *Atlantic*.
1 SAR hel sqn with 21 *Sea King* Mk 41.
2 utility sqns with 27 Do-28 ac, 15 H-34G hel.

Reserves: 23,500.

Air Force: 110,000 (44,000 conscripts); 509 combat aircraft.
16 FGA sqns: 4 with 60 F-4F, 8 with 144 F-104G; 4 with 84 G-91 (to be replaced by *AlphaJet*).
4 AWX sqns with 60 F-4F.
4 recce sqns with 88 RF-4E.
2 OCU with 18 TF-104G, 55 G-91T.
5 tpt sqns with 89 Transall C-160.
4 hel sqns with 117 UH-1D.
8 SSM sqns with 72 *Pershing*.
24 SAM btys with 216 *Nike Hercules*.
36 SAM btys with 216 *HAWK*.
4 aircraft control and warning regts.
Other ac: 4 Boeing 707, 3 C-140, 9 HFB-320, 3 VFW-614, 9 *Pembroke*, 2 C-47, 5 *Noratlas*, 121 Do-28D, (10 F-4F, 175 *AlphaJet* FGA, 3 AB-212 hel on order.)

Reserves: 100,000.

Para-Military Forces: 20,000 Border Police.

GREECE

Population: 9,095,000.
Military service: 28-30 months.
Total armed forces: 200,000 (148,000 conscripts).
Estimated GNP 1976: \$22.76 bn.
Defence expenditure 1977: 41.05 bn drachmas (\$1.10 bn).
\$1 = 37.3 drachmas (1977), 36.5 drachmas (1976).

Army: 160,000 (123,000 conscripts).
1 armd div.
11 inf divs.
1 armd bde.
1 para-cdo bde.
1 marine inf bde.
2 SSM bns with 8 *Honest John*.
1 SAM bn with 12 *HAWK*.
12 arty bns.
14 army aviation coys.
275 M-47, 650 M-48, 75 AMX-30 med, 170 M-24 lt tks; 180 M-8 armd cars; 450 M-59, 500 M-113, Mowag APC; 100 75mm pack, 80 105mm, 240 155mm how; 105mm, 155mm, 175mm, 203mm SP gun/how; *Honest John* SSM; 550 106mm RCL; SS-11, *TOW*, 7 *Milan* ATGW; 40mm, 75mm, 90mm AA guns; *HAWK* SAM; 2 *Aero Commander*, 25 U-17, 28 L-21 ac; 5 Bell 47B, 25 UH-1D, 42 AB-204/-205 hel. (95 AMX-30 med tks on order.)

Reserves: about 270,000.

Navy: 17,500 (11,000 conscripts).
6 submarines (2 ex-US *Guppy*, 4 Type 209, 3 on order).
11 destroyers.
4 destroyer escorts.
9 FPBG, 7 with *Exocet* SSM (1 more on order), 2 with SS-12 SSM (6 with *Penguin* SSM on order).
9 fast torpedo boats.
2 large, 4 small patrol craft.
2 coastal minelayers.
14 coastal minesweepers.
14 landing ships (8 LST, 5 med, 1 dock).

6 landing craft.
1 sqn with 5 *Alouette* III hel.
(7 destroyers, 2 LST, *Exocet* SSM on order.)

Reserves: about 20,000.

Air Force: 22,500 (14,000 conscripts); 235 combat aircraft.
6 FGA sqns: 2 with 37 F-4E, 3 with 60 A-7H, 1 with 15 F-104G.
5 interceptor sqns: 2 with 40 F-5A, 1 with 15 F/TF-104G, 2 with 40 *Mirage* F1CG.
1 recce sqn with 20 RF-5A.
1 MR sqn with 8 HU-16B *Albatross*.
2 tpt sqns with 28 C-47, 12 C-130H, 1 *Gullstream*, 5 CL-215.
3 hel sqns with 14 AB-205, 2 AB-206, 10 Bell 47G, 12 SH-19D.
Trainers incl 60 T-33A, 20 T-41D, 18 T-37B, 8 F-5B, 40 T-2E.
1 SAM bn with *Nike Hercules*.
(18 F-4E FGA, 300 *Sidewinder* AAM on order.)

Reserves: about 20,000.

Para-Military Forces: 28,000 Gendarmerie, 90,000 National Guard.

ITALY

Population: 56,700,000.
Military service: Army and Air Force 12 months, Navy 18 months.
Total armed forces: 330,000 (211,000 conscripts).
Estimated GNP 1976: \$161.6 bn.
Defence expenditure 1977: 4,117 bn lire (\$4.64 bn).
\$1 = 888 lire (1977), 852 lire (1976).

Army: 218,000 (163,000 conscripts).
3 corps, each of 1 armd, 3 mech divs.
1 indep mech bde.
5 indep mot bdes.
5 alpine bdes.
1 AB bde.
2 amph bns.
1 msl bde with 1 *Lance* SSM, 4 *HAWK* SAM bns.
700 M-47, 200 M-60, 600 *Leopard* med tks; 30 Fiat 6616 armd cars; 4,000 M-106, M-113, M-548, M-577 APC; 1,500 guns/how, incl 105mm (incl Model 56 pack), 155mm, 203mm; 369 SP guns/how; incl M-109 155mm, M-107 175mm; 120mm mor; *Lance* SSM; 57mm, 106mm RCL; *Mosquito*, *Cobra*, SS-11, *TOW* ATGW; 40mm AA guns; *Indigo*, *HAWK* SAM. (267 M-113, 208 M-548 APC, 36 M-109 SP how, CL-89 drones on order.)

Army Aviation: 20 units with 40 L-19, 39, L-21, 80 SM-1019 lt ac; hel incl 70 AB-47G/J, 36 AB-204B, 99 AB-205A, 141 AB-206A/A-1, 26 CH-47C. (5 A-109 hel on order.)

Reserves: 550,000.

Navy: 42,000, incl air arm, 1,700 Marines, and 24,000 conscripts.
8 submarines (4 more building).
1 hel cruiser with 9 AB-204B ASW hel, 1 *Terrier*/ASROC.
6 GW destroyers (2 with 4 ASW hel, *Terrier* SAM; 2 with 2 ASW hel, *Tartar* SAM; 2 with 1 ASW hel, *Tartar* SAM).
12 destroyers/escorts.
8 coastal escorts.
4 ocean, 30 coastal, 10 inshore minesweepers.
5 FPBG, 1 hydrofoil with *Otomat* SSM (6 hydrofoils building).
2 landing ships, 57 landing craft.
1 Marine inf bn with LVTP-7 APC.

Naval Air Arm:
2 ASW hel sqns with 24 SH-3D, 30 AB-204/-212, 2 S-61.

Reserves: 115,800.

Air Force: 70,000 (24,000 conscripts); 336 combat aircraft.
6 FGA sqns: 1 with 18 F-104G, 3 with 54 F/RF-104S/G, 2 with 36 G-91Y.
3 lt attack/recce sqns with 54 G-91R.
6 AWX sqns with 72 F-104S.
3 recce sqns with 54 F/RF-104S/G.
3 MR sqns: 2 with 14 *Atlantic*, 1 with 8 S-2 *Tracker*.
1 ECM recce sqn with 6 PD-808.
3 tpt sqns: 2 with 28 C-119 (being replaced by G-222), 1 with 12 C-130H.
5 comms sqns with 50 P-166M, 40 SIAI-208M, 8 PD-808, 2 DC-9.
2 SAR sqns with 11 HU-16 ac, 15 AB-204 hel.
1 OCU with 20 TF-104G.
9 trg sqns with 75 G-91T, 100 MB-326, 51 P-166M ac, AB-47, AB-204 hel.
1 hel incl 40 AD-204D, 65 AB-47J.
8 SAM groups with *Nike Hercules*.
(44 G-222, 20 SF-260 ac, 20 HH-3F, 2 S-61 hel on order.)

Reserves: 29,000.

Para-Military Forces: 90,000 *Carabinieri*, incl 1 AB bn, with M-47 tks, M-113 APC, 72 hel; 72,000 Public Security Guard; 5,000 Finance Guards.

LUXEMBOURG

Population: 358,000.
Military service: voluntary.
Total armed forces: 625.
Estimated GDP 1976: \$2.42 bn.
Defence expenditure 1977: 921 m francs (\$25.16m).
\$1 = 36.6 francs (1977), 39.0 francs (1976).

Army: 625.
1 lt inf bn.
1 indep coy.
TOW ATGW.

Para-Military Forces: 430 Gendarmerie.

NETHERLANDS

Population: 13,948,000.
Military service: Army 14 months, Navy and Air Force 14-17 months.
Total armed forces: 109,700 (49,100 conscripts).
Estimated GNP 1976: \$85.1 bn.
Defence expenditure 1977: 8.37 bn guilders (\$3.36 bn).
\$1 = 2.49 guilders (1977), 2.71 guilders (1976).

Army: 75,000 (43,000 conscripts).
2 armd bdes.
4 mech inf bdes.
2 SSM bns with *Honest John*.
3 army aviation sqns (Air Force crews).
340 *Centurion*, 470 *Leopard* med, AMX-13 lt tks; 2,000 AMX-VCI, YP-408, and M-113 APC; 105mm, 155mm, 203mm how; AMX 105mm, M-109 155mm, 24 M-107 175mm, M-110 203mm SP gun/how; 107mm, 120mm mor; *Honest John* SSM; *LAW*, *Carl Gustav* 84mm, 106mm RCL; *TOW* ATGW; L/70 40mm AA guns; 60 *Alouette* III, 30 BO-105 hel. (2,000 YPR-765 APC, twin 35mm SP AA guns, *Lance* SSM on order.)

Deployment: Germany: 1 armd bde, 1 recce bn.

Reserves: 145,000; 1 armd, 2 inf bdes, and corps troops, incl 1 indep inf bde, would be completed by call-up of reservists. A number of inf bdes could be mobilized for territorial defence.

Navy: 17,000 (2,900 Marines, 1,900 naval air arm, 2,000 conscripts).
6 submarines.
2 GW destroyers with *Tartar/Sea Sparrow* SAM, *Harpoon* SSM, 1 lt ASW hel.
6 frigates with *Seacat* SAM and 1 lt ASW hel.
9 destroyers/escorts.
6 coastal escorts.
5 patrol vessels.
37 MCM ships (3 spt, 18 coastal, 16 in-shore).
2 fast combat spt ships.
(12 frigates on order.)

Marines:
2 amph combat gps.
1 mountain/arctic warfare coy.

Naval Air Arm:
2 MR sqns with 8 *Atlantic*, 15 P-2 *Neptune*.
2 ASW hel sqns with 7 *Lynx*, 12 *Wasp*.
(10 *Lynx* on order.)

Deployment: Netherlands Antilles: 1 destroyer, 1 amph combat det, 1 MR det (3 ac).

Reserves: about 20,000; 9,000 on immediate recall.

Air Force: 17,700 (4,100 conscripts); 162 combat aircraft.
2 FB sqns with 36 F-104G.
3 FB sqns with 54 NF-5A/B.
1 FB/trg sqn with 18 NF-5B.
2 interceptor sqns with 36 F-104G.
1 recce sqn with 18 RF-104G.
1 tpt sqn with 12 F-27.
4 SAM sqns with 16 *Nike Hercules*.
11 SAM sqns with 66 *HAWK*.
(84 F-16 fighters, 840 *Sidewinder* AAM on order.)

Reserves: about 11,500.

Para-Military Forces: 3,700 Gendarmerie; 4,000 Home Guard.

NORWAY

Population: 4,068,000.
Military service: Army 12 months, Navy and Air Force 15 months.
Total armed forces: 39,000 (25,000 conscripts).
Estimated GNP 1976: \$31.1 bn.
Defence expenditure 1977: 5.85 bn kroner (\$1.12 bn).
\$1 = 5.24 kroner (1977), 5.47 kroner (1976).

Army: 20,000 (16,000 conscripts).
1 bde gp of 3 inf bns in North Norway.
Indep armd sqns, inf bns, and arty regts.
78 *Leopard*, 38 M-48 med, 70 NM-116 lt tks (M-24/-90); M-113 APC; 250 105mm, 155mm how, 130 M-109 SP how; 107mm mor; 75mm, *Carl Gustav* 84mm, 106mm RCL; *ENTAC*, *TOW* ATGW; Rh-202 20mm, L/60, and L/70 40mm AA guns; 40 O-1E, L-18 lt ac.

Reserves: 120,000. 11 Regimental Combat Teams (bdes) of about 5,000 men each, supporting units, and territorial forces; 21 days' refresher training each 3rd/4th year.

Home Guard (all services) 80,000, mobilizable in 4 hours (all have done full initial service).

Navy: 9,000, incl 1,600 coastal artillery and 5,000 conscripts.
15 coastal submarines.
5 frigates/escorts with *Sea Sparrow* SAM and *Penguin* SSM.
2 coastal escorts.
20 FPB, 26 FPBG with *Penguin* SSM (14 on order).
10 coastal minesweepers, 5 minelayers (2 on order).
1 spt ship.
7 landing craft.
6 patrol ships (fishery protection, 7 on order).
36 coastal arty btys.

Reserves: 22,000. Coastguard will be established as part of navy.

Air Force: 10,000 (4,000 conscripts); 145 combat aircraft.
3 FGA sqns with 75 F-5A.
1 FGA sqn with 22 CF-104G.
1 AWX sqn with 16 F-104G.
1 recce sqn with 13 RF-5A.
1 MR sqn with 5 P-3B.
1 OCU with 14 F-5B.
2 tpt sqns: 1 with 6 C-130H, 1 with 5 DHC-6, 2 *Falcon* 20 ECM ac.
1 SAR sqn with 10 *Sea King* Mk 43 hel.
2 hel sqns with 32 UH-1B.
17 *Saab Safrir* trainers.
4 lt AA bns with L/70 40mm guns.
4 SAM btys with *Nike Hercules*.
(72 F-16 fighters, 40 *Roland II* SAM on order.)

Reserves: 18,000. 7 lt AA bns for airfield defence with L/60 40mm guns.

PORTUGAL

Population: 8,787,000.
Military service: Army 15-24 months.
Total armed forces: 58,800. (The three services are being reduced, the army to 26,000, the navy and air force to 8,000 each.)
Estimated GNP 1976: \$15.8 bn.
Defence expenditure 1977: 17.86 bn escudos (\$461 m).
\$1 = 38.7 escudos (1977), 30.0 escudos (1976).

Army: 36,000.
5 cav regts.
16 inf regts.
6 arty regts.
2 engr regts.
2 sigs regts.
100 M-47, 5 M-48 med, 10 M-24 lt tks; *Panhard* EBR armd cars; 40 *Chaimite* (*Com-mando*) APC; 10 25-pdr, 30 5.5-in. guns, 50 105mm guns/how; 105mm SP guns/how; 18 106mm RCL; SS-11 ATGW; coast and 40mm AA arty.

Navy: 12,800 (2,500 Marines).
3 submarines (*Daphne*-class).
7 frigates.
10 corvettes.
10 large, 8 coastal patrol craft.
7 coastal minesweepers (3 in reserve).
2 LCT, 8 landing craft.

Air Force: 10,000; 52 combat aircraft.
1 FGA sqn with 18 G-91.
1 interceptor sqn with 20 F-86F.
1 MR sqn with 8 P-2V5 *Neptune* (being phased out).
1 recce sqn with 6 CASA C-212 *Aviocar*.
20 CASA C-212 *Aviocar*, 2 C-130H, DC-6 tpt ac.

5 G-91T, 14 T-33, 24 T-37, 16 Do-27, 28 *Chipmunk*, 35 Reims-Cessna FTB 337G, 10 T-38 trainers.
34 *Alouette III*, 12 SA-330 *Puma* hel.
1 para regt of 1,200.

Para-Military Forces: 9,700 National Republican Guard, 13,700 Public Security Police, 6,500 Fiscal Guard.

TURKEY

Population: 41,093,000.
Military service: 20 months.
Total armed forces: 465,000 (310,000 conscripts).
Estimated GNP 1976: \$40.2 bn.
Defence expenditure 1977-78: 46.42 bn liras (\$2.65 bn).
\$1 = 17.5 liras (1977), 16.0 liras (1976).

Army: 375,000 (250,000 conscripts). (About half the divs and bdes are below strength.)
1 armd div.
2 mech inf divs.
14 inf divs.
5 armd bdes.
4 mech inf bdes.
5 inf bdes.
1 para bde.
1 cdo bde.
4 SSM bns with *Honest John*.
2,800 M-47 and M-48 med tks; 1,650 M-113, M-59, *Commando* APC; 1,500 75mm, 105mm, 155mm, and 203mm how; 265 105mm, 190 155mm, 36 175mm SP guns; 1,750 60mm, 81mm, 4.2-in. mor; 18 *Honest John* SSM; 1,200 57mm, 390 75mm, 800 106mm RCL; 85 *Cobra* ATGW; 900 40mm AA guns; 10 *Beaver*, 95 U-17, 3 *Cessna* 421, 7 Do-27, 18 Do-28 D-1, 20 *Beech Baron* ac; 100 AB-205/-206, 20 *Bell* 47G, 48 UH-1D hel. (193 *Leopard* tks; *TOW*, *Milan* ATGW; 56 AB-205 hel on order.)

Deployment: Cyprus: 2 inf divs.

Reserves: 700,000.

Navy: 43,000 (31,000 conscripts).
14 submarines (2 on order).
12 destroyers (5 ex-US *Gearing*, 5 *Fletcher*, 1 *Sumner*, 1 *R. H. Smith*-class).
2 frigates (with 1 hel).
14 FPB (14 on order), 6 FPBG (3 on order).
41 large, 4 coastal patrol craft.
21 coastal, 4 inshore minesweepers.
9 minelayers (6 coastal).
2 LST, 20 LCT, 36 landing craft.
1 MR sqn with 10 S-2E *Tracker* (2 trainers).
3 AB-205, 12 AB-212 ASW hel.
(6 AB-212 hel, 33 *Harpoon* SSM on order.)

Reserves: 25,000.

Air Force: 47,000 (29,000 conscripts); 319 combat aircraft.
14 FGA sqns: 2 with 40 F-4E, 4 with 70 F-5A, 2 with 34 F-104G, 2 with 40 F-104S, 3 with 54 F-100D/F, 1 with 20 F-100C.
1 interceptor sqn with 25 F/TF-102A.
2 recce sqns with 36 RF-5A.
4 tpt sqns with 7 C-130E, 20 *Transall* C-160, 30 C-47, 3 C-54, 3 *Viscount* 794, 2 *Islander*.
Hel incl 10 AB-204, 10 UH-1D, 10 H-19.
8 SAM sqns with *Nike Ajax/Hercules*.
Trainers incl 20 T-33A, 35 T-37, 18 T-34, 25 T-41, 35 F-100C, 13 F-5B, TF-102A, TF-104G, *Beech* AT-11, *Cessna* 421B.
(56 *AlphaJet* trainers on order.)

Para-Military Forces: 75,000 Gendarmerie (incl 3 mobile bdes).

The Military Balance 1977/78

Other European Countries

ALBANIA

Population: 2,650,000.
 Military service: Army 2 years; Air Force, Navy, and special units 3 years.
 Total armed forces: 45,000 (22,500 conscripts).
 Estimated GNP 1974: \$1.1 bn.
 Defence expenditure 1977: 805 m leks (\$137 m).
 \$1 = 5.88 leks.

Army: 34,000 (20,000 conscripts).

1 tk bde.
 9 inf bdes.
 2 tk bns.
 1 arty regt.
 2 AD regts.
 8 lt coastal arty bns.
 70 T-34, 15 T-54, 15 T-59 med tks; 20 BA-64, BTR-50/-152, K-63 APC; 76mm, 85mm, 122mm, 152mm guns/how; SU-76, SU-100 SP guns; 120mm mor; 107mm RCL; 57mm, 76mm, 85mm ATK guns; 37mm, 57mm, 85mm, 100mm AA guns; SA-2 SAM.

Navy: 3,000 (1,000 conscripts).

4 submarines (Soviet W-class, 1 trg).
 4 coastal escorts (*Kronstadt*-class).
 42 MTB (12 Soviet P-4, 30 *Hu Chwan* hydrofoils).
 4 *Shanghai*-class MGB.
 8 MCM ships (2 Soviet T-43-, 6 T-301-class).

10 patrol boats (Soviet PO-2).

Air Force: 8,000 (1,500 conscripts); 103 combat aircraft.

2 AWX sqns with 10 MiG-17/F-4, 13 MiG-19/F-6.
 6 interceptor sqns with 26 MiG-15/F-2, 10 MiG-17/F-4, 32 MiG-19/F-6, 12 MiG-21/F-8 (Chinese).
 1 tpt sqn with 4 Il-14.
 2 hel sqns with 30 Mi-4.
 Trainers incl 10 MiG-15UTI.

Reserves: (all services): 100,000.

Para-Military Forces: 13,000: Internal security force 5,000; frontier guard 8,000.

AUSTRIA

Population: 7,880,000.

Military service: 6 months, followed by 60 days' reservist training for 12 years.

Total armed forces: 37,300 (25,000 conscripts).

Estimated GNP 1976: \$39.8 bn.

Defence expenditure 1977: 9.05 bn schilling (\$534 m).

\$1 = 16.95 schilling (1977), 18.3 schilling (1976).

Army: 33,000 (23,000 conscripts).

1 mech div of 3 mech bdes, each with 1 tk,

1 mech inf, 1 armd arty bns, and/or 1 armd ATK bn.

3 inf bdes, each with 3 inf, 1 arty bns.

3 arty bns.

1 cdo bn.

3 engr bns.

5 sigs bns.

150 M-47, 120 M-60 med tks; 460 Saurer 4K4F APC; 132 M-2 105mm, M-1 155mm how, 38 M-109 155mm SP how; 18 Steyr 680 M-3 130mm multiple RL; 300 81mm, 100 M-2 107mm, 82 M-30 120mm mor; 150 M-18 57mm, 45 M-20 75mm, 390 M-40 106mm RCL; 240 M-52/M-55 85mm towed, 120 *Kuerassier* SP ATK guns; 50 *Pinzgauer* 712 20mm AA guns.

Deployment: *Cyprus* (UNFICYP): 1 inf coy, fd hospital (312); *Syria* (UNDOF): 1 bn (520); other Middle East (UNTSO): 12.

Reserves: 112,000; 3 reserve bdes (each of 3 inf, 1 arty bns), 16 regts, and 4 bns *Landwehr* distributed among 8 regional military comds. 650,000 have a reserve commitment.

Air Force: 4,300 (2,000 conscripts); 30 combat aircraft. (Austrian air units, an integral part of the Army, are listed separately for purposes of comparison.)

3 FB sqns with 30 Saab 1050.
 1 tpt sqn with 3 *Beaver*, 2 *Skyvan*, 12 *Turbo-Porter*.

6 hel sqns with 22 AB-204B, 10 AB-206A, 24 *Alouette* III, 12 OH-58B, 2 S-65Oe (HH-53), 4 Bell 47G.

2 trg sqns with 20 Saab 91D, 5 Saab 1050.
 Other ac incl 20 Cessna L-19.

4 indep AD bns.

300 20mm Oerlikon, 70 35mm Z/65, Z/75, 60 Types 55 and 60 40mm Bofors AA guns; *Super-Bat* and *Skyguard* AD system.

Reserves: 700.

Para-Military Forces: 11,250 Gendarmerie.

EIRE

Population: 3,200,000.

Military service: voluntary.

Total armed forces: 14,650.

Estimated GNP 1976: \$8.1 bn.

Defence budget 1977: £85.2 m (\$146 m).

\$1 = £0.584 (1977), £0.544 (1976).

Army: 13,370.

10 inf bns.



Austria has developed and produced much of the equipment for its army, including artillery, mortars, recoilless rifles, and the Saurer armored personnel carrier shown here.

4 recce sqns.
 3 fd arty btys.
 1 AA arty bty.
 7 engr coys.
 10 AML H90, 32 AML H60 AFV; 50 Panhard VTT/M3, 10 Unimog APC; 48 25-pdr gun/how; 72 m/41C 120mm mor; 477 Carl Gustav 84mm, 96 IliO 90mm RCL; 26 Bofors 40mm AA guns.

Navy: (Naval Service): 570.
 2 patrol vessels (1 on order).
 3 coastal minesweepers (ex-British Ton-class).
 1 training/supply vessel.

Air Force: (Air Corps): 710; 16 combat aircraft.
 1 COIN sqn with 6 Super Magister, 10 SF-260W.
 4 Chipmunk, 8 Cessna FR-172H trainers; 1 King Air, 1 Dove lt tpts; 8 Alouette III hel.

Reserves: 18,665 (1st line 490, 2nd line 18,175).

FINLAND

Population: 4,739,000.
 Military service: 8-11 months (11 months for officers and NCOs).
 Total armed forces: 39,900 (32,000 conscripts; total mobilizable strength 700,000 within days).
 Estimated GNP 1976: \$32.4 bn.
 Defence expenditure 1977: 1.62 bn markka (\$426 m).
 \$1 = 3.8 markka (1977), 3.9 markka (1976).

Army: 34,400.
 1 armd bde.
 6 inf bdes.
 8 indep inf bns.
 3 fd arty regts.
 2 indep fd arty bns.
 2 coast arty regts.
 3 indep coast arty bns.
 1 AA arty regt.
 4 indep AA arty bns.
 T-54, T-55 med, PT-76 lt tks; BTR-50P/-60 APC; 76mm, 105mm, 122mm, 130mm, 150mm, 152mm, 155mm guns/how; 60mm, 81mm, 120mm, 160mm mor; 55mm, 95mm RCL; SS-11 ATGW; 23mm, 30mm, 35mm, 40mm, 57mm towed, ZSU-57-2 SP AA guns.

Deployment: Cyprus (UNFICYP): 290; Egypt (UNEF): 640.

Navy: 2,500 (incl 500 coastguard).
 2 Riga-class frigates.
 2 corvettes.
 15 MGB, 4 Osa-II class FPBG with Styx SSM.
 5 large, 12 coastguard patrol craft.
 1 coastal minelayer, 6 inshore minesweepers.
 17 small landing craft/tpts.

Air Force: 3,000; 48 combat aircraft.
 2 fighter sqns with 24 MiG-21F, 24 J-35S Draken.
 Tpts incl 8 C-47, 1 Cessna 402, 5 Cherokee Arrow.
 Trainers incl 60 Magister, 30 Saab Safir, 3 MiG-15UTI, 4 MiG-21UTI, 3 J-35C.
 1 hel flt with 3 Mi-4, 4 Mi-8, 2 Hughes 500, 1 AB-206A.
 (6 J-35F fighters on order.)

Reserves (all services): 690,000 (30,000 a year do training).

Para-Military Forces: 4,000 frontier guards.



With 504 home-built combat aircraft, Sweden has the third largest air force in noncommunist Europe. This Mach 2 Saab-37 is adaptable to fighter, support, or recce roles.

SPAIN

Population: 36,396,000.
 Military service: 18 months.
 Total armed forces: 309,000 (217,000 conscripts).
 Estimated GNP 1976: \$101.7 bn.
 Defence expenditure 1976: 147.8 bn pesetas (\$2.15 bn).
 \$1 = 68.6 pesetas (1977), 67.5 pesetas (1976).

Army: 220,000 (178,000 conscripts).
 1 armd div.
 1 mech inf div.
 1 mot inf div.
 2 mountain divs.
 1 armd cav bde.
 10 indep inf bdes.
 1 mountain bde.
 1 airportable bde.
 1 para bde.
 2 arty bdes.
 10 mixed AA/coast arty regts.
 3 Foreign Legion regts.
 3 Regulares regts (local forces in Ceuta/Melilla).

(about 70 per cent strength)

1 SAM bn with Nike Hercules and HAWK.
 200 AMX-30, 475 M-47/-48 med, 200 M-41 lt tks; 75 AML-60/-90 armd cars; 400 M-113 APC; 500 105mm, 122mm, 155mm, 203mm guns/how; 75 105mm, 155mm, and 175mm SP guns/how; 216mm, 300mm multiple RL; 60mm, 81mm, 120mm mor; 90mm, 106mm RCL; Milan, Cobra ATGW; 400 40mm, 88mm, 90mm AA guns; 88mm, 6-in, 15-in coast arty guns; Nike Hercules and HAWK SAM; 20 Cessna O-1, 20 Do-27 lt ac; 20 UH-1B/H, 16 AB-206A, 6 CH-47C, 1 Alouette III, 13 Bell 47G, 3 Puma hel.
 (180 AMX-30; 8-in how; 12 Skyguard AD systems on order.)

Deployment: Balearics: 6,000. Canaries: 16,000. Ceuta/Melilla: 18,000.

Navy: 48,000 (8,000 Marines, 30,000 conscripts).
 10 submarines (4 Daphne-class, 4 US, 2 midget).
 1 helicopter carrier (capacity 20 hel).

13 destroyers (10 ex-US Gearing-, Fletcher-class).
 14 frigates/corvettes (5 with Standard SAM and ASROC, 8 more on order).
 2 motor torpedo boats.
 22 minesweepers.
 23 patrol craft (11 coastal).
 8 large landing ships, 8 tank landing craft.
 1 FGA sqn with 5 AV-8A Matador (Harrier), 2 TAV-8A.
 1 comms sqn with 4 Commanche.
 5 hel sqns with 10 SH-3D, 11 AB-204/212AS, 12 Bell 47G, 10 Hughes 500HM, 6 AH-1G.
 4 Marine lt inf regts and 2 indep gps. (2 subs, 5 AV-8A FGA, 6 Sea King hel on order.)

Air Force: 41,000 (9,000 conscripts); 157 combat aircraft.
 5 FGA sqns with 35 F-4C(S), 24 Mirage III, 6 IIIDE, 15 Mirage F1CE.
 2 FGA/recce sqns with 40 F/RF-5A.
 1 COIN sqn with 25 HA-220 Saeta.
 1 MR sqn with 9 HU-16B Albatross and 3 P-3A Orion.
 3 SAR sqns with 17 AB-205/-206, 5 SA-16.
 8 tpt sqns with 7 C-130H, 12 CASA-207, 30 CASA-212, 12 DHC-4.
 Other ac incl 3 Convair C-440, 1 Falcon 20, 36 Do-27, 8 King Air, 3 Baron, 3 KC-97 tankers.
 7 trg sqns with 24 F-5B, 40 T-33, 25 T-34, 10 Piper and Beechcraft, 80 T-6G, 40 HA-200A/B, 42 Bonanza; 28 AB-47, 3 AB-205 hel.
 (5 C-130H tpts on order.)

Para-Military Forces: 65,000 Guardia Civil, 38,000 Policia Armada.

SWEDEN

Population: 8,263,000.
 Military service: Army and Navy 7½-15 months, Air Force 8-12 months.
 Total armed forces: 68,550 (49,300 conscripts; total mobilizable strength about 750,000 within 72 hours. There are some 120,200 more conscripts (105,000 army,

9,400 navy, 5,800 air force) plus 15,000 officer and NCO reservists doing 18-40 days refresher training at some time in the year.
 Estimated GNP 1976: \$76.5 bn.
 Defence expenditure 1977-78: Kr. 11.93 bn (\$2.83 bn).
 \$1 = 4.21 kronor (1977), 4.39 kronor (1976).

Army: 46,000 (36,500 conscripts).
Peace establishment:
 49 non-operational armd, inf, and arty trg regts for basic conscript trg.
War establishment:
 5 armd bdes.
 20 inf bdes.
 4 *Norrland* bdes.
 50 indep inf, arty, and AA arty bns.
 23 Local Defence Districts with 100 indep bns and 400-500 indep coys.
 350 Strv 101, 102 (*Centurion*), 300 103B (S-tank) med, Strv 74, Ikv 91 lt tks; Pbv 302A APC; 105mm, 150mm, 155mm how; Ikv 102/103 105mm, Bk 1A (L/50) 155mm SP guns; 81mm, 120mm mor; 90mm ATK guns; *Carl Gustav* 84mm, *Miniman* RCL; SS-11, *Bantam* ATGW; 20mm, 40mm, 57mm AA guns; *Redeye*, RBS-70, *HAWK* SAM; 20 SK-61 (*Bulldog*), 12 *Super Cub*, 5 Do-27; 15 HKP-3 (AB-204B), 19 HKP-6 (*JetRanger*) hel. (Ikv 91 lt tanks, FH77 155mm how on order.)

Deployment: *Cyprus* (UNFICYP): 425; *Egypt* (UNEF/UNDOF): 687.

Navy: 12,000 (7,100 conscripts).
 17 submarines (3 building).
 6 destroyers (2 with Rb-08 SSM, 4 with *Sea-cat* SAM).
 6 frigates (2 with lt hel).
 1 FPBG with *Penguin* SSM (16 on order).
 29 large torpedo boats.
 12 MTB, 22 patrol launches (under 100 tons).
 12 minelayers (9 coastal, 1 command ship).
 12 inshore minesweepers (8 under 100 tons).
 86 landing craft (under 100 tons).
 25 mobile, 45 static coastal arty btys with 75mm, 105mm, 120mm, 152mm, 210mm guns, Rb-08, Rb-52 (SS-11) SSM.
 5 HKP-2 (*Alouette* II), 3 HKP-4B (Vertol 107), 7 HKP-4 (KV-107/II), 10 HKP-6 (*JetRanger*) hel.

Air Force: 10,550 (5,700 conscripts); 504 combat aircraft. (Further aircraft in storage, including 110 A-32A.)
 7 FGA sqns; 2 with 36 A-32A *Lansen* (with Rb-04E ASM), 4 with 72 AJ-37 *Viggen*, 1 with 18 SK-60C (Saab 105).
 17 AWX sqns: 13 with 234 J-35F *Draken*, 4 with 72 J-35D.
 4 recce sqns: 1 with 18 S-32C *Lansen*, 2 with 36 S-35E *Draken*, 1 with 18 SH-37 *Viggen*.
 2 tpt sqns with 3 C-130E/H, 3 *Caravelle*, 7 C-47, 6 *Pembroke*.

5 comms sqns with 110 SK-60A/B (Saab 105), 57 SK-61 (*Bulldog*).
 Trainers incl 150 SK-60, 78 SK-61, 20 SK-35C *Draken*, 40 SK-50 *Safir*, 17 SK-37 *Viggen*.
 5 hel gps (3-4 ac each) with 1 HKP-2 (*Alouette* II), 6 HKP-3 (AB-204B), 10 HKP-4B (Vertol 107).
 2 SAM sqns with *Bloodhound* II.
 A fully computerized, fully automatic control and air surveillance system, *Stril* 60, coordinates all air defence components.
 (30 JA-37 interceptors, *Maverick* ASM, *Skyflash* AAM, 100 *Improved HAWK* SAM on order.)

Reserves: voluntary defence organizations (all services) 500,000.

SWITZERLAND

Population: 6,720,000.
Military service: 17 weeks recruit training followed by reservist refresher training of 3 weeks for 8 out of 12 years for *Auszug* (age 20-32), 2 weeks for 3 years for *Landwehr* (33-42), 1 week for 2 years for *Landsturm* (43-50).
 Total armed forces: about 3,500 regular and 15,000 recruits (total mobilizable strength 625,000 within 48 hours. There are two recruit intakes per year (Jan/Jun), each of 15,000. In addition, some 300,000 reservists are called up for refresher training at some time during the year).
 Estimated GNP 1976: \$58.9 bn.
 Defence expenditure 1977: fr 3.25 bn (\$1.28 bn).
 \$1 = 2.53 francs (1977), 2.49 francs (1976).

Army: 580,000 on mobilization, excluding Aviation Brigade (Air Force).
War Establishment:
 3 fd corps, each of 1 mech, 2 inf divs.
 1 mountain corps of 3 mountain inf divs.
 Some indep inf and fortress bdes.
 320 *Centurion*, 150 Pz-61, 170 Pz-68 med, 200 AMX-13 lt tks; 1,250 M-113 APC; 105mm guns; 105mm, 155mm, 150 M-109U 155mm SP how; 120mm mor; 80mm multiple RL; 75mm, 90mm, 105mm ATK guns; 83mm, 106mm RCL; *Bantam* ATGW; 10 patrol boats. (110 Pz-68 med tks on order.)

Air Force: (Aviation Brigade, part of the Army): 45,000 on mobilization (maintenance by civilians); 345 combat aircraft.
 9 FGA sqns with 140 *Hunter* F58.
 9 FGA sqns with 150 *Venom* FB50 (to be replaced by F-5E).
 2 interceptor sqns with 39 *Mirage* IIIS.
 1 recce sqn with 16 *Mirage* IIIRS.
 1 tpt sqn with 3 Ju-52/3m.
 7 lt ac sqns with 6 Do-27, 12 *Porter*, 6 *Turbo-Porter*, 3 *Bonanza*.
 2 hel sqns with 30 *Alouette* II/III.

Other ac incl 49 *Pilatus* P-2, 70 P-3, 65 *Vampire* FB6, 35 T55, 2 *Mirage* IIIBS, 23 FFA C-3605; 70 *Alouette* II/III hel.
 1 para coy.
 3 air-base regts.
 1 AD bde with 1 SAM regt of 2 bns, each with 32 *Bloodhound*, and 7 arty regts (22 bns) with 176 20mm, 35mm, and 40mm AA guns.
 (66 F-5E, 6 F-5F FGA, 45 *Skyguard* AA systems on order.)

Reserves: Militia 621,500.

YUGOSLAVIA

Population: 21,734,000.
Military service: Army and Air Force 15 months; Navy 18 months.
 Total armed forces: 260,000 (145,000 conscripts).
 Estimated GDP 1975: \$30.2 bn.
 Defence expenditure 1977: 30 bn dinars (\$1.64 bn).
 \$1 = 18.28 dinars (1977), 17.3 dinars (1975).

Army: 193,000 (130,000 conscripts).
 9 inf divs.
 7 indep lk bdes.
 11 indep inf bdes.
 3 mountain bdes.
 1 AB bn.
 9 arty, 5 ATK regts.
 12 AA arty regts.
 1,500 T-34, T-54/-55, M-47, about 650 M-4 med, some PT-76 lt tks; M-3, M-8, BTR-40/-50/-60P/-152, M-60, APC; M-980 MICV; 76mm, 105mm, 122mm, 150mm, 152mm, 155mm guns/how; SU-76, SU-100, 105mm SP how; 120mm mor; 130mm multiple RL; *FROG-7* SSM; 57mm, 75mm, 100mm towed; M-18 76mm, M-36 90mm, ASU-57 SP ATK guns; 57mm, 75mm, 82mm, 105mm RCL; *Snapper*, *Sagger* ATGW; 20mm, 30mm, 37mm, 40mm, 57mm, 85mm, 88mm towed, ZSU-57-2 SP AA guns.

Navy: 27,000, incl Marines (8,000 conscripts).
 5 submarines (2 building).
 1 destroyer.
 3 corvettes.
 10 *Osa*-class FPBG with *Styx* SSM.
 14 *Shershen*-class MTB.
 20 FPB, 23 large patrol craft.
 4 coastal, 10 inshore, 14 river minesweepers.
 31 landing craft.
 25 coast arty btys.
 Mi-8, Ka-25 hel.
 1 marine bde.
 (10 FPBG on order.)

Air Force: 40,000 (7,000 conscripts); 287 combat aircraft.
 12 FGA sqns with 9 F-84G, 12 *Kraguj*, 110 *Galeb/Jastreb*.
 8 fighter sqns with 110 MiG-21F/PF.
 3 recce sqns with 21 RT-33A, 25 *Galeb/Jastreb*.
 60 tpts, incl 38 C-47, 2 Ii-18, 4 Yak-40, 1 *Caravelle*, 2 An-12, 9 An-26, 4 Li-2, 1 Boeing 727-200.
 120 *Galeb/Jastreb*, 3 T-33, 18 MiG-21UTI trainers.
 14 Mi-1, 11 Mi-4, 48 Mi-8, 30 *Gazelle*, 20 *Alouette* III, some Ka-25 ASW hel. (102 *Gazelle* on order.)
 8 SA-2, 4 SA-3 SAM btys.

Para-Military Forces and Reserves: 500,000 Reservists, 16,000 Frontier Guards, 600,000 Territorial Defence Force, 300,000 Youth units.



Yugoslavia's Jastreb light-attack aircraft, of which there also is a recce variant.

The Military Balance 1977/78

The Middle East and The Mediterranean

BILATERAL AGREEMENTS WITH EXTERNAL POWERS

The Soviet Union has a fifteen-year treaty of friendship and co-operation with Iraq which was signed in April 1972. A similar but more comprehensive treaty with Egypt, signed in May 1971, was abrogated by Egypt in March 1976. Before May 1975 the Soviet Union was a major arms supplier to Egypt but no significant quantities of arms or spare parts have been delivered since then. The Soviet Union continues to deliver arms to Iraq, Syria, and Libya, and military assistance has also been provided from time to time to Algeria, Morocco, Sudan, and the People's Democratic Republic of Yemen.

The United States has varying types of security assistance agreements and has been providing military aid on either a grant or credit basis to Greece, Turkey, Spain, Morocco, Tunisia, Lebanon, Jordan, Saudi Arabia, and Israel. She provides, in addition, a significant amount of military equipment on a cash-sales basis to many countries, notably Greece, Spain, Israel, Iran, Kuwait, Saudi Arabia, and Jordan.

There are US military facilities in Greece and Turkey, recently the subject of renegotiation. A treaty with Spain extending the use of military bases in Spain for five years was signed on 24 January 1976 and ratified in June 1976. (There is also an agreement with Portugal for the use of the Azores.) The United States has had limited base rights in Bahrain, terminated on 30 June 1976, and maintains communications facilities in Morocco under informal arrangements.

Britain has an agreement with the Republic of Malta, signed on 26 March 1972, which permits her to base forces on the island for British and for NATO purposes. This agreement expires on 31 March 1979, and British forces are to leave by then. Britain concluded treaties of friendship with Bahrain, Qatar, and the United Arab Emirates in August 1971 and is also an arms supplier to Iran, Kuwait, Bahrain, Qatar, the United Arab Emirates, Saudi Arabia, Oman, Jordan, and Egypt. Some British troops have been aiding government forces in Oman and providing training and technical assistance.

Britain—a signatory, with Greece and Turkey, of the 1959 Treaty of Guarantee which guarantees the independence, territorial integrity, and security of the Republic of Cyprus—maintains a garrison in two Sovereign Base Areas in Cyprus. Greece and Turkey are each entitled to maintain a contingent in the island under an associated Treaty of Alliance with the Republic. Turkish forces in Cyprus were very substantially increased in July 1974, and the consti-

tutional provisions of the 1959 agreement are now under review.

The People's Republic of China has supplied arms to Albania, Sudan, and the People's Democratic Republic of Yemen.

France has a military mission in Morocco and supplies arms to a number of countries, including Egypt, Greece, Libya, Morocco, Abu Dhabi, Iraq, Kuwait, and Saudi Arabia.

MULTILATERAL AGREEMENTS INCLUDING EXTERNAL POWERS

A number of Mediterranean countries are members of the North Atlantic Treaty Organization (see pp. 74–83).

The members of the Central Treaty Organization (CENTO) are Britain, Iran, Pakistan, and Turkey, with the United States as an associate. All sit on the Military, Economic, and Counter-Subversion Committees and on the Permanent Military Deputies Group. The Treaty provides for mutual co-operation for security and defence but has no central command structure for forces allocated to it. For the local powers, the economic organization of Regional Co-operation for Development (RCD), which has evolved independently out of CENTO, is a basis for more concrete co-operation.

There are United Nations forces stationed in Cyprus (UNFICYP), Syria (UNDOF), and Egypt (UNEF).

ARRANGEMENTS WITHIN THE REGION

Algeria, Bahrain, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, the United Arab Emirates, the Yemen Arab Republic, and the People's Democratic Republic of Yemen are members of the League of Arab States. Among its subsidiary bodies are the Arab Defence Council, set up in 1959, and the Unified Arab Command, organized in 1964.

Defence agreements were concluded by Egypt with Syria in November 1966 and Jordan in May 1967, to which Iraq later acceded. These arrangements provided for the establishment of a Defence Council and Joint Command. The loosely associated Eastern Front Command, comprising Iraq, Jordan, the Palestine Liberation Army, and Syria, was reorganized in December 1970 into separate Jordanian and Syrian commands. Iraq and Syria concluded defence pacts in May 1968 and July 1969, but friction between the two countries casts some doubt on their application. Jordan and Syria have set up a joint committee to co-ordinate

economic and political planning and a Syrian-Jordanian consultative body to co-ordinate military policy. The Federation of Arab Republics, formed by Libya, Syria, and Egypt in April 1971, provided for a common defence policy and a Federal Defence Council, and in January 1973 an Egyptian Commander-in-Chief was appointed to command all

Federation forces. The present status of the agreement is unclear. Algeria and Libya signed a defence agreement in December 1975, and Egypt signed one with Sudan in January 1977. Iran has provided military assistance to Oman, and Iranian and Jordanian troops have been assisting government forces there.



The USSR has provided Egypt, Iraq, Libya, and Syria with export versions of the sweptwing MiG-23 Flogger, fitted with less sophisticated electronics.

ALGERIA

Population: 17,885,000.
 Military service: 6 months.
 Total armed forces: 75,800.
 Estimated GNP 1976: \$14.5 bn.
 Defence expenditure 1977: 1.6 bn dinars (\$387 m).
 \$1 = 4.13 dinars (1977), 4.13 dinars (1976).

Army: 67,000.
 1 armd bde.
 4 mot inf bdes.
 3 indep tk bns.
 50 indep inf bns.
 1 para bn.
 12 coys of desert troops.
 10 indep arty bns.
 5 AA arty bns.
 3 engr bns.
 100 T-34, 300 T-54/-55 med, 50 AMX-13 lt tks; AML armd cars; 440 BTR-40/-50/-60/-152, *Walid* APC; 600 85mm, 122mm, 152mm guns and how; 5 SU-85, 85 SU-100, ISU-122/-152 SP guns; 240 120mm and 240mm mor; 14 *FROG-4* SSM; 20 140mm, 40 240mm RL; *Sagger* ATGW; 85mm, 100mm AA guns.

Reserves: up to 100,000.

Navy: 3,800.
 6 ex-Soviet SO-1 submarine chasers.
 6 *Komar*, 3 *Osa I*, 2 *Osa II*-class FPBG with *Styx* SSM.
 12 ex-Soviet P-6 torpedo boats.
 2 fleet minesweepers (ex-Soviet T-43 class).
 1 LST (*Polnocny*-class).

Air Force: 5,000; 177 combat aircraft.

2 lt bbr sqns with 24 Il-28.
 3 interceptor sqns with 35 MiG-21.
 7 FGA sqns: 2 with 20 Su-7BM, 4 with 50 MiG-17, 1 with 20 MiG-15.
 2 COIN sqns with 28 *Magister*.
 2 tpt sqns with 8 An-12, 7 F-27, 4 Il-18, 12 Il-14.
 4 hel sqns with 4 Mi-6, 42 Mi-4, 5 Mi-8, 6 Hughes 269A, 5 *Puma*.
 Tpts incl 1 *King Air*, 3 *Super King Air*, 2 CL-215.
 Trainers incl MiG-15/-17/-21UTI, Su-7U, Yak-11/-18.
 SA-2 SAM.

Para-Military Forces: 10,000 Gendarmerie.

EGYPT

Population: 38,880,000.
 Military service: 3 years.
 Total armed forces: 345,000.
 Estimated GNP 1976: \$12.9 bn.
 Defence expenditure 1977-78: £E 1.72 bn (\$4.37 bn).
 \$1 = £E 0.394 (1977), £E 0.391 (1976).

Army: 300,000, incl Air Defence Command.
 2 armd divs (each with 1 armd, 2 mech bdes).
 3 mech inf divs.
 5 inf divs (each with 2 inf bdes).
 1 Republican Guard Brigade (div).
 3 indep armd bdes.
 7 indep inf bdes.
 2 alrmbde bdes.
 1 para bde.
 6 cdo gps.
 6 arty, 2 hy mor bdes.
 1 ATGW bde.

2 SSM regts (up to 24 *Scud*).
 1,100 T-54/-55, 750 T-62 med, 80 PT-76 lt tks; 2,500 OT-62/-64, BTR-40/-50/-60/-152, *Walid* APC; 200 BMP-76PB AFV; 1,300 76mm, 100mm, 122mm, 130mm, 152mm, and 180mm, 40 203mm guns and how; about 200 SU-100 and ISU-152 SP guns; 300 120mm, 160mm, 240mm mor; 300 140mm, 240mm RL; 30 *FROG-3*/-7, 24 *Scud*, *Samlet* SSM; 900 57mm 85mm, and 100mm ATK guns; 900 82mm 107mm RCL; 1,000 *Sagger*, *Snapper Swatter* ATGW; 350 ZSU-23-4, ZSU-57-AA guns; SA-6/-7/-9 SAM; 6 *Fournie* RF-4 ac. (*Beeswing* ATGW on order.)

Air Defence Command (75,000): 108 combat ac.

9 interceptor sqns with 108 MiG-21MF interceptors; 360 SA-2, 200 SA-3, 75 SA-6 SAM; 2,500 20mm, 23mm, 37mm, 40mm 57mm, 85mm, and 100mm AA guns; missile radars incl *Fan Song*, *Low Blow*, *Fla Face*, *Straight Flush*, and *Long Track*; gun radars *Fire Can*, *Fire Wheel*, and *Whiff*; EW radars *Knife Rest* and *Spoon Rest* (*Crotale* SAM on order.) (There is a shortage of spares for Soviet equipment used by the Army and Air Force.)

Reserves: about 500,000.

Navy: 20,000.

12 submarines (6 W- and 6 R-class, ex Soviet).
 5 destroyers (4 *Skory*, 1 ex-British Z-class).
 3 escorts (ex-British).
 12 SO-1 submarine chasers (ex-Soviet).
 12 FPBG (6 *Osa*, 6 *Komar*) with *Styx* SSM (6 building).
 30 MTB (6 *Shersten*, 20 P-6, 4 P-4).
 3 large patrol craft.
 14 ex-Soviet MCM (6 T-43, 4 *Yurka*, 2 T-301, 2 K8).
 16 landing craft (9 *Vydra*, 4 SMB-1, 3 *Polnocny*).
 3 SRN-6 hovercraft.
 10 *Sea King* hel.
 (2 submarines, 30 *Otomat* SSM on order.)

Reserves: about 15,000.

Air Force: 25,000; about 365 combat aircraft.

25 Tu-16D/G medium bbrs (some with *Kel ASM*).
 5 Il-28 lt bbrs.
 3 FB regts with 80 MiG-21, 90 MiG-17.
 4 FGA/strike regts, 3 with 60 Su-7, 1 with 38 *Mirage IIIE*, also some 25 Su-20, 16 MiG-27 *Flogger D*.
 24 MiG-23 *Flogger B* interceptors.
 4 C-130, 2 EC-130H, 30 Il-14, 19 An-12, 1 *Falcon*, 1 *Boeing 707* tpts.
 12 Mi-4, 32 Mi-6, 70 Mi-8, 6 *Sea King*, 30 *Commando*, 42 *Gazelle* hel.
 150 MiG-15/-21/-23, Su-7, L-29, and 40 *Gomhouria* trainers.
 (44 *Mirage F-1* on order.)

Para-Military Forces: about 50,000; National Guard 6,000, Frontier Corps 6,000, Defence and Security 30,000, Coast Guard 7,000.

IRAN

Population: 34,756,000.
Military service: 2 years.
Total armed forces: 342,000.
Estimated GDP 1975: \$56.8 bn.
Defence expenditure 1977-78: 562.48 bn rials (\$7.9 bn).
\$1 = 71.2 rials (1977), 66.6 rials (1975).

Army: 220,000.
3 armd divs.
4 inf divs.
4 indep bdes (2 inf, 1 AB, 1 special force).
1 SAM bn with *HAWK*.
Army Aviation Command.
760 *Chieftain*, 400 M-47/-48, 460 M-60A1 med tks; 250 *Scorpion* lt tks; *Fox*, *Ferret* scout cars; about 2,000 M-113, BTR-40/-50/-60/-152 APC; 650 guns and how, incl 75mm, 330 105mm, 130mm, 100 155mm, 175mm SP, 203mm towed and SP; 64 BM-21 RL; 106mm RCL; *ENTAC*, SS-11, SS-12, *Dragon*, *TOW* ATGW; 650 23mm, 35mm, 40mm, 57mm, 85mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; *HAWK* SAM. (1,220 *Chieftain* med, 110 *Scorpion* lt tks, BMP MICV, ASU-85 SP ATK, ZSU-23-4 SP AA guns, *Rapier*, *Improved HAWK*, SA-7/-9 SAM on order.)
Aircraft include 45 Cessna 185, 10 O-2A, 6 Cessna 310, 3 F-27, 5 *Shrike Commander*. 120 AH-1J, 100 Bell 214A, 20 *Huskie*, 52 AB-205A, 40 CH-47C hel. (193 Bell 214A, 82 AH-1J on order.)

Deployment: *Oman*: 1,000: 2 coys, 1 hel sqn. *Syria* (UNDOF): 388.

Reserves: 300,000.

Navy: 22,000.
3 destroyers (1 with *Seacat*, all with *Standard* SAM).
4 frigates with Mk 2 *Seakiller* SSM and *Seacat* SAM.
4 corvettes (ex-US patrol frigates).
20 patrol boats (9 under 100 tons).
5 minesweepers (3 coastal, 2 inshore).
2 landing ships, 2 landing craft.
2 logistic support ships.
8 SRN-6 and 6 *Wellington* BH-7 hovercraft.
(3 *Tang*-class submarines, 4 *Spruance*-class destroyers, 12 FBPG with *Exocet* SSM, 2 landing craft on order.)

Naval Air:
1 MR sqn with 6 P-3F *Orion*.
1 ASW sqn with 6 S-65A.

1 tpt sqn with 6 *Shrike Commander*, 4 F-27. Hel incl 5 AB-205A, 14 AB-206A, 6 AB-212, 20 SH-3D, 3 RH-53D.
3 Marine bns.
(3 P-3C MR ac, 3 RH-53D hel on order.)

Air Force: 100,000; 341 combat aircraft.
10 FB sqns with 32 F-4D, 141 F-4E with *Sidewinder* and *Sparrow* AAM. *Maverick* ASM.
10 FGA sqns with 12 F-5A, 100 F-5E.
2 fighter sqns with 40 F-14A *Tomcat*.
1 recce sqn with 16 RF-4E.
1 tanker sqn with 10 Boeing 707-302L.
4 med tpt sqns with 57 C-130E/H, 5 Boeing 747.
4 lt tpt sqns with 23 F-27, 3 *Aero Commander* 690, 4 *Falcon* 20.
10 *Huskie*, 6 AB-205, 4 AB-206A, 5 AB-212, 5 Bell 214C, 2 CH-47C, 16 *Super Frelon* hel.
Trainers include 9 T-33, 18 F-5B/F, 30 *Bonanza* F33A/C.
5 SAM sqns with *Rapier* and 25 *Tigercat*. (69 F-5E/F, 40 F-14, 160 F-16 fighters; 4 Boeing 747, 2 F-27 tpts; 1 Boeing 707-320C tanker; 19 F-33A/C *Bonanza* trainers; 50 CH-47, 2 AS-61A, 38 Bell 214C hel; *Blindfire* SAM radar; *Phoenix*, *Sparrow*, *Sidewinder* AAM on order.)

Para-Military Forces: 70,000 Gendarmerie with lt ac and hel; 40 patrol boats.

IRAQ

Population: 11,800,000.
Military service: 2 years.
Total armed forces: 188,000.
Estimated GNP 1976: \$14.2 bn.
Defence expenditure 1977-78: 491.5 m dinars (\$1.66 bn).
\$1 = 0.296 dinars (1977), 0.299 dinars (1976).

Army: 160,000.
4 armd divs (each with 2 armd, 1 mech bde).
2 mech divs.
4 inf divs (each with 1 mech, 2 mot bdes).
1 indep armd bde.
1 Republican Guard mech bde.
2 indep inf bdes.
1 special forces bde.
1,350 T-62, T-54/-55, 50 T-34, AMX-30 med, 100 PT-76 lt tks; about 1,800 AFV incl BTR-40/-50/-60/-152, OT-62, 100 BMP; 700 75mm, 85mm, 100mm, 122mm, 130-

mm, 152mm guns/how; 50 SU-100, 40 ISU-122 SP guns; 120mm, 160mm mor; BM-21 RL; *Sagger*, SS-11 ATGW; 20 *FROG-7*, *Scud-B* SSM; 800 23mm, 37mm, 57mm, 85mm, 100mm AA guns; ZSU-23-4, ZSU-57-2; SA-7 SAM. (T-62 med tks, *Scud* SSM on order.)

Reserves: 250,000.

Navy: 3,000.
3 SO-1 submarine chasers.
10 *Osa*-class FPBG with *Styx* SSM.
12 P-6 torpedo boats.
4 patrol boats (under 100 tons).
2 minesweepers.

Air Force: 25,000 (10,000 AD personnel); about 369 combat aircraft.
1 bbr sqn with 4 Tu-16.
1 lt bbr sqn with 10 Il-28.
12 FGA/interceptor sqns: 4 with 90 MiG-23B, 3 with 60 Su-7B, 3 with 30 MiG-17, 2 with 20 *Hunter* FB59/FR10.
5 interceptor sqns with 115 MiG-21, 20 MiG-19.
1 COIN sqn with 20 *Jet Provost* T52.
2 tpt sqns with 12 An-2, 6 An-12, 10 An-24, 2 Tu-124, 13 Il-14, 2 *Heron*, 2 *Islander*.
7 hel sqns with 4 Mi-1, 35 Mi-4, 16 Mi-6, 30 Mi-8, 40 *Alouette* III, 10 *Super Frelon*.
Trainers incl 30 MiG-15/-21/-23UTI, Su-7U, *Hunter* T69, Yak-11, L-29.
SA-2, SA-3, and 25 SA-6 SAM.
(L-39 trainers, 20 *Alouette* III hel on order.)

Para-Military Forces: 4,800 security troops, 50,000 People's Army.

ISRAEL

Population: 3,622,000.
Military service: men 36 months, women 24 months (Jews and Druses only; Muslims and Christians may volunteer). Annual training for reservists thereafter up to age 54 for men, up to 25 for women.
Total armed forces: 164,000 (123,000 conscripts), mobilization to 400,000 in 72 hours.
Estimated GNP 1976: \$12.6 bn.
Defence expenditure 1977-78: £1 40.2 bn (\$4.27 bn).
\$1 = £1 9.42 (1977), £1 7.67 (1976).

Army: 138,000 (120,000 conscripts, male and female), 375,000 on mobilization. (11 bdes (5 armd, 4 inf, 2 para) normally are kept near full strength; 6 (1 armd, 4 mech, 1 para) between 50 per cent and full strength; the rest at cadre strength.)

20 armd bdes.
9 mech bdes.
9 inf bdes.
5 para bdes.
3,000 med tks, incl 1,000 *Centurion*, 650 M-48, 810 M-60, 400 T-54/-55, 150 T-62, *Chariot*; 65 PT-76 lt tks; about 3,600 AFV, incl AML-60, 15 AML-90, RBY *Ramta* armd cars; about 4,000 M-2/-3/-113, BRDM, BTR-40/-50P(OT-62)/-60P/-152 APC; 500 105mm, L-354, M-109, and 155mm, 60 175mm, some 203mm SP how; 450 120mm, 122mm, 130mm, and 155mm guns/how; *Lance*, *Ze'ev* (Wolf) SSM; 122mm, 135mm, 240mm RL; 900 81mm, 120mm, and 160mm mor (some SP); 106mm RCL; *TOW*, *Cobra*, *Dragon*, SS-11, *Sagger* ATGW; about 900 *Vulcan/Chaparral* 20mm msl/gun systems and 30mm and 40mm AA guns; *Redeye* SAM.
(125 M-60 med tks; 700 M-113 APC; 94 155mm how; 175mm gun; *TOW*; *Lance* on order.)

Navy: 5,000 (1,000 conscripts), 6,000 on



The Iranian Air Force, one of the largest in the Mideast, has such advanced equipment as the F-4E and F-14 Tomcat, with 160 of these F-16s on order.

mobilization.
 1 Type 206 submarine (2 building).
 6 *Reshet*-class FPBG with *Gabriel* SSM.
 12 *Saar*-class FPBG with *Gabriel* SSM.
 About 40 small patrol boats (under 100 tons).
 12 landing craft (3 under 100 tons).
 3 *Westwind* 1124N MR ac.
 Naval cdo: 300.
 (7 *Reshet*-class FPBG and *Harpoon* SSM on order.)

Air Force: 21,000 (2,000 conscripts, AD only), 25,000 on mobilization; 549 combat aircraft. (In addition, there are combat aircraft in reserve, incl 25 *Mystère* IVA.)
 12 FGA/interceptor sqns: 1 with 5 F-15, 6 with 165 F-4E, 3 with 30 *Mirage* IIIICJ/BJ, 2 with 100 *Kfir*/Kfir C2.
 6 FGA sqns with 235 A-4E/H/M/N *Skyhawk*.
 1 recce sqn with 12 RF-4E, 2 EV-1.
 Tpts incl 10 Boeing 707, 24 C-130E/H, 12 C-97, 20 *Noratlant*, 10 C-47, 2 KC-130H, 14 *Arava*, 15 Do-28, 10 *Islander*.
 10 Do-27, 25 *Cessna* U206, 2 *Turbo-Porter* lt ac.
 Trainers incl 24 TA-4H, 80 *Magister*, *Mystère* IV, *Super Mystère*, 20 *Queen Air*, 20 *Super Cub*.
 Hel incl 12 *Super Frelon*, 28 CH-53G, 6 AH-1G, 40 AB-205A, 25 AB-206, 30 UH-1D, 15 S-65, 30 *Alouette* II/III.
 15 SAM btys with 90 *HAWK*.
 (20 F/TF-15A interceptors, 35 F-4 FGA, 4 E-2C AEW ac, *Sidewinder* AAM on order.)

Reserves (all services): 460,000.

Para-Military Forces: 4,500 Border Guards and 5,000 *Nahal* Militia.

JORDAN

Population: 2,866,000.
 Military service: 24 months.
 Total armed forces: 67,810.
 Estimated GNP 1976: \$1.3 bn.
 Defence expenditure 1977: 67 m dinars (\$200.6 m).
 \$1 = 0.334 dinars (1977), 0.330 dinars (1976).

Army: 61,000.
 2 armd divs.
 2 mech divs.
 2 inf divs.
 4 special forces bns.
 2 AA bdes.
 320 M-47/-48/-60, 200 *Centurion* med tks; 140 *Ferret* scout cars; 600 M-113, 120 *Saracen* APC; 110 25-pdr, 90 105mm, 155mm, 203mm how; 35 M-52 105mm, 20 M-44 155mm SP how; 16 155mm guns; 81mm, 107mm, 120mm mor; 106mm and 120mm RCL; *TOW*, *Dragon* ATGW; 200 M-42 40mm SP AA guns; *Redeye* SAM. (100 *Vulcan* 20mm AA guns, *Improved HAWK* SAM on order.)

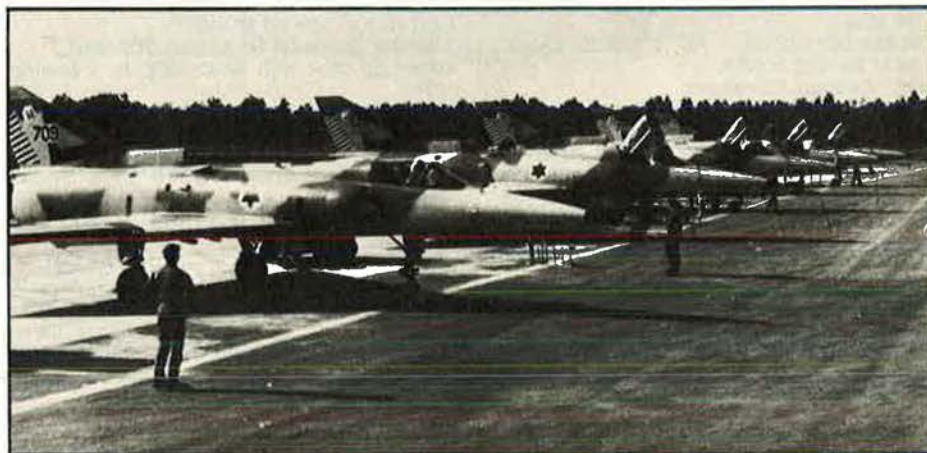
Deployment: Oman: engr det.

Navy: 160.
 10 small patrol craft.

Air Force: 6,650; 78 combat aircraft.
 3 FGA sqns with 60 F-5A/E.
 1 interceptor sqn with 18 F-104A.
 4 C-130B, 1 *Falcon* 20, 4 CASA 212A *Aviocar*, 2 *Dove* tpts.
 18 *Alouette* III hel.
 4 F-5B, 1 *Hunter*, 2 F-104B, 10 T-37, and 12 *Bulldog* trainers.
 (4 S-76 hel on order.)

Reserves: 30,000.

Para-Military Forces: 10,000; 3,000 Mobile Police Force, 7,000 Civil Militia.



Israel's armored forces, with more than 3,000 tanks and 3,600 other armored fighting vehicles, are supported by the largest air force in the Mideast. The *Gabriel* SSM (top) is an indigenous product, as are the Mach 2.2 *Kfir* fighters shown above.

KUWAIT

Population: 1,090,000.
 Military service: 18 months.
 Total armed forces: 10,000.
 Estimated GNP 1976: \$12.6 bn.
 Defence expenditure 1976: 592.2 m dinars (\$2.06 bn).
 \$1 = 0.288 dinars (1976), 0.286 dinars (1975).

Army: 8,500.
 1 armd bde.
 2 inf bdes.
 12 *Chieftain*, 50 *Vickers*, 50 *Centurion* med tks; 90 *Saladin* armd, 20 *Ferret* scout cars; 130 *Saracen* APC; 10 25-pdr guns; 20 AMX 155mm how; SS-11, *HOT*, *TOW*, *Vigilant* ATGW. (153 *Chieftain* med tks; APC; arty; SA-7 SAM on order.)

Navy: 500 (Coastguard).
 12 inshore patrol boats.
 16 patrol launches.
 3 landing craft.

Air Force: 1,000 (excluding expatriate personnel); 49 combat aircraft.
 2 FB sqns (forming) with 4 A-4M.
 1 FGA sqn with 4 *Hunter* FGA57, 5 T67.
 1 interceptor sqn with 10 *Lightning* F53, 2 T55, 12 *Mirage* F-1CK.
 1 COIN sqn with 12 BAC-167 *Strikemaster* Mk 83.
 2 DC-9, 2 DHC-4, 1 *Argosy*, 2 *Hercules* tpts.
 1 hel sqn with 6 AB-204B, 4 AB-205, 2 *Whirlwind*, 24 *Gazelle*, 12 *Puma*.
 6 *Jet Provost* T51 trainers (in store).
 50 *Improved HAWK* SAM.
 (8 *Mirage* F-1BK/CK interceptors, 26 A-4KU, 6 TA-4KU FGA on order.)

LEBANON

Population: 2,980,000.
 Estimated GNP 1974: \$3.7 bn.
 Defence expenditure 1977: £L211.7 m (\$69.9 m).

\$1 = £L 3.03 (1977), £L 2.65 (1976).

Army: The Lebanese army no longer exists as a cohesive organization, being split into a number of factions. Formerly its strength was some 17,000, organized into 20 tk, inf, and arty bns. The eqpt available to it included the following:
 25 AMX-13, 18 M-41 lt tks; 100 Panhard, AEC, *Chalmite* armd cars; 80 M-113, 16 M-59, Panhard M-3 APC; 6 75mm guns, 24 122mm, 20 155mm how; 25 120mm mor; 106mm RCL; 60 *Charioteer* 84mm SP ATK guns, *ENTAC*, SS-11, 20 *TOW* ATGW; 60 20mm and 30mm, 15 M-42 40mm SP AA guns.

Navy: 250.
 4 large, 2 coastal patrol craft.
 1 landing craft.

Air Force: 1,000; 21 combat aircraft.
 1 FGA sqn with 10 *Hunter* F70 and 2 T66.
 1 interceptor sqn with 9 *Mirage* IIIEL/BL with R.530 AAM.
 1 hel sqn with 10 *Alouette* II/III, 6 AB-212.
 6 SA *Bulldog*, 8 *Magister*, and 3 *Vampire* trainers.
 1 *Dove*, 1 *Turbo-Commander* 690A tpts.
 Some French EW/ground-control radars.

Para-Military Forces: formerly 5,000 *Gen-darmerie* (now being reformed after having disintegrated).

LIBYA

Population: 2,630,000.
 Military service: voluntary.
 Total armed forces: 29,200.
 Estimated GNP 1975: \$12.2 bn.
 Defence expenditure 1976: 67.9m Libyan dinars (\$229 m).
 \$1 = 0.296 dinars (1976), 0.296 dinars (1975).

Army: 22,000.
 1 armd bde.

2 mech inf bdes.
 1 National Guard bde.
 1 special forces bde.
 3 arty, 2 AA arty bns.
 200 T-62, 1,000 T-54/-55 med tks; 100 *Saladin*, 75 EE-9 *Cascavel* armd cars; 100 *Ferret* scout cars; 220 BTR-40/-50/-60, 110 OT-62/-64, 60 *Saracen*, 250 M-113A1, BMP APC; 75 105mm, 70 122mm, 155mm how; 300 *Vigilant*, *Sagger* ATGW; *Scud* SSM; 120 23mm, L40/70, 57mm AA guns; 6 AB-47, 5 AB-206, 4 *Alouette* III hel; some Cessna O-1 lt ac. (400 *Cascavel/Urutu* AFV on order.)

Navy: 2,700.
 1 frigate (with *Seacat* SAM).
 2 corvettes (3 more building).
 3 FPBG with SS-12M SSM.
 11 patrol craft (10 large, 1 coastal).
 1 log support ship.
 (10 FPBG, 80 *Otomat* SSM, 1 LST on order.)

Air Force: 4,500 (including expatriate personnel); 162 combat aircraft. (Some may be in storage.)
 1 bbr sqn with 12 Tu-22.
 4 interceptor sqns: 2 with 30 *Mirage* IIIIE, 2 with 30 MiG-23 *Flogger* E.
 4 FGA sqns with 50 *Mirage* V.
 2 COIN sqns with 30 *Galeb*.
 1 recce sqn with 10 *Mirage* IIIER.
 2 tpt sqns with 8 C-130E, 9 C-47, 2 *Falcon*, 1 *JetStar*.
 10 *Mirage* IIIB, 2 *Mystère* 20, 5 MiG-23U, 12 *Magister*, 3 T-33 trainers.
 4 hel sqns with 13 *Alouette* II/III, 3 AB-47, 9 *Super Frelon*, 8 CH-47C, 12 Mi-8.
 3 SAM regts with 60 *Crotale* and 8 btys with 60 SA-2, SA-3, and SA-6 SAM.
 (38 *Mirage* F-1, 16 CH-47C hel on order.)

MOROCCO

Population: 18,200,000.
 Military service: 18 months.
 Total armed forces: 84,650.
 Estimated GNP 1976: \$7.85 bn.
 Defence expenditure 1977: 1.56 bn dirham (\$345.9 m).
 \$1 = 4.51 dirham (1977), 4.37 dirham (1976).

Army: 75,000.
 1 lt security bde.
 1 para bde.
 5 armd bns.
 2 mot inf bns.
 18 inf bns.
 9 Royal Guard bns.
 7 camel corps bns.
 2 desert cav bns.
 7 arty gps.
 2 engr bns.
 50 M-48, 50 T-54 med, 120 AMX-13 lt tks; 36 EBR, 50 AML, and M-8 armd cars; 40 M-3 half-track, 95 OT-62/-64, 30 UR-416 APC; 30 AMX-105, 150 76mm, 85mm, and 105mm guns; 18 M-114 155mm how; 82mm, 120mm mor; 105mm RCL; *ENTAC*, *TOW* ATGW; 50 37mm, 57mm, 100mm AA guns, *Chaparral* SAM. (100 M-48 med tks; 334 M-113 APC on order.)

Navy: 4,000 (600 Marines).
 3 corvettes.
 1 coastal minesweeper.
 3 large, 6 coastal patrol craft (14 building).
 1 landing ship log (2 building).
 1 landing craft.
 1 naval inf bn.
 (5 frigates, 1 corvette on order.)

Air Force: 5,650; 45 combat aircraft. (Some ac, incl 2 MiG-15, 12 MiG-17 FGA in storage.)

2 FGA sqns with 24 *Magister*.
 2 interceptor sqns with 17 F-5A and 4 F-5B.
 2 tpt sqns with 8 C-47, 8 C-119G, 8 C-130H, 6 *King-Air*, 12 *Broussard*, 1 Do-28D.
 40 AB-205A, 8 AB-206, 5 AB-212, 4 *Alouette* II, 6 *Gazelle*, and 20 *Puma* hel.
 25 T-6, 18 T-28, 2 SF-260M trainers.
 (50 *Mirage* F-1 fighters, 12 T-34C, 20 T-2E, 28 SF-260M trainers, 20 *Puma* hel on order.)

Para-Military Forces: 30,000, incl 11,000 *Sûreté Nationale*.

OMAN

Population: 806,000.
 Military service: voluntary.
 Total armed forces: 13,000 (excluding expatriate personnel).
 Defence expenditure 1977: 158 m rial omani (\$457 m).
 \$1 = 0.346 rial omani (1977), 0.345 rial omani (1976).

Army: 11,800.
 2 bde HQ.
 8 inf bns.
 1 Royal Guard regt.
 1 arty regt.
 1 sigs regt.
 1 armd car sqn.
 1 para sqn.
 1 engr sqn.
 36 *Saladin* armd cars; 24 75mm pack how; 25-pdr, 36 105mm, 3 5.5-in guns; 120mm mor; 10 *TOW* ATGW.

Navy: 450.
 3 patrol vessels (1 Royal Yacht, 2 ex-Dutch MCM).
 1 trg ship (ex-1,500-ton log ship).
 4 FPB.
 4 small landing craft.
 (2 minesweepers, 3 FPB, 1 log support ship on order.)

Air Force: 750; 36 combat aircraft.
 1 FGA/recce sqn with 16 *Hunter*.
 1 FGA sqn with 12 *Jaguar*.
 1 COIN/trg sqn with 8 BAC-167.
 1 tac tpt sqn with 15 *Skyvan*.
 2 tpt sqns: 1 with 3 BAC-111 and 2 *Viscount*, 1 with 7 BN *Defender*, 1 *Falcon*.
 1 hel sqn with 20 AB-205, 3 AB-206, 1 AB-212, 5 AB-214 hel.
 1 SAM sqn with 28 *Rapier* SAM.

Para-Military Forces: 3,000 tribal Home Guard (*Firqats*).

SAUDI ARABIA

Population: 7,500,000.
 Military service: voluntary.
 Total armed forces: 61,500.
 Estimated GNP 1975: \$37.2 bn.
 Defence expenditure 1977-78: 26.69 bn Saudi riyals (\$7.53 bn).
 \$1 = 3.54 riyals (1977), 3.53 riyals (1975).

Army: 45,000.
 1 mech div.
 1 armd bde.
 2 inf bns.
 1 para bn.
 1 Royal Guard bn.
 3 arty bns.
 6 AA arty bns.
 10 SAM btys with *HAWK*.
 400 AMX-30, 75 M-47/-60 med, 60 M-41, 150 *Scorpion*, AMX-13 lt tks; 200 AML-60/-90, some *Staghound* and *Greyhound* armd cars; *Ferret* scout cars; M-113,

Panhard M-3, *Commando* APC; 105mm guns; 75mm RCL; SS-11, *Dragon*, *Vigilant*, *Harpon* ATGW; AA guns; *Rapier*, *HAWK* SAM. (200 M-60 med, 100 *Scorpion* lt tks; 250 AMX-10P AFV; 250 APC; guns/how; AMX-30SA SP AA guns; *Shahine* (*Crotale*) and 6 btys *Improved HAWK* SAM on order.)

Deployment:
Lebanon (Arab Peace-keeping Force): 700.

Navy: 1,500.
 1 FPBG.
 3 FPB (*Jaguar*-class).
 1 large patrol craft (ex-US coastguard cutter).
 (6 FPBG, 4 MCM, 4 landing craft, *Harpoon* SSM on order.)

Air Force: 15,000; 137 combat aircraft.
 2 FB sqns with 70 F-5E.
 2 COIN/trg sqns with 30 BAC-167.
 2 interceptor sqns with 37 *Lightning* F52/F53.
 2 tpt sqns with 39 C-130E/H.
 2 hel sqns with 16 AB-206 and 24 AB-205.
 Other ac incl 4 KC-130 tankers, 1 Boeing 707, 2 *Falcon* 20, 2 *JetStar* tpts; 12 *Alouette* III, 1 AB-204 hel.
 Trainers incl 20 F-5B, 7 *Lightning* T54/55, 6 Cessna T-41A.
 (20 F-5F FB, 11 BAC-167 COIN ac, *Maverick* ASM, *Sidewinder* AAM on order.)

Para-Military Forces: 35,000 National Guard in regular and semi-regular bns; 6,500 Frontier Force and Coastguard with 50 small patrol boats and 8 SRN-6 hovercraft.

SUDAN

Population: 18,650,000.
 Military service: voluntary.
 Total armed forces: 52,100.
 Estimated GNP 1974: \$2.8 bn.
 Defence expenditure 1975-76: £S 46 m (\$131.4 m).
 \$1 = £S 0.35 (1975), £S 0.35 (1974).

Army: 50,000.
 2 armd bdes.
 7 inf bdes.
 1 para bde.
 3 arty regts.
 3 AD arty regts.
 1 engr regt.
 70 T-54, 60 T-55 med tks; 30 T-62 lt tks (Chinese); 50 *Saladin*, 45 *Commando* armd cars; 60 *Ferret* scout cars; 100 BTR-40/-50/-152, 60 OT-64, 49 *Saracen* APC; 55 25-pdr, 40 100mm, 20 105mm, 18 122mm guns and how; 30 120mm mor; 30 85mm ATK guns; 80 Bofors 40mm, 80 Soviet 37mm, 85mm AA guns. (AMX-10 APC on order.)

Deployment:
Lebanon (Arab Peace-keeping Force): 1,000.

Navy: 600.
 3 patrol boats (ex-Iranian).
 6 large patrol boats.
 6 small patrol craft (ex-Yugoslav).
 2 landing craft.

Air Force: 1,500; 27 combat aircraft.
 1 interceptor sqn with 10 MiG-21MF.
 1 FGA sqn with 17 MiG-17 (ex-Chinese).
 5 BAC-145 and 6 *Jet Provost* Mk 55, 3 *Pembroke* (in storage).
 1 tpt sqn with 5 An-24, 4 F-27, 1 DHC-6.
 1 hel sqn with 10 Mi-8.
 (15 *Mirage* fighters; 6 C-130H, 4 DHC-5D tpts, 10 *Puma* hel on order.)

Para-Military Forces: 3,500: 500 National Guard, 500 Republican Guard, 2,500 Border Guard.

SYRIA

Population: 7,750,000.
Military service: 30 months.
Total armed forces: 227,500.
Estimated GDP 1975: \$4.7 bn.
Defence expenditure 1977: £Syr 3.93 bn (\$1.07 bn).
\$1 = £Syr 3.68 (1977), £Syr 3.68 (1976).

Army: 200,000, incl AD Comd.
2 armd divs (each 2 armd, 1 mech bde).
3 mech divs (each 1 armd, 2 mech bdes).
3 armd bdes.
1 mech bde.
3 inf bdes.
2 arty bdes.
6 cdo, 4 para bns.
1 SSM bn with *Scud*, 2 btys with *FROG*.
48 SAM btys with SA-2/-3/-6.
200 T-34, 1,500 T-54/-55, 800 T-62 med, 100 PT-76 lt tks; 1,600 BTR-40/-50/-60/-152, BMP, OT-64 APC; 800 122mm, 130mm, 152mm, and 180mm guns/how; ISU-122/-152, 75 SU-100 SP guns, 140mm and 240mm RL; 30 *FROG*-7, 36 *Scud* SSM; 120mm, 160mm mor; 85mm, 100mm ATK guns; *Snapper*, *Sagger*, *Swatter* ATGW; 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-2/-3/-6/-7/-9 SAM. (*Milan* ATGW, *Gazelle* hel on order.)

Deployment:
Lebanon (Arab Peace-keeping Force): 30,000.

Reserves: 100,000.

Air Defence Command. (Under Army Command with Army and Air Force manpower.)
24 SAM btys with SA-2/-3, 14 with SA-6, AA arty, interceptor ac, and radar.

Navy: 2,500.
2 *Petya*-class frigates.
6 *Komar*- and 6 *Osa*-class FPBG with *Styx* SSM.
1 T-43-class, 2 coastal minesweepers.
8 MTB (ex-Soviet P-4).

Reserves: 2,500.

Air Force: 25,000; about 395 combat ac. (Some aircraft believed to be in storage.)
4 FGA sqns with 80 MiG-17.
3 FGA sqns with 50 Su-7.
2 FGA sqns with 45 MiG-23.
About 220 MiG-21 interceptors.
Tpts incl 8 Il-14, 2 An-24, 4 An-26.
Trainers incl Yak-11/-18, L-29, MiG-15UTI, and 32 MBB 223 *Flamingo*.
Hel incl 4 Mi-2, 8 Mi-4, 50 Mi-8, and 9 Ka-25.
(15 *Super Frelon*, 6 CH-47C hel on order.)

Para-Military Forces: 9,500. 8,000 Gendarmerie; 1,500 Desert Guard (Frontier Force).

TUNISIA

Population: 6,062,000.
Military service: 12 months selective.
Total armed forces: 22,200 (13,000 conscripts).
Estimated GNP 1975: \$4.8 bn.
Defence expenditure 1977-78: 68.65 m dinars (\$156 m).
\$1 = 0.44 dinars (1977), 0.43 dinars (1976).

Army: 18,000, (12,000 conscripts).
2 combined arms regts.
1 Sahara regt.
1 para-cdo bn.
1 arty bn.
1 engr bn.
30 AMX-13, 20 M-41 lt tks; 20 *Saladin*, 15 EBR armd cars; 10 155mm, 10 105mm SP guns; 40mm AA guns. (*Chaparral* SAM, 40 *Kuerassier* SP ATK guns on order.)

Navy: 2,500 (500 conscripts).
1 destroyer escort (ex-US radar picket).
1 corvette (ex-French *Fougeux*-type, 1 building).
1 coastal minesweeper.
3 patrol boats with SS-12M SSM (1 on order).
10 coastal patrol boats (less than 100 tons).

Air Force: 1,700 (500 conscripts); 18 combat aircraft.
1 fighter sqn with 10 F-86F.
1 COIN sqn with 8 MB-326B.
3 G-222 tpts.
12 SF-260W, 12 T-6 trainers.
6 *Alouette* II, 6 *Alouette* III, 1 *Puma* hel. (12 MB-326G/K COIN ac on order.)

Para-Military Forces: 9,000; 5,000 Gendarmerie (6 bns), 4,000 National Guard.

UNITED ARAB EMIRATES (UAE)

Population: 690,000.
Military service: voluntary.
Total armed forces: 26,100. (The Union Defence Force and the armed forces of the United Arab Emirates (Abu Dhabi, Dubai, Ras Al Khaimah, and Sharjah) were formerly merged in May 1976.)
Estimated GNP 1976: \$8.5 bn.
Defence expenditure 1977-78: 392.3 m dirhams (\$100.6 m).
\$1 = 3.90 dirhams (1977), 3.94 dirhams (1976).

Army: 23,500.
1 Royal Guard bde.
3 armd/armd car bns.
7 inf bns.
3 arty bns.
3 AD bns.
80 *Scorpion* lt tks; 125 *Saladin*, 6 *Shorland*, Panhard armd cars; 60 *Ferret* scout cars; Panhard M-3, 30 *Saracen* APC; 22 25-pdr, 105mm guns; 16 AMX 155mm SP how; 81mm mor; 120mm RCL; *Vigilant* ATGW; *Rapier* SAM.

Deployment:
Lebanon (Arab Peace-keeping Force): 700.

Navy: 800.
6 large, 9 small patrol craft.
14 coastal patrol craft (police).

Air Force: 1,800; 38 combat aircraft.
2 sqns with 24 *Mirage* V, 8 *Hunter* FGA.
1 sqn with 6 MB-326 COIN.
Tpts incl 2 C-130H, 1 G-222, 4 *Islander*, 3 DHC-4, 1 Cessna 182.
Hel incl 8 AB-205, 6 AB-206, 3 AB-212, 10 *Alouette* III, 5 *Puma*.
(2 G-222, 4 DHC-5D tpts on order.)

YEMEN ARAB REPUBLIC (NORTH)

Population: 6,995,000.
Military service: 3 years.

Total armed forces: 39,850.
Estimated GNP 1973: \$830 m.
Defence expenditure 1975-76: 261.7 m riyals (\$60 m).
\$1 = 4.33 riyals (1975), 4.62 riyals (1973).

Army: 37,600.
3 inf divs (10 inf bdes, incl 3 reserve).
1 para bde.
3 cdo bdes.
2 armd bns.
2 arty bns.
1 AA arty bn.
30 T-34, T-54 med tks; 30 *Saladin* armd, *Ferret* scout cars; 120 BTR-40/-152, *Walid* APC; 50 76mm, some 122mm guns; 50 SU-100 SP guns; 82mm, 120mm mor; 75mm RCL; *Vigilant* ATGW; 37mm guns. (How, AA guns on order.)

Deployment:
Lebanon (Arab Peace-keeping Force): 500.

Navy: 750.
5 large patrol craft (ex-Soviet *Poluchat*-class).
3 MTB (ex-Soviet P-4 class).

Air Force: 1,500; some 22 combat aircraft. (Some aircraft are believed to be in storage.)
1 lt bbr sqn with 14 Il-28.
1 fighter sqn with 8 MiG-17, some MiG-21. C-47, 2 *Skyvan*, some Il-14 tpts.
4 MiG-15UTI, 18 Yak-11 trainers.
Mi-4, AB-205 hel.

Para-Military Forces: 20,000 tribal levies.

YEMEN: PEOPLE'S DEMOCRATIC REPUBLIC (SOUTH)

Population: 1,790,000.
Military service: conscription, term unknown.
Total armed forces: 21,300.
Estimated GNP 1972: \$500 m.
Defence expenditure 1977: 15.3 m South Yemeni dinars (\$43.7 m).
\$1 = 0.35 dinars (1977), 0.383 dinars (1972).

Army: 19,000.
10 inf bdes, each of 3 bns.
2 armd bns.
1 arty bde.
1 sigs unit.
1 trg bn.
200 T-34, T-54 med tks; 10 *Saladin* armd cars; 10 *Ferret* scout cars; 25-pdr, 105mm pack, 122mm, 130mm how; mor; 122mm RCL; 23mm SP, 37mm, 57mm, 85mm AA guns; SA-7 SAM.

Deployment:
Lebanon (Arab Peace-keeping Force): 500.

Navy: 300 (subordinate to Army).
2 submarine chasers (ex-Soviet SO-1 class).
2 MTB (ex-Soviet P-6 class).
3 minesweepers (ex-British *Ham*-class).
6 small patrol craft.
2 landing craft (ex-Soviet *Polnocny*-class).

Air Force: 2,000; 33 combat aircraft. (Some aircraft are believed to be in storage.)
1 bbr sqn with 6 Il-28.
1 fighter sqn with 12 MiG-21.
1 FB sqn with 15 MiG-17.
1 tpt sqn with 4 Il-14, 3 An-24, some C-47.
1 hel sqn with 8 Mi-8, Mi-4.
3 MiG-15UTI trainers.

Para-Military Forces: Popular Militia; 1,500 Public Security Force.

The Military Balance 1977/78

Sub-Saharan Africa

MULTILATERAL AGREEMENTS

The Organization of African Unity (OAU), constituted in May 1963, includes all internationally recognized independent African states except South Africa. It has a Defence Commission which is responsible for defence and security co-operation and the defence of the sovereignty, territorial integrity, and independence of its members; however, this has rarely met.

BILATERAL AGREEMENTS

The US has security assistance agreements with Ghana, Kenya, Liberia, Senegal, and Zaire.

The Soviet Union signed Treaties of Friendship with Somalia in July 1974, with Angola in October 1976, and with Mozambique in March 1977. Military aid has been given to Angola, Ethiopia, Guinea, Guinea-Bissau, Mali, Mozambique, Nigeria, Somalia, and Uganda. Soviet naval facilities have been constructed in Somalia.

China has military assistance agreements with Cameroon, Equatorial Guinea, Guinea, Mali, and Tanzania, and has given aid to Mozambique.

Britain maintains overflying, training, and defence arrangements with Kenya.

France has agreements on defence and military co-operation with the Central African Empire, Gabon, Ivory Coast, Niger, and Upper Volta. The military agreement

with the Malagasy Republic has been terminated but military co-operation between the two countries maintained. Since March 1974 France has had a co-operation agreement for defence with Senegal, and since February 1974 a co-operation agreement including military clauses with Cameroon. The defence agreements between France and Benin, Chad, and Togo have been terminated but replaced by agreements on technical military co-operation. Similarly, a defence agreement with the People's Republic of Congo has been terminated and replaced by an agreement on training and equipment for the Congolese armed forces. An agreement has been concluded with Djibouti for the continued stationing of French forces there. Military assistance has been given to Zaire.

Cuba has given military aid to the People's Republic of Congo, Guinea, and Somalia, and has some 15,000 men in Angola, now engaged in training Angola's armed forces and assisting with internal security. Cuban advisers are present in a number of other African countries.

Egypt, Morocco, and South Africa have given military assistance to Zaire.

ARRANGEMENTS WITHIN THE REGION

Kenya and Ethiopia signed a defence agreement in 1963.

Military links have existed in practice between South Africa and Rhodesia, with South Africa giving certain defence assistance. There is, however, no known formal agreement.

ANGOLA: PEOPLE'S REPUBLIC OF

Population: 6,100,000.

Military service: conscription, term unknown.

Total armed forces: 31,500.

Defence expenditure 1975: 2.5 bn escudos (\$98.0 m).

\$1 = 25.5 escudos (1975).

Army: 30,000.

1 armd regt.

9 inf regts.

1 cdo regt.

1 AD regt.

85 T-34, 50 T-54 med, some 70 PT-76 lt tks; 100 BRDM-2 armd cars; 165 BTR-40/-152, OT-62 APC; 120 guns, incl 105mm, 122mm; 110 BM-21 122mm multiple RL; 1,000 82mm, 120mm mor; 2,000 75mm, 82mm, 107mm RCL; ZIS-3 76mm ATK

guns; Sagger ATGW; 23mm, 37mm AA guns; SA-7 SAM. (Equipment totals are uncertain. Some 15,000 Cubans serve with the Angolan forces and operate ac and hy equipment. Some Portuguese also serve; several hundred Soviet advisers and technicians are reported to be in Angola.)

Navy: 700.

5 Argos-class patrol boats.

1 Zhuk-class patrol boat (under 100 tons).

7 small coastal patrol boats.

5 landing craft.

Air Force: 800; 33 combat aircraft.

12 MiG-17, 17 MiG-21, 4 G-91 fighters.

Tpts incl 6 *Noratlas*, 2 C-45, 1 C-47, 10

Do-27, 5 An-26, 2 *Turbo-Porter*, 27 *Auster*.

Some 4 Mi-8, 11 *Alouette*, 2 Bell 47 hel.

CONGO: PEOPLE'S REPUBLIC OF

Population: 1,440,000.

Military service: voluntary.

Total armed forces: 7,000.

Estimated GNP 1976: \$600 m.

Defence expenditure 1976: 8.89 bn CFA francs (\$37.2 m).

\$1 = 239 CFA francs (1976).

Army: 6,500.

1 armd bn (5 sqns).

1 inf bn.

1 para-cdo bn.

1 arty gp.

1 engr bn.

14 Chinese T-62, 3 PT-76 lt tks; 10 BRDM scout cars; 44 BTR-152 APC; 6 75mm, 10 100mm guns; 8 122mm how; 82mm, 10 120mm mor; 57mm, 76mm, 100mm ATK



Half of the African states south of the Sahara are totally or partially equipped with Soviet weapons. Rhodesia and Kenya, largely British-equipped, fly Hawker Hunters.

guns; 10 14.5mm, 37mm, 57mm AA guns. 1 hel sqn with 10 AB-204, 5 Alouette III, 2 Mi-8, 10 UH-1H.

Navy: 200.

7 coastal patrol craft (3 *Shanghai*-class).
9 river patrol boats.

Air Force: 300; 8 combat aircraft.

8 MiG-15/-17 fighters.
3 C-47, 4 An-24, 1 F-28, 1 *Frégate*, 5 Il-14,
3 *Broussard* tpts.
4 Alouette II/III hel.

Para-Military Forces: 1,400 Gendarmerie;
2,500 militia.

ETHIOPIA

Population: 29,330,000.
Military service: voluntary.
Total armed forces: 53,500.
Estimated GNP 1975: \$2.9 bn.
Defence expenditure 1976: 215 m birr (\$103.4 m).
\$1 = 2.08 birr (1976), 2.07 birr (1975).

Army: 50,000. (Augmented by 75,000 People's Militia. The Territorial Army has now been incorporated in the army and reservists called up, largely for guard duties.)

4 inf divs: 3 with 3 inf bdes; 1 with 1 mech, 1 mot, 1 inf bde.

1 COIN div.
1 lt inf bn (bde).
1 AB inf bn.

5 arty bns.
2 engr bns.
35 M-60, 35 T-34/-54 med, 70 M-41 lt tks; 56 AML-60 armd cars; about 90 M-113, *Commando*, M-59, 40 BTR-152 APC; 36 75mm pack, 52 105mm, 12 155mm towed, 12 M-109 155mm SP how; 146 M-2 107mm, 140 M-30 4.2-in mor.

Navy: 1,500.

1 coastal minesweeper (ex-Netherlands).
1 training ship (ex-US seaplane tender).
3 large patrol craft (ex-US).
1 *Kraljevica*-class patrol boat.
4 FPB (ex-US *Swift* class).
4 coastal patrol craft (under 50 tons).
4 landing craft (ex-US, under 100 tons).

Air Force: 2,000; 35 combat aircraft.

1 lt bbr sqn with 2 *Canberra* B2.
3 FGA sqns: 2 with 20 F-5, 1 with 7 F-86F.
1 recce sqn with 6 T-28A.
1 tpt sqn with 6 C-47, 2 C-54, 7 C-119G, 3 *Dove*, 1 Il-14, 1 *Otter*.
3 trg sqns with 20 *Safir*, 13 T-28A/D, 20 T-33A.

Reserves (all services): 20,000.

Para-Military Forces: 84,000; 9,000 mobile emergency police force; 75,000 People's Militia.

GHANA

Population: 10,400,000.
Military service: voluntary.
Total armed forces: 17,700.
Estimated GNP 1974: \$3.6 bn.
Defence expenditure 1976-77: 113.5 m cedi (\$130.5 m).
\$1 = 0.87 cedi (1976), 1.15 cedi (1974).

Army: 15,000.

2 bdes (6 inf bns and support units).
1 recce bn.
1 mor bn.
1 fd engr bn.
1 sigs bn.
1 AB coy.
9 *Saladin* armd cars; 26 *Ferret* scout cars;
82mm, 10 120mm mor.

Deployment: *Egypt* (UNEF): 1 bn, 597 men.

Navy: 1,300.

2 ASW corvettes.
3 minesweeper (ex-British, 1 *Ton*-, 2 *Ham*-class).
4 patrol craft (2 ex-British *Ford*-class).
2 FPB (4 on order).
1 training vessel.

Air Force: 1,400; 6 combat aircraft.

1 COIN sqn with 6 MB-326F.
2 tpt sqns with 8 *Islander*, 6 *Skyvan* 3M.
1 comms and liaison sqn with 6 F-27, 1 F-28, 1 HS-125.
1 hel sqn with 2 Bell 212, 4 *Alouette* III, 3 *Hughes* 269, *Wessex* 53.
13 *Bulldog* trainers.
(6 MB-326K COIN ac on order.)

Para-Military Forces: 3,000, 3 Border Guard bns.

KENYA

Population: 14,360,000.
Military service: voluntary.
Total armed forces: 7,700.
Estimated GNP 1975: \$2.8 bn.
Defence expenditure 1976: 294 m shillings (\$35 m).

\$1 = 8.40 shillings (1976), 7.13 shillings (1975).

Army: 6,500.

4 inf bns.
1 spt gp.
1 engr bn.
3 *Saladin*, 14 *Ferret* armd cars; 15 UR-416,
10 Panhard M3 APC; 8 105mm lt guns; 20
81mm, 8 120mm mor; 56 84mm *Carl*
Gustav and 120mm RCL. (40 Vickers MK
3 med tks on order.)

Navy: 400.

7 large patrol craft (with 2 40mm Bofors
guns).

Air Force: 800; 21 combat aircraft.

1 FGA sqn with 4 *Hunter* FGA9, 12 F-5E/F.
1 COIN sqn with 5 BAC-167 *Strikemaster*.
1 trg sqn with 14 *Bulldog*.
2 lt tpt sqns: 1 with 6 DHC-4, 1 with 15
Beaver.

Other ac incl 1 *Turbo Commander*, 2 *Navajo*.
3 *Alouette* II, 2 Bell 47G hel.

Para-Military Forces: 1,800 police.

MOZAMBIQUE

Population: 9,650,000.
Military service: voluntary.
Total armed forces: 19,000. (The aim is to
have 20,000 trained troops by end-1977.
There are 2 Tanzanian bns in Mozam-
bique. Chinese, Cuban, East German, and
Soviet advisers are reported with Mozam-
bique forces.)

Defence expenditure 1975: 600 m escudo
(\$18 m).
\$1 = 33.3 escudos (1975).

Army: 19,000 (incl Air Force manpower).

1 tk bn.
9 inf bns.
2-3 arty bns.
35 T-34/-54/-55 med, some PT-76 lt tks;
BTR-40, BRDM armd cars; BTR-60/-152
APC; 76mm, 85mm, 100mm, 122mm guns/
how; BM-21 multiple RL; 60mm, 82mm,
120mm mor; 82mm, 107mm ATK guns;
Sagger ATGW; 23mm, 37mm, 57mm AA
guns; 24 SA-6, SA-7 SAM.

Air Force: 8 combat aircraft. (Not all the air- craft shown are necessarily airworthy.)

8 MiG-21 fighters.
Tpts incl 8 *Noratlant*, 5 C-47, An-24.
Lt ac incl 7 Zlin.
15 *Harvard* trainers.
2 *Alouette* II/III, some Mi-8 hel.

NIGERIA

Population: 66,350,000.
Military service: voluntary.
Total armed forces: 230,500. (Large-scale
demobilization has been planned.)

Estimated GNP 1975: \$24.3 bn.
Defence expenditure 1976-77: 1.5 bn naira
(\$2.4 bn).
\$1 = 0.625 naira (1976), 0.615 naira
(1975).

Army: 221,000.

4 inf divs.
4 engr bdes.
4 recce regts.
4 arty regts.
Scorpion lt tks; 45 *Saladin*, 15 AML-60/-90
armd cars; 25 *Ferret*, some *Fox* scout
cars; 12 *Saracen* APC; 76mm, 25-pdr, 105-
mm, 122mm, 130mm guns/how; 20mm,
40mm AA guns. (*Scorpion* lt tks, *Fox*
scout cars on order.)

Navy: 3,500.
 1 ASW/AA frigate.
 2 corvettes (2 building).
 6 patrol craft (4 large, 2 ex-British Ford-class).
 1 landing craft.
 (2 large patrol craft, *Seacat* SAM on order.)

Reserves: 2,000.

Air Force: 6,000; 36 combat aircraft. (There are additional unserviceable aircraft.)
 1 lt bbr sqn with 4 Il-28.
 2 FGA/AD sqns: 1 with 12 MiG-17, 1 with 20 MiG-21J.
 2 tpt sqns with 12 F-27, 1 F-28, 6 C-130H, 7 C-47, 1 DC-6, 6 *Noratlas*.
 1 SAR hel sqn with 3 *Whirlwind*, 4 BO-105, 2 *Puma*.
 3 trg/service sqns with 4 MiG-15, 20 *Bulldog*, 10 P-149D, 23 Do-27/-28, 3 *Navajo*, 8 L-29.
 6 *Alouette* III hel.

RHODESIA

Population: 6,750,000 (270,000 White).
 Military service: 18 months (White, Asian, and Coloured population; Blacks may volunteer). (Partial mobilization is in effect. All men of 17-25 who have completed conscript service are liable to indefinite retention in the forces.)
 Total armed forces: 9,500, plus about 15,000 Territorial Force called up for service at any time.
 Estimated GNP 1976: \$US 3.4 bn.
 Defence expenditure 1977-78: \$R 98.4 m (\$US 159 m). (A further \$R 47.5 m is in the Police appropriation.)
 \$US 1 = \$R 0.617 (1977), \$R 0.617 1976).

Army: 8,250 (3,250 conscripts), plus about 15,000 Territorial Force called up for service at any one time.
 3 inf bns. (1 White bn (1,000), 2 Black bns (2,400); a third Black forming. There is an establishment for 3 bdes, to be brought up to strength by mobilizing Territorials.)
 3 Special Air Service sqns.
 Selous Scouts (Special Air Service-type unit).
 Grey's Scouts, mounted Inf (250).
 1 arty bty.
 1 engr sqn.
 60 AML-90 *Eland* armd cars; *Ferret* scout cars; UR-416 lt armd APC, lt APC; 25-pdr, 105mm pack how, 5.5-in how; 105mm RCL.

Air Force: 1,300; 48 combat aircraft.
 1 lt bbr sqn with 5 *Canberra* B2 and 2 T4.
 2 FGA sqns: 1 with 10 *Hunter* FGA9, 1 with 12 *Vampire* FB9.
 1 trg/recce sqn with 8 *Provost* T-52, 11 *Vampire* T55.
 1 tpt sqn with 9 C-47, 1 *Baron* 55, 6 *Islander*.
 1 lt tpt sqn with 12 A1-60C4, 18 Cessna 337.
 2 hel sqns with 55 *Alouette* II/III.

Reserves:
 All White, Asian, and Coloured citizens completing conscript service are liable to full-time National Service between ages 17-25 inclusive. Men of 26-34 do 84 days' continuous training, then 5-week periods of active service in Territorial Force. Men of 35-50 do 5-week periods of active service with Police Reserve or Ministry of Internal Affairs. Ground personnel servicing Air Force units are reservists or civilians. The Territorial Force has been expanded to 55,000; it contains 8 bns, each with an establishment of 1,000 men, and support units. There is also a Reserve

Holding Unit of 3,000 for men over 38.

Para-Military Forces: British South African Police (BSAP): 8,000 active, 35,000 reservists (the White population provides about a third of the active strength but nearly three-quarters of the reservist strength). Guard Force: establishment 1,000.

SENEGAL

Population: 4,630,000.
 Military service: 2 years selective.
 Total armed forces: 5,950.
 Estimated GNP 1974: \$1.2 bn.
 Defence expenditure 1976: 11.0 bn CFA francs (\$47 m).
 \$1 = 234 CFA francs (1976), 241 CFA francs (1974).

Army: 5,500.
 4 inf bns.
 1 engr bn.
 1 recce sqn.
 2 para coys.
 2 cdo coys.
 1 arty bty.
 AML armd cars; 75mm pack how, 6 105mm how; 8 81mm mor; 30mm, 40mm AA guns.

Navy: 250.
 3 large patrol craft with SS-12 SSM (1 on order).
 14 small patrol craft.
 1 LCT, 6 landing craft.

Air Force: 200; no combat aircraft.
 6 C-47, 2 F-27, 4 *Broussard*, 1 Cessna 337 tpts.
 2 *Alouette* II, 1 *Gazelle* hel.

Para-Military Forces: 1,600.

SOMALI DEMOCRATIC REPUBLIC

Population: 3,335,000.
 Military service: voluntary.
 Total armed forces: 31,500.
 Estimated GNP 1972: \$300 m.
 Defence expenditure 1976: 165 m shillings (\$25 m).

\$1 = 6.6 shillings (1976), 6.93 shillings (1972).

Army: 30,000. (Spares of all services are short and not all equipment is serviceable.)
 7 tk bns.
 8 mech Inf bns.
 14 mot inf bns.
 2 cdo bns.
 13 fd, 10 AA arty bns.
 200 T-34, 100 T-54/-55 med tks; 100 BTR-40/-50, 250 BTR-152 APC; about 100 76mm and 85mm guns; 80 122mm how; 100mm ATK guns; 150 14.5mm, 37mm, 57mm, and 100mm AA guns; SA-2/-3 SAM.

Navy: 500.
 3 Osa-class FPBG with Styx SSM.
 6 large patrol craft (ex-Soviet *Poluchat*-class).
 4 MTB (ex-Soviet P-6-class).
 4 medium landing craft (ex-Soviet T-4-class).

Air Force: 1,000; 55 combat aircraft.
 1 lt bbr sqn with 3 Il-28.
 2 FGA sqns with 40 MiG-17 and MiG-15UTI.
 1 fighter sqn with 12 MiG-21MF.
 1 tpt sqn with 3 An-2, An-24/-26.
 Other aircraft incl 3 C-47, 1 C-45, 6 P-148, 15 Yak-11, 2 Do-28.
 1 hel sqn with 5 Mi-4, 5 Mi-8, 1 AB-204.

Para-Military Forces: 12,000: 8,000 Police; 1,500 border guards; 2,500 People's Militia.

SOUTH AFRICA

Population: 26,910,000.
 Military service: 24 months.
 Total armed forces: 55,000 (38,400 conscripts).
 Estimated GNP 1976: \$31.7 bn.
 Defence expenditure 1977-78: 1.65 bn rand (\$1.9 bn).
 \$1 = 0.87 rand (1977), 0.87 rand (1976).

Army: 41,000 (34,000 conscripts, 2,100 women).
 1 corps, 2 div HQ. (Following are cadre units, forming 2 divs when brought to full strength on mobilization of Citizen Force.)



The Italian-built Aermacchi MB-326 is used as a trainer or light attack aircraft by the air forces of South Africa, Ghana (shown above), Zaire, and Zambia.

- 1 armd bde.
- 1 mech bde (one forming).
- 4 mot bdes.
- 2 para bns.
- 8 fd and 2 med arty regts.
- 9 lt AA arty regts.
- 9 fd engr sqns.
- 5 sigs regts.

Some 150 *Centurion*, 20 *Comet* med, M-41 lt tks; 1,600 *Eland* (AML-60/-90) armd cars; 230 scout cars incl *Ferret*, M-3A1; 280 *Saracen*, *Ratel* APC; 500 lt APC incl *Hippo*, *Rhino*; 25-pdr, 105mm SP how, 25-pdr, 105mm, 5.5-in, 155mm guns/how; 81mm, 120mm mor; 17-pdr, 90mm ATK guns; 105mm RCL; SS-11, *ENTAC* ATGW; 204GK 20mm, K-63 twin 35mm, L/70 40mm, 3.7-in AA guns; 18 *Cactus* (*Crotale*), 54 *Tiger*cat SAM.

Reserves: 130,000 Active Reserve (Citizen Force). Reservists serve 30 days per year for 8 years.

Navy: 5,500 (1,400 conscripts).

- 3 *Daphne*-class submarines.
- 1 destroyer with 2 *Wasp* ASW hel.
- 3 ASW frigates (3 with 1 *Wasp* hel).
- 1 escort minesweeper (training ship).
- 6 coastal minesweepers.
- 2 patrol craft (ex-British *Ford*-class).
- (2 *Agosta*-class submarines, 2 Type A69 frigates, 6 FPBG, 6 corvettes with *Gabriel* II SSM, *Exocet* SSM on order.)

Reserves: 10,500 Citizen Force with 1 destroyer, 2 frigates, 7 minesweepers.

Air Force: 8,500 (3,000 conscripts); 362 combat aircraft.

- 2 lt bbr sqns; 1 with 6 *Canberra* B(I)12, 3 T4; 1 with 9 *Buccaneer* S50.
- 2 FGA sqns with 32 *Mirage* F-1A.
- 1 fighter/recce sqn with 27 *Mirage* IIICZ/BZ/RZ.
- 1 interceptor sqn with 16 *Mirage* F-1CZ.
- 2 MR sqns with 7 *Shackleton* MR3, 19 *Piaggio* P166S.
- 4 tpt sqns with 7 C-130B, 1 L-100-20, 15 L-100-30, 9 *Transall* C-160Z, 30 C-47, 5 DC-4, 1 *Viscount* 781, 7 HS-125, 7 *Swearingen Merlin* IVA.
- 4 hel sqns: 2 with 40 *Alouette* III, 1 with 25 SA-330 *Puma*, 1 with 15 SA-321L *Super Frelon*.
- 1 flt of 11 *Wasp* (naval assigned).
- 2 comms and liaison sqns (army assigned) with 22 *Cessna* 185A/D/E, 40 AM-3C *Bosbok*, 20 C-4M *Kudu*.
- Operational trainers incl 29 *Mirage* IIIEZ/DZ/D2Z, 12 F-86, 150 MB-326 *Impala* I, 22 *Impala* II, 30 *Vampire*; other trg ac incl 100 *Harvard* (some armed), C-47 ac, *Alouette* II/III hel.
- (50 *Impala* II, 20 *Kudu* on order.)

Reserves: 25,000 Citizen Force. 6 sqns with 75 *Impala* I/II, 10 *Harvard*, T-6G.

Para-Military Forces: 90,000 Commandos (in inf bn-type units grouped in formations of 5 or more with local industrial and rural protection duties). Members do 12 months' initial and 19 days' annual training. There are 13 Air Cdo sqns with private aircraft. 35,500 South African Police (SAP) (19,500 Whites, 16,000 Non-Whites).

TANZANIA

Population: 15,990,000.
Military service: voluntary.
Total armed forces: 18,600.
Estimated GNP 1974: \$1.9 bn.
Defence expenditure 1975: 520 m shillings (\$70 m).

\$1 = 7.43 shillings (1975), 7.16 shillings (1974).

Army: 17,000.

- 1 tk bn.
- 10 inf bns.
- 2 arty bns.
- 1 engr bn.
- 20 Chinese T-59 med, T-60, 14 T-62 lt tks; BTR-40/-152, K-63 APC; 24 ex-Soviet 76-mm guns, 30 ex-Chinese 122mm how; 82mm, 50 ex-Chinese 120mm mor; 14.5-mm, 37mm AA guns.

Deployment: Mozambique: 2 inf bns.

Navy: 600.

- 6 FPB (*Shanghai*-class).
- 11 MTB (4 *Hu Chwan* hydrofoils, 3 P-6, 3 P-4-class).
- 8 coastal patrol craft.

Air Force: 1,000; 29 combat aircraft.

- 3 fighter sqns with 11 MiG-21/F-8, 3 MiG-17/F-4, 15 MiG-19/F-6.
- 1 tpt sqn with 1 An-2, 12 DHC-4, 1 HS-748, 6 *Cessna* 310.
- 2 MiG-15UTI, 11 *Cherokee* trainers.
- 2 Bell 47G, 2 AB-206 hel.

Para-Military Forces: 1,400 Police Field Force and a police marine unit; 35,000 Citizen's Militia.

UGANDA

Population: 12,300,000.
Military service: voluntary.
Total armed forces: 21,000.
Estimated GNP 1974: \$2.0 bn.
Defence expenditure 1974-75: 350 m shillings (\$49 m).
\$1 = 7.16 shillings (1974).

Army: 20,000.

- 2 bdes, each of 4 bns.
- 1 mech inf bn.
- 1 para/cdo, 1 marine/cdo bn.
- 1 trg bn.
- 1 arty regt.
- 10 T-34, 15 T-54/-55, 10 M-4 med tks; BRDM, *Saladin* armd, 15 *Ferret* scout cars; 250 BTR-40/-152, OT-64, *Saracen* APC; 76mm, 122mm guns; 82mm, 120mm mor; *Sagger* ATGW; 50 40mm AA guns. (Some equipment unserviceable.)

Navy: A small lake patrol service being formed.

Air Force: 1,000 (excluding expatriate instructors and maintenance personnel); 24 combat aircraft. (Some unserviceable.)
2 fighter sqns with 12 MiG-21, 10 MiG-17, 2 MiG-15UTI.



The South African Air Force has two squadrons of French-built *Alouette* III copters.

1 tpt sqn with 6 C-47, 1 DHC-6.
1 hel sqn with 6 AB-205, 4 AB-206.
Trainers incl 12 L-29, 10 Piper, (6 AS 202 *Bravo* on order.)

ZAIRE REPUBLIC

Population: 26,310,000.
Military service: voluntary.
Total armed forces: 33,400.
Estimated GNP 1974: \$3.5 bn.
Defence expenditure 1976: 62.2 m zaires (\$76.8 m).
\$1 = 0.81 zaires (1976), 0.5 zaires (1974).

Army: 30,000.

- 1 tk bn (another forming).
- 2 armd bns.
- 1 mech bn.
- 14 inf bns.
- 5 para, 2 cdo bns.
- 4 'Guard' bns.
- 60 Type-62 lt tks (ex-Chinese); 44 AML-90, 122 AML-60 armd cars; M-3 scout cars; 70mm, 75mm, 122mm, 130mm guns/how; 82mm, 120mm mor; 107mm RL; 57mm ATK guns; 75mm, 106mm RCL; *Snapper* ATGW; 20mm, 37mm, 40mm AA guns.

Navy: 400.

- 2 FPB (*Shanghai*-class).
- 1 70-ton coastal patrol craft.
- 3 P4-class torpedo boats (ex-Korean).
- 11 river patrol boats (6 ex-US *Stewart* type).
- 6 patrol boats (ex-US *Swift*-class), under 100 tons.

Air Force: 3,000; 54 combat aircraft.

- 1 fighter sqn with 14 *Mirage* VM, 3 VDM.
- 2 COIN sqns with 17 MB-326GB, 8 AT-6G, 12 AT-28D.
- 1 tpt wing with 8 C-130H, 2 DHC-4A, 3 DHC-5, 2 DC-6, 4 C-54, 8 C-47, 2 Mu-2.
- 1 hel sqn with 15 *Alouette* III, 23 *Puma*, 7 Bell 47.
- Trg ac incl 24 SF-260MC, 15 T-6, 15 *Cessna* A150.
- (12 *Mirage* V fighters, 3 DHC-5 tpts on order.)

Para-Military Forces: 30,000: 8 National Guard, 6 Gendarmerie bns.

ZAMBIA

Population: 5,235,000.
Military service: voluntary.
Total armed forces: 8,500.
Estimated GNP 1974: \$2.5 bn.
Defence expenditure 1977: 246.3 m kwacha (\$309.4 m).
\$1 = 0.796 kwacha (1977), 0.644 kwacha (1974).

Army: 7,000.

- 4 inf bns.
- 1 armd car sqn.
- 1 arty bty, 1 SAM bty.
- 1 engr, 1 sigs sqn.
- 28 *Ferret* scout cars; 8 M-56 105mm pack how; 24 20mm AA guns; 4 *Rapier* SAM.

Air Force: 1,500; 18 combat aircraft.

- 1 COIN sqn with 18 MB-326G.
- 2 tpt sqns: 1 with 5 DHC-4, 7 DHC-5, 2 DC-6, 1 HS-748; 1 with 4 *Beaver*, 10 Do-28, 1 *Saab Supporter*.
- Trainers incl 6 *Chipmunk*, 8 SF-260MZ.
- 1 hel sqn with 4 AB-205, 4 AB-206, 1 AB-212, 3 Bell 47G, 2 Mi-8. (10 AB-47G on order.)

Para-Military Forces: Police Mobile Unit 700 (1 bn).

The Military Balance 1977/78

CHINA

Chinese defence policy has for many years maintained a balance, at times uneasy, between the two extremes of nuclear deterrence and People's War. The former aims to deter strategic attack, the latter, by mass mobilization of the population, to deter or repel conventional land invasion. With Mao's death in September 1976 and the attack on the 'Gang of Four' thereafter, the strongest adherents of the strategic concept that men are more important than weapons were removed. There is now some indication of an effort to develop more modern general-purpose forces, to meet more limited military contingencies than the extremes of nuclear deterrence or mass war.

The People's Liberation Army (PLA) was probably the key factor in the accession to power of Hua Kuo-feng, despite some division within its leadership. The PLA can therefore be expected to have increased influence over military policy, and it has not hidden its desire for more modern weapons and for increased spending. Military conferences have covered air defence, aircraft and missiles, and planning, research, and production. While this foreshadows efforts at modernization, there is continuing debate about its pace and nature. It is too early yet to see whether, or how soon, the money for it will be forthcoming (but see the note on defence expenditure on p. 98). It is also too early to foresee the effect of Teng Hsiao-ping's reappointment at the end of July 1977 to his three major positions, including Chief of the PLA General Staff. The picture that can be drawn of Chinese forces accordingly is not dissimilar from that of last year.

NUCLEAR WEAPONS

The testing programme continued, with three tests in the year; one in September 1976, one (the third underground test) in October, and one (of four megatons) in November, bringing the total to twenty-one since testing started in 1964. A theatre nuclear force is operational, capable of reaching large parts of the Soviet Union and Asia. The stockpile of weapons, both fission and fusion, probably amounts to several hundreds and could continue to grow rapidly. Fighter aircraft could be used for tactical delivery, and for longer ranges there is the Tu-16 medium bomber, with a radius of action up to 2,000 miles. MRBM with a range of some 600-700 miles are operational but may be phased out and replaced by IRBM, also operational now, with a range of 1,500-1,750 miles. The missile force seems to be controlled by the Second Artillery, apparently the missile arm of the PLA.

A multi-stage ICBM with a limited range of 3,000-3,500 miles was first tested in 1976 and some may have been

deployed. An ICBM thought to have a range of 8,000 miles has also been under development but is unlikely to become operational for some years yet. Full-range testing, which would require impact areas in the Indian or Pacific Oceans, has not yet been carried out, but the missile has been successfully used (and thus tested) as a launcher for satellites. China has one G-class submarine with missile launching tubes, but does not appear to have missiles for it. All the present missiles are liquid-fuelled, but solid propellants are being developed.

CONVENTIONAL FORCES

The PLA is organized in 11 Military Regions and divided into Main and Local Forces. Main Force (MF) divisions, administered by the Military Regions in which they are stationed but commanded by the Ministry of National Defence, are available for operations in any region and are better equipped. Local Forces (LF), which include Border Defence and Internal Defence units, are predominantly infantry and concentrate on the defence of their own localities in co-operation with para-military units.

The PLA is generally equipped and trained for the environment of People's War, but new efforts are being made to arm a proportion of the formations with modern weapons. Infantry units account for most of the manpower and 121 of the 136 Main Force divisions; there are only 12 armoured divisions. The naval and air elements of the PLA have only about one-seventh of the total manpower, compared with about a third for their counterparts in the Soviet Union, but naval strength is increasing, and the equipment for both arms is steadily being modernized. The PLA, essentially a defensive force, lacks facilities and logistic support for protracted large-scale operations outside China.

Major weapons systems produced include MiG-19 and F-9 fighters (the last Chinese-designed), SA-2 SAM, Type-50 medium, and Type-60 amphibious tanks, and a Chinese-designed Type-62 light tank and APC. R- and W-class medium-range diesel submarines are being built in some numbers, together with SSM destroyers and fast patrol boats; a nuclear-powered attack submarine (armed with conventional torpedoes) has been under test for some years. Most military equipment is 10-20 years out of date, but China has shown increasing interest in acquiring Western military technology.

BILATERAL AGREEMENTS

China has a 30-year Treaty of Alliance and Friendship

with the Soviet Union, signed in 1950, which contains mutual defence obligations, but it is highly unlikely that this remains in force. There is a mutual defence agreement with North Korea, dating from 1961, and an agreement to provide free military aid. There are non-aggression pacts

with Afghanistan, Burma, and Cambodia. Chinese military equipment and logistic support have been offered to a number of countries. Major recipients of arms in the past have been Albania, Pakistan, and Tanzania.

CHINA

Population: 900-950,000,000.
 Military service: Army 2-4 years, Air Force 4 years, Navy 5 years.
 Total regular forces: 3,950,000.
 GNP and defence expenditure—see note on this page.

Strategic Forces

IRBM: 30-40 CSS-2.
 MRBM: 30-40 CSS-1.
 Aircraft: about 80 Tu-16 med bbrs.

Army: 3,250,000.

Main Forces:
 12 armd divs.
 121 inf divs.
 3 AB divs.
 40 arty divs (incl AA divs).
 15 railway and construction engr divs.
 150 indep regts.
 Local Forces:
 70 inf divs.
 130 indep regts.
 10,000 Soviet IS-2 hy, T-34 and Chinese-produced Type-59/-63 med, Type-60 (PT-76) amph, and Type-62 lt tks; 3,500 M-1967, K-63 APC; 20,000 guns, how and RL to 203mm, incl SU-76, SU-100, and ISU-122/-152 SP arty; 82mm, 90mm, 120mm, 160mm, 240mm mor; 57mm, 75mm RCL; 57mm, 85mm, 100mm ATK guns; 37mm, 57mm, 85mm, 100mm AA guns.

Deployment:

China is divided into 11 Military Regions (MR), in turn divided into Military Districts (MD), with usually two or three Districts to a Region. Divs are grouped into some 40 armies, generally of 3 inf divs, 3 arty regts, and, in some cases, 3 armd regts. Main Force (MF) divs are administered by Regions but are under central comd. The distribution of divs, excluding arty and engr, is believed to be:
 North and North-East China (Shenyang and Peking MR; figures include the equivalent of 2-3 divs of border troops in each of these MR, as do figures for West and South-West China); 55 MF divs, 25 LF divs.
 North and North-West China (Lanchow and Sinkiang MR): 20 MF divs, 8 LF divs.
 East and South-East China (Tsinan, Nanking, Foochow, and Canton MR includes Hainan



PRC F-6s, copies of the Soviet MiG-19. Taxiing aircraft are all-weather fighters; those in foreground, day fighters.

island): 28 MF divs, 18 LF divs.
 Central China (Wuhan MR): 15 MF divs (incl 3 AB), 11 LF divs.
 West and South-West China (Chengtu and Kunming MR): 18 MF divs, 8 LF divs.

Navy: 300,000, incl 30,000 Naval Air Force and 38,000 Marines; 22 major surface combat ships.

1 G-class submarine (with SLBM tubes). (China is not known to have any missiles for this boat. There is also 1 Han-class boat, nuclear-powered, armed with conventional torpedoes, under test.)
 66 fleet submarines (incl 36 Soviet R-, 21 W-, 2 Ming-class). (Incl trg vessels.)
 6 Luta-class destroyers with Styx SSM (more building).
 4 ex-Soviet Gordy-class destroyers with Styx SSM.
 12 destroyer escorts (4 Riga-type with Styx SSM).
 16 patrol escorts.
 35 submarine chasers (Soviet Kronstadt-type).
 90 Osa- and 70 Komar-type FPBG with Styx SSM (more building).
 175 MTB (under 100 tons).
 100 hydrofoils (under 100 tons).
 400 MGB (Shanghai-, Swatow-, Whampoa-classes).
 22 minesweepers (16 Soviet T-43 type).
 15 LST, 16 med, 15 inf landing ships, some 450 landing craft.
 300 coast and river defence vessels (most under 100 tons).

Deployment:

North Sea Fleet: about 200 vessels deployed from the mouth of the Yalu river to south of Lienyunkang; major bases at Tsingtao, Lushun, Luta.

East Sea Fleet: about 500 vessels; deployed from south of Lienyunkang to Tangshan; major bases at Shanghai, Chou Shan, Ta Hsiehtao.

South Sea Fleet: about 200 vessels; deployed from Tangshan to the Vietnamese frontier; major bases at Huangpu, Chanchiang, Yulin.

Naval Air Force: 30,000; about 700 shore-based combat aircraft, organized into 4 bbr and 5 fighter divs, incl about 130 Il-28 torpedo-carrying, Tu-16 med and Tu-2 lt bbrs and some 500 fighters, incl MiG-17, MiG-19/F-6, and some F-9; a few Be-6 Madge MR ac; 50 Mi-4 Hound hel and some lt tpt ac. Naval fighters are integrated into the AD system.

Air Force: 400,000, incl strategic forces and 120,000 AD personnel; about 5,200 combat aircraft.

About 80 Tu-16 and a few Tu-4 med bbrs.
 About 400 Il-28 and 100 Tu-2 lt bbrs.
 About 600 MiG-15 and F-9 FB.

About 4,000 MiG-17/-19, 120 MiG-21, and some F-9 fighters organized into air divs and regts.

About 450 fixed-wing tpt ac, incl some 300 An-2, about 100 Li-2, 50 Il-14 and Il-18, some An-12/-24/-26, and Trident. 350 hel, incl Mi-4, Mi-8, and 16 Super Frelon. These could be supplemented by about 500 ac from the Civil Aviation Administration, of which about 150 are major tpts.

There is an AD system, capable of providing a limited defence of key urban and industrial areas, military installations, and weapon complexes. Up to 4,000 naval and air force fighters are assigned to this role, also about 100 CSA-1 (SA-2) SAM and more than 10,000 AA guns.

Para-Military Forces: Public security force and a civilian militia with various elements: the Armed Militia, up to 7 million, organized into about 75 divs and an unknown number of regts; the Urban Militia, of several million; the Civilian Production and Construction Corps, about 4 million; and the Ordinary and Basic Militia, 75-100 million, who receive some basic training but are generally unarmed.

Gross National Product and Defence Expenditure

Gross National Product

There are no official Chinese figures for GNP or National Income. Western estimates have varied greatly, and it is difficult to choose from a range of figures, variously defined and calculated. The United States Arms Control and Disarmament Agency (ACDA) has estimated GNP for 1975 to be \$299 bn, while a recent British estimate for 1976 was \$309 bn.

Defence Expenditure

China has not made public any budget figures since 1960,

and there is no general agreement on the volume of resources devoted to defence. Such estimates as there are have been speculative. The Joint Economic Committee of the United States Congress suggested in 1976 that China spends 20-25 per cent of what the United States spends on defence, or \$23-28 bn. A speech by the Chinese Defence Minister in May 1977, to the effect that China was in a race against time and had decided to step up the manufacture of modern weapons, suggests that defence expenditure may increase.

The Military Balance 1977/78

Other Asian Countries And Australasia

BILATERAL AGREEMENTS

The United States has bilateral defence treaties with Japan, the Republic of China (Taiwan), and the Republic of Korea, and one (being renegotiated) with the Philippines. Under several other arrangements in the region, she provides military aid on either grant or credit basis to Taiwan, Indonesia, the Republic of Korea, Malaysia, the Philippines, and Thailand, and sells military equipment to many countries, notably Australia, Japan, Korea, and Taiwan. There are military facilities agreements with Australia, Japan, the Republic of Korea, the Philippines, and Taiwan. There are major bases in the Philippines and on Guam. The 1973 Diego Garcia Agreement between the British and American governments provides for the development of the present limited US naval communications facility on Diego Garcia into a US naval support facility.

The Soviet Union has treaties of friendship, co-operation, and mutual assistance with India, Bangladesh, Mongolia, and the Democratic People's Republic of Korea. Military assistance agreements exist with Sri Lanka (Ceylon) and the Socialist Republic of Vietnam. Important Soviet military aid is also given to Afghanistan.

Australia has supplied a small amount of defence equipment to Malaysia and Singapore and is giving defence equipment and assistance to Indonesia, including the provision of training facilities. Vietnam and Laos signed in July 1977 a series of agreements which contained military provisions and a border pact and may have covered the stationing of Vietnamese troops in Laos.

MULTILATERAL AGREEMENTS

In 1954 the United States, Australia, Britain, France, New Zealand, Pakistan, the Philippines, and Thailand signed the South-East Asia Collective Defence Treaty, which came into force in 1955 and brought the Treaty Organization, SEATO, into being. Pakistan left SEATO in 1973. The SEATO Council decided in 1975 that the Organization should be phased out, and it was formerly closed down on 30 June 1977.

Australia, New Zealand, and the United States are members of a tripartite treaty known as ANZUS, which was signed in 1951 and is of indefinite duration. Under this treaty each agrees to 'act to meet the common danger' in the event of attack on either metropolitan or island territory of any one of them, or on armed forces, public vessels, or aircraft in the Pacific.

Five-Power defence arrangements, relating to the defence of Malaysia and Singapore and involving Australia, Malaysia, New Zealand, Singapore, and Britain, came into effect on 1 November 1971. These stated that, in the event of any externally organized or supported armed attack or threat of attack against Malaysia or Singapore, the five governments would consult together for the purpose of deciding what measures should be taken, jointly or separately. Britain withdrew her forces from Singapore, except for a small contribution to the integrated air-defence system, by 31 March 1976. New Zealand troops remained, as did Australian air forces in Malaysia.

AFGHANISTAN

Population: 20,100,000.
Military service: 2 years.
Total armed forces: 110,000.
Estimated GNP 1976: \$1.3 bn.
Defence expenditure 1976-77: 2.5 bn afghanis (\$47.8 m).
\$1 = 52.3 afghanis (1976).

Army: 100,000.
3 armd divs (under strength).
10 inf divs (under strength).
3 mountain inf bdes.
1 arty bde, 3 arty regts.
1 cdo regt.
200 T-34, 500 T-54/-55, T-62 med, 40 PT-76 lt tks; 400 BTR-40/-50/-60/-152 APC; 900 76mm, 100mm, 122mm, and 152mm guns and how; 100 120mm mor; 50 132mm multiple RL; 350 37mm, 57mm,

85mm, 100mm, and ZSU-23-4 SP AA guns; *Sagger, Snapper* ATGW.

Reserves: 150,000.

Air Force: 10,000; 184 combat aircraft.
3 lt bbr sqns with 30 Il-28.
7 FGA sqns with 80 MiG-17, 24 Su-7.
3 interceptor sqns with 50 MiG-21.
2 tpt sqns with 10 An-2, 10 Il-14, 2 Il-18.
3 hel sqns with 18 Mi-4, 12 Mi-8.
Trainers incl 30 MiG-15UTI/-17UTI, Yak-11/-18.
1 AD div: 1 SAM bde (3 bns with SA-2), 1 AA bde (2 bns with 37mm, 85mm, 100mm guns), 1 radar bde (3 bns).

Reserves: 12,000.

Para-Military Forces: 30,000 Gendarmerie.

AUSTRALIA

Population: 13,990,000.
Military service: voluntary.
Total armed forces: 69,650.
Estimated GNP 1976: \$US 100.7 bn.
Defence expenditure 1976-77: \$A 2.26 bn (\$US 2.80 bn).
\$1 = \$A 0.805 (1976).

Army: 31,800.
1 inf div HQ and 3 task force HQ.
1 armd regt.
2 recce/APC regts.
6 inf bns.
1 Special Air Service regt.
4 arty regts (1 med, 2 fd, 1 lt AA).
1 aviation regt.
3 fd engr, 1 fd survey regt.
2 sigs regts.
24 *Leopard*, 143 *Centurion* med tks; 750



The Royal Australian Air Force flies Australian, British, French, Italian, New Zealand, and US-built aircraft, including two squadrons of these F-111Cs.

M-113 APC; 17 5.5-in guns; 250 105mm how; M-40 106mm RCL; ENTAC ATGW; 40mm AA guns; Redeye SAM; 25 Bell 47, 54 Bell 206B-1 hel; 18 Pilatus Porter ac, 136 watercraft.
(77 Leopard med tks, 69 M-113 APC, 20 Rapier SAM, 10 Blindfire AD radar, 11 Nomad lt ac on order.)

Deployment: Egypt (UNEF): 44.

Reserves: 28,000, incl active reserve of 20,000 in combat, support, log, and trg units.

Navy: 16,200.

4 Oberon-class submarines.
1 aircraft carrier (carries 8 A-4, 6 S-2, 10 hel).
3 ASW destroyers with Tartar SAM, Ikara ASW msls.
2 modified Daring-class destroyers.
6 destroyers with Seacat SAM/SSM, Ikara ASW msls.
1 trg ship.
1 coastal minesweeper, 2 coastal minehunters (modified British Ton-class).
12 Attack-class patrol boats.
1 oiler, 1 destroyer tender, 6 landing craft.
(2 submarines, 2 frigates, 15 patrol craft on order.)

Fleet Air Arm: 32 combat aircraft.

1 FB sqn with 13 A-4G Skyhawk.
2 ASW sqns with 3 S-2E, 16 S-2G Tracker.
1 ASW hel sqn with 8 Sea King.
1 hel sqn with 4 Bell UH-1H, 2 Bell 206B, 4 Wessex.
1 trg sqn with 8 MB-326H, 3 TA-4G.
2 HS-748 ECM trg ac.

Reserves: 4,236, incl active reserve of 833.

Air Force: 21,650; 120 combat aircraft. (A further 8 Canberra B20 bbrs, 28 Mirage IIID/O FGA, 6 CH-47, 16 Wessex 31B, 1 UH-1B hel also held.)
2 strike/recce sqns with 23 F-111C.
3 interceptor/FGA sqns with 48 Mirage IIIO.
1 recce sqn with 13 Canberra B20.
2 MR sqns: 1 with 10 P-3 Orion; 1 with 12 Neptune SP2H.
5 tpt sqns: 2 with 24 C-130A/E; 2 with 22 DHC-4; 1 with 2 BAC-111, 10 HS-748, 3

Mystère 20, 17 C-47.
1 Forward Air Controller flight with 6 CA-25.
1 OCU with 14 Mirage IIIO.
1 hel tpt sqn with 6 CH-47 Chinook.
2 utility hel sqns with 47 UH-1H Iroquois.
Trainers incl 80 MB-326, 33 CA-25 Winjeel, 37 CT-4 Airtrainer.
(10 Orion MR, 12 C-130H tpts on order.)

Deployment: Malaysia/Singapore: 2 sqns with Mirage IIIO.

Reserves: 1,095: 450 Air Force Reserve, 5 Citizens Air Force sqns; 645 Emergency Reserve.

BANGLADESH

Population: 80,520,000.
Military service: voluntary.
Total armed forces: 71,000.
Estimated GNP 1972: \$5.3 bn.
Defence expenditure 1976-77: 746 m taka (\$51.5 m).
\$1 = 14.5 taka (1976), 7.30 taka (1972).

Army: 65,000.

1 inf div HQ.
7 inf bdes (25 inf bns).
1 tk regt.
4 arty, 2 hy mor regts.
3 engr bns.
30 T-54 med tks; 30 105mm, 5 25-pdr gun/how; 81mm, 50 120mm mor; 106mm RCL. (Army and Air Force spares are short; some equipment is unserviceable.)

Navy: 3,000.

1 frigate (ex-British Type 61).
5 patrol craft (2 Kraljevica-class).
3 armed river patrol boats.
1 support vessel.

Air Force: 3,000; 11 combat aircraft.

1 fighter sqn with 11 MiG-21MF.
1 tpt sqn with 1 An-24, 2 An-26, 4 Beaver.
1 hel sqn with 5 Alouette III, 2 Wessex HC, 6 AB-212, 8 Mi-8.
Trainers incl 2 MiG-21UTI, 1 T-33A, 8 F-86.

Para-Military Forces: 12,000 Bangladesh Rifles, 36,000 Armed Police Reserve.

BRUNEI

Population: 170,000.
Military service: voluntary.
Total armed forces: 2,600. (All services form part of the Army.)
Estimated GNP 1976: \$381.7 m.
Defence expenditure 1977: \$B 303 m (\$US 123.1 m).
\$1 US = \$B 2.46 (1977), \$B 2.62 (1976).

Army: 2,600.

2 inf bns.
24 Sankey APC, 16 81mm mor. (16 Scorpion lt tks on order.)

Navy

6 coastal, 3 river patrol craft; 2 landing craft.

Air Force

1 HS-748 tpt ac.
3 Bell 205, 3 Bell 206, 4 Bell 212 hel.

Para Military Forces: 1,700 Royal Brunei Police.

BURMA

Population: 32,445,000.
Military service: voluntary.
Total armed forces: 169,500.
Estimated GNP 1975: \$2.7 bn.
Defence expenditure 1976: 787 m kyat (\$113 m).
\$1 = 6.96 kyat (1976), 6.56 kyat (1975).

Army: 153,000.

3 inf divs each with 10 bns.
2 armd bns.
84 indep inf bns (in regional comds).
5 arty bns.
Comet lt tks: 40 Humber armd cars; 45 Ferret scout cars; 50 25-pdr, 5.5-in gun/how; 120 76mm, 80 105mm how; 120mm mor; 50 6-pdr and 17-pdr ATK guns; 10 40mm, 3.7-in AA guns.
(Spares are short for all three services; some equipment is unserviceable.)

Navy: 9,000 (800 marines).

2 frigates.
4 coastal escorts.
5 MGB/MTB (under 100 tons).
37 gunboats (17 under 100 tons).
35 river patrol boats (under 100 tons).
1 support ship.
9 landing craft (1 utility, 8 med).

Air Force: 7,500; 25 combat aircraft.

1 COIN sqn with 15 AT-33, 10 SF-260M.
Tpts incl 4 C-45, 6 C-47, 2 Bristol 170, 6 DHC-3, 10 Cessna 180.
Hel incl 10 KB-47G, 12 HH-43B, 10 Alouette III, 18 UH-1.
Trainers incl 25 Provost, 8 T-33, 10 T-37C, 7 Chipmunk.

Para-Military Forces: 38,000 People's Police Force, 35,000 People's Militia.

CHINA: REPUBLIC OF (TAIWAN)

Population: 17,235,000.
Military service: 2 years.
Total armed forces: 460,000.
Estimated GNP 1975: \$16.1 bn.
Defence expenditure 1975-76: 38.3 bn New Taiwan dollars (\$1 bn).
\$US 1 = NNT 38.0 (1975).

Army: 320,000.

2 armd divs.
12 hy inf divs.



Save for a locally designed trainer, all aircraft of the Republic of China Air Force are US-built; among them are fighter, recce, and trainer versions of the F-104G.

6 lt inf divs.
2 armd cav regts.
2 AB bdes.
4 special forces gps.
1 SSM bn with *Honest John*.
3 SAM bns: 2 with 72 *Nike Hercules*, 1 with 24 *HAWK*.
150 M-47/-48 med, 1,000 M-41 lt tks; 250 M-113 APC; 550 105mm, 300 155mm guns and how; 350 75mm M-116 pack, 90 203mm, 10 240mm how; 225 105mm SP how; 150 M-18 76mm SP ATK; 500 106mm RCL; 300 40mm AA guns (some SP); *Honest John* SSM; *Nike Hercules*, *Chaparral* SAM; 50 UH-1H, 60 Hughes 500 hel. (24 *Improved HAWK* SAM, 118 UH-1H hel on order.)

Deployment: *Quemoy*: 60,000; *Matsu*: 20,000.

Reserves: 1,000,000.

Navy: 35,000.
5 submarines (2 ex-US *Guppy*-II-class, 3 *SX-404* midget).
18 destroyers.
10 frigates (12 ex-US armed transports).
3 patrol vessels (plus up to 14 small patrol boats).
6 MTB.
22 MCM craft (9 coastal minesweepers).
50 landing vessels: 2 dock, 2 comd, 20 LST, 4 med, 22 utility.
(*Gabriel* SSM on order.)

Reserves: 45,000.

Marines: 35,000.
2 divs.
M-47 med tks; LVT-4 APC; 105mm, 155mm how; 106mm RCL.

Reserves: 35,000.

Air Force: 70,000; 296 combat aircraft.
13 fighter sqns with 90 F-100A/D, 110 F-5A/B/E, 63 F-104G.
1 recce sqn with 8 RF-104G.
1 MR sqn with 25 S-2A *Tracker*.
1 SAR sqn with 10 HU-16A ac, 10 UH-1H hel.
30 C-46, 50 C-47, 40 C-119, 10 C-123, 1 Boeing 720B tpts.
160 trainers, incl PL-1B *Chien Shou*, T-28, T-33, T-38, F-5B/F, TF-104G.
7 UH-19, 10 Bell 47G hel.
(60 F-5E fighters, *Shafir* AAM on order.)

Reserves: 90,000.

Para-Military Forces: 100,000 militia.

INDIA

Population: 622,375,000.
Military service: voluntary.
Total armed forces: 1,096,000.
Estimated GNP 1975: \$89.7 bn.

Defence expenditure 1977-78: 30.42 bn rupees (\$3.45 bn).
\$1 = 8.83 rupees (1977), 8.55 rupees (1975).

Army: 950,000.
2 armd divs.
17 inf divs.
10 mountain divs.
5 indep armd bdes.
1 indep inf bde.
1 para bde.
14 indep arty bdes, incl about 20 AA arty regts, 4 arty observation sqns, and indep flts.
180 *Centurion* Mk 5/7, 900 T-54/-55/-62, some 700 *Vijayanta* med, 150 PT-76 lt tks; 700 BTR-50/-152, OT-62/-64(2A) APC; about 2,000 75mm, 76mm, and 25-pdr (mostly towed), about 300 100mm, 105mm (incl pack how), and *Abbot* 105mm SP, 550 130mm, 5.5-in, 155mm guns/how; 500 120mm, 160mm mor; 57mm, 106mm RCL; SS-11 and *ENTAC* ATGW; 100mm ATK guns; ZSU-23-4 SP, 30mm, 40mm AA guns; 40 *Tiger*cat SAM; 40 *Krishak*, 20 *Auster* AOP9 lt ac; some *Alouette* III, 38 SA-315 *Cheetah* hel (75 more on order).

Reserves: 200,000. Territorial Army 40,000.

Navy: 46,000, incl Naval Air Force.
8 submarines (Soviet F-class).
1 aircraft carrier (capacity 25 ac, incl 12 *Sea Hawk*, 4 *Alizé*, 2 *Alouette* III).
2 cruisers.
3 destroyers.
25 frigates (4 *Leander*-class with 2 *Seacat* SAM, 10 *Petya*-class, 9 GP, 2 trg).
8 *Osa*-class FPBG with *Styx* SSM.
8 patrol boats (incl 5 *Poluchat*-class).
8 minesweepers (4 inshore).
1 landing ship, 6 landing craft (*Polnocny*-class).
(2 *Leander* frigates, 8 *Nanuchka* msl patrol ships, 3 landing craft on order.)

Naval Air Force: 2,000.

1 attack sqn with 25 *Sea Hawk* (10 in carrier).
1 MR sqn with 12 *Alizé* (4 in carrier).
1 MR sqn with 9 *Super Constellation*, 3 *Il-38*.
2 hel sqns with 22 *Alouette* III.
2 ASW sqns with 12 *Sea King* hel.
2 *Devon*, 7 *HJT-16 Kiran*, 5 *BN Islander*, 4 *Vampire* T55 ac, 4 Hughes 300 hel.
(5 *Sea King* ASW hel on order.)

Air Force: 100,000; about 670 combat aircraft.
3 lt bbr sqns with 50 *Canberra* B(I)58, B(1)12.
13 FGA sqns: 4 with 100 *Su-7B*, 4 with 50 *HF-24 Marut* 1A, 5 with 65 *Hunter* F56.
10 interceptor sqns with 270 *MiG-21F/PFMA/FL/MF*.
8 interceptor sqns with 130 *Gnat* Mk 1.
1 recce sqn with 6 *Canberra* PR57.

11 tpt sqns: 1 with 12 *Il-14*; 1 with 16 *HS-748*, 3 *Tu-124*; 2 with 32 *C-119G*; 2 with 30 *An-12*; 1 with 29 *Otter*; 3 with 50 *C-47*; 1 with 14 *Caribou*.
12 hel sqns: 6 with 100 *Mi-4*; 3 with 35 *Mi-8*; 3 with 174 *Chetek* (*Alouette* III); 12 *AB-47*, 2 *S-62*.
Trainers incl *Mystère* IV, 110 *Kiran*, *HT-2, Hunter, Canberra*, 24 *T-66*, 14 *MiG-21U*, *Su-7U*, 32 *HS-748*, 50 *Iskra*.
20 SAM sites with 120 SA-2.
(110 *MiG-21MF*, 100 *Ajeet* (*Gnat*), 10 *HS-748*, 10 *Marut* Mk 1T, 40 *Iskra* ac, 45 *Chetek* hel on order.)

Para-Military Forces: About 200,000 Border Security Force, 100,000 in other organizations.

INDONESIA

Population: 135,770,000.
Military service: selective.
Total armed forces: 247,000.
Estimated GNP 1975: \$29.2 bn.
Defence expenditure 1977-78: 560 bn rupiahs (\$1.35 bn).
\$1 = 415 rupiahs (1977), 415 rupiahs (1975).

Army: 180,000. (About one-third of the army is engaged in civil and administrative duties.)

1 armd cav bde (1 tk bn, support units). (In Strategic Reserve Command.)
14 inf bdes (90 inf, 14 arty, 13 AA, 10 engr bns; 1 in Strategic Reserve Command).
2 AB inf bdes (6 bns). (In Strategic Reserve Command.)
5 fd arty regts.
4 AA arty regts.
Stuart, 150 *AMX-13*, 75 *PT-76* lt tks; 75 *Saladin* armd, 55 *Ferret* scout cars; *Saracen*, 130 *BTR-40/-152* APC; 50 76mm, 40 105mm, 122mm guns/how; 200 120mm mor; *ENTAC* ATGW; 20mm, 40mm, 200 57mm AA guns; 1 *Beaver*, 1 *Beech* 18, 2 *C-47*, 2 *Aero Commander* 680, *Cessna* 185, *Piper* L-4, 18 *PZL Wilga* 32 ac; 7 *Alouette* III hel. (Some equipment non-operational for lack of spares.) (16 *AB-205* hel on order.)

Deployment: *Egypt* (UNEF): 1 battalion, 510.

Navy: 39,000, incl Naval Air and 12,000 Marines. (Some equipment and ships non-operational for lack of spares.)
3 submarines (ex-Soviet W-class).
11 frigates (3 ex-Soviet *Riga*-, 4 ex-US *Jones*-class).
23 coastal escorts (8 ex-Soviet *Kronstadt*-class).
12 *Komar*-class FPBG with *Styx* SSM.
44 patrol craft (2 under 100 tons).
15 MCM (incl ex-Soviet T-43-class, 6 ex-US).
3 comd/support ships.
10 amph vessels.
1 marine bde.
(2 Type 206 submarines, 3 corvettes, 5 minesweepers, 4 FPBG, 6 patrol boats, *Exocet* SSM on order.)

Naval Air: 1,000.

5 *HU-16*, 6 *C-47*, 6 *Nomad* MR ac; 4 *Bell* 47G, 6 *Alouette* II/III hel. (6 *Nomad* on order.)

Air Force: 28,000; 39 combat aircraft. (Some aircraft non-operational for lack of spares. In addition to the aircraft shown above, some 22 *Tu-16*, 10 *Il-28*, 40 *MiG-15/-17*, 35 *MiG-19*, 15 *MiG-21*, 10 *Il-14*, 10 *An-12* ac, 20 *Mi-4*, 9 *Mi-6* hel are in store.)
2 FGA sqns with 16 *CA-27 Avon-Sabre*, 7

F-51D *Mustang*.
 1 COIN sqn with 16 OV-10F.
 61 tpts: 8 C-130B, 3 *Super Constellation*, 12 C-47, 1 *Skyvan*, 8 F-27, 1 C-140 *JetStar*, 7 Cessna 207/401/402, 18 *Gelatik*, 10 *Otter*, 6 CASA C-212.
 2 hel sqns with 12 UH-34D, 5 Bell 204B, 4 *Alouette III*, 1 S-61A.
 Trainers incl 4 T-6, 16 T-33, 20 T-34, *Airtourer*.
 (2 *King Air A-100*, 21 *Musketeer*, 16 T-34, 22 CASA C-212 ac; 3 Bell 47G, 2 Bell 206B hel on order.)

Para-Military Forces: 12,000 Police Mobile bde; about 100,000 Militia.

JAPAN

Population: 114,010,000.
 Military service: voluntary.
 Total armed forces: 238,000.
 Estimated GNP 1976: \$567 bn.
 Defence expenditure 1977-78: 1,691 bn yen (\$6.10 bn).
 \$1 = 277 yen (1977), 299 yen (1976).

Army: 155,000.
 1 mech div.
 12 inf divs (7-9,000 men each).
 1 tk bde.
 1 AB bde.
 1 composite bde.
 1 arty bde.
 2 AA arty bdes.
 1 sigs and 5 engr bdes.
 8 SAM gps (each of 4 btys) with 190 *HAWK*.
 1 hel wing and 34 aviation sqns.
 560 Type 61, 150 Type 74 med, 130 M-41 lt tks; 430 Type SU 60, 70 Type 73 APC; M-2 155mm guns; 360 M-2 105mm, 220 M-1 155mm, 30 M-52 105mm SP, 10 M-44 155mm SP, 70 203mm how; 550 107mm mor (some SP); 1,500 57mm, 75mm, 106mm, 106mm SP RCL; Type 30 SSM; Type 64, KAM-9 ATGW; 400 35mm twin, 37mm, 40mm, 75mm, 90mm AA guns; *HAWK* SAM; 30 L-19, 20 LM-1/2, 10 LR-1 ac; 50 KV-107, 40 UH-1H, 80 UH-1B, 100 OH-6J, 3 H-13 hel.
 (2 LR-1 ac, 3 KV-107, 13 UH-1H, 10 OH-6J, 1 AH-1S hel on order.)

Reserves: 39,000.

Navy: 40,000 (including Naval Air).
 15 submarines.
 30 destroyers (2 with 3 hel and *ASROC*; 1 with *Tartar* SAM, *ASROC*; 4 with 2 hel, *ASROC*; 8 with 2 hel or *ASROC*; 1 with *Standard* SAM, *ASROC*; 14 GP).
 15 frigates (11 with *ASROC*, 4 GP).
 15 coastal escorts.
 5 MTB.
 9 coastal patrol craft (all under 100 tons).
 37 MCM (1 tender, 1 minelayer, 29 coastal, 6 inshore).
 5 LST.
 (1 LST, 5 destroyers, 1 frigate, 2 submarines, 6 MCM on order.)

Naval Air: 14,000.
 11 MR sqns: with 110 P-2J, P2V-7, S-2A, 17 PS-1.
 7 hel sqns with 70 S-61A, KV-107A, HSS-2.
 1 tpt sqn with 4 YS-11M, 1 S-2A.
 5 SAR sqns with 3 US-1 ac, 1 S-61A, 8 S-62A hel.
 Trainers incl 6 YS-11T, 5 TC-90, 30 B-65, 8 T-34, 30 KM-2 ac; 7 Bell 47, 4 OH-6J hel.
 (5 PS-1, 13 KM-2, 11 P-2J, 1 TC-90 ac, 14 HSS-2, 2 S-61A hel on order; 1 P2V-7, 6 S-2A in store.)

Reserves: 600.

Air Force: 43,000; 364 combat aircraft.
 3 FGA sqns with 100 F-86F.
 10 interceptor sqns: 6 with 160 F-104J; 4 with 90 F-4EJ.
 1 recce sqn with 14 RF-4E.
 3 tpt sqns with 10 YS-11, 22 C-1A.
 1 SAR wing with 20 MU-2 ac, 21 KV-107, 7 S-62 hel.
 220 trainers: incl T-1A/B, 25 T-2A, T-33, T-34, F-104DJ, 4 C-46.
 5 SAM gps with *Nike-J* (6th forming).
 A Base Defence Ground Environment with 28 control and warning units.
 (43 F-4EJ, 44 F-1, 10 T-2, 18 T-3, 7 C-1, 2 MU-2, 2 MU-2J ac, 3 V-107 hel on order.)

KAMPUCHEA (CAMBODIA)

Population: 8,570,000.
 Estimated GNP 1971: \$1.5 bn.
 Total armed forces: 90,000.

Army: The former Khmer Liberation Army, which was organized into some 4 divs and 3 indep regts, appears still to have the same strength it had at the end of hostilities in 1975, and none of the former regime's troops seem to have been incorporated into the structure. The forces are deployed in small detachments on internal security duties throughout the country. Their equipment, a mixture of Soviet, Chinese, and American arms, includes: 10 BTR-152, 200 M-113 APC; 300 105mm, 122mm, 20 155mm guns/how; 107mm mor; 107mm RCL, 40mm AA guns.

Navy: Some 150 small patrol, river, and 6 landing craft. (Navy and Air Force may be part of the Army.)

Air Force: Aircraft are thought to include some 10 AU-24 COIN, 9 C-47 and C-123 tpts, 15 T-51, 20 T-28 trainers, 25 UH-1H hel gunships. However, their condition is not known.

KOREA: DEMOCRATIC PEOPLE'S REPUBLIC (NORTH)

Population: 16,720,000.
 Military service: Army, Navy 5 years, Air Force 3-4 years.
 Total armed forces: 500,000.
 Estimated GNP 1976: \$8.9 bn.
 Defence expenditure 1976: 2.06 bn won (\$1 bn). (It is uncertain whether this covers all defence expenditure, and there is no consensus on a suitable exchange rate for the dollar conversion.)



Japan's air force is equipped with several indigenous designs, including the supersonic T-2 trainer. Some interceptor squadrons fly this F-4EJ Phantom.

\$1 = 2.05 won.

Army: 430,000.
 2 tk divs.
 3 mot inf divs.
 20 inf divs.
 3 recce bdes.
 12 indep inf and lt inf bdes.
 3 AA arty bdes.
 5 indep tk regts.
 5 AB bns.
 3 SSM regts with *FROG*.
 20 arty regts.
 10 AA arty regts.
 350 T-34, 1,400 T-54/-55 and Type 59 med, 150 PT-76, 50 T-62 lt tks; 750 BTR-40/-50/-152, M-1967 APC; 3,000 guns and how up to 152mm; 1,200 RL; 9,000 120mm and 160mm mor; 1,500 82mm RCL; 57mm to 100mm ATK guns; 24 *FROG-5/-7* SSM; 5,000 AA guns, incl ZSU-57-2 SP, 37mm, 57mm, 85mm, 100mm.

Navy: 25,000.
 10 submarines (ex-Soviet W-, ex-Chinese R-class).
 7 frigates (1 building).
 19 submarine chasers/escorts (15 ex-Soviet SO-1-class).
 10 *Komar* and 8 *Osa*-class FPBG with *Styx* SSM.
 100 MGB (incl 8 ex-Chinese *Shanghai*- and 8 *Swatow*-class).
 150 MTB (incl 4 ex-Soviet *Shersten*, 12 P-4, and 60 P-6-class).
 4 large patrol craft, 90 landing craft.

Air Force: 45,000; 630 combat aircraft.
 3 lt bbr sqns with 80 Il-28.
 13 FGA sqns with 20 Su-7 and 300 MiG-15/-17.
 10 fighter sqns with 130 MiG-21 and 100 MiG-19.
 225 tpts, incl An-2, An-24, Il-14/-18, Tu-154.
 Hel incl 30 Mi-4, 20 Mi-8.
 Trainers incl Yak-11/-18, MiG-15/-21UTI, Il-28U.
 3 SAM bdes with 250 SA-2.

Para-Military Forces: 40,000 security forces and border guards; civilian militia of 1,000,000 to 2,000,000 with small arms, some AA arty.

KOREA: REPUBLIC OF (SOUTH)

Population: 35,200,000.
 Military service: Army and Marines 2½ years, Navy and Air Force 3 years.
 Total armed forces: 635,000.
 Estimated GNP 1975: \$18.4 bn.

Defence expenditure 1977: 871 bn won (\$1.8 bn).
\$1 = 484 won (1977), 491 won (1975).

Army: 560,000.
1 mech div.
19 inf divs.
2 armd bdes.
5 special forces bdes.
2 AD bdes.
7 tk bns.
30 arty bns.
1 SSM bn with *Honest John*.
2 SAM bdes with *HAWK* and *Nike Hercules*.
M-60, 880 M-47/-48 med tks; 500 M-113/-577 APC; 2,000 105mm, 155mm, 175mm, 203mm towed and SP guns/how; 3,000 82mm, 107mm mor; M-18 SP ATK guns; 57mm, 75mm, 106mm RCL; *TOW*, *LAW* ATGW; *Honest John* SSM; 40mm AA guns; 80 *HAWK*, 40 *Nike Hercules* SAM; 5 KH-4 hel. (100 OH-6A hel on order.)

Reserves: 1,100,000.

Navy: 25,000.
7 destroyers (*Gearing*-, *Sumner*-, *Fletcher*-class).
9 destroyer escorts (6 escort transports).
14 coastal escorts.
44 patrol boats (under 100 tons).
1 FPBG.
12 coastal minesweepers.
21 landing ships (8 LST, 1 dock, 11 med, 1 utility).
70 amph craft.
(7 FPBG, 120 *Harpoon* SSM on order.)

Reserves: 25,000.

Marines: 20,000; 1 div, 2 bdes.

Reserves: 60,000.

Air Force: 30,000; 335 combat aircraft.
11 FB sqns with 33 F-4D/E, 270 F-5A/E, F-86D/F, AT-33.
1 recce sqn with 12 RF-5A.
1 ASW sqn with 20 S-2F.
Tpts incl 20 C-46, 12 C-54, 12 C-123, 2 HS-748, *Aero Commander*.
Trainers incl 20 T-28D, 30 T-33A, 20 T-41D, 35 F-5B.
6 UH-19, 5 UH-1D, 2 Bell 212 hel.
(24 OV-10G COIN ac, *Sidewinder* AAM on order.)

Reserves: 55,000.

Para-Military Forces: A local defence militia, 1,000,000 Homeland Defence Reserve Force.

LAOS

Population: 3,500,000.
Military service: conscription, term unknown.
Total armed forces: 48,550.
Estimated GNP 1972: \$211 m.
Defence expenditure 1974-75: 16 bn kip (\$27 m).
\$1 = 600 kip (1974), 500 kip (1972).

Army: (Lao People's Liberation Army): 46,000. (The Royal Lao Army has been disbanded; some men may have been absorbed into the Liberation Army.)
100 inf bns (under Military Regions).
Supporting arms and services.
M-24, PT-76 lt tks; BTR-40, M-113 APC; 75mm, 85mm, 105mm, 155mm how; 81mm, 82mm, 4.2-in mor; 107mm RCL; 4 Cessna U-17A lt ac.

Navy: About 550.
20 river patrol craft.

14 landing craft/tpts (all under 100 tons).

Air Force: 2,000; 45 combat aircraft. (Most aircraft inherited from the Royal Lao Air Force; degree of serviceability unknown.)
40 T-28A/D COIN aircraft.
5 AC-47 gunships.
Tpts incl 10 C-47, 10 C-123, 6 An-24, 1 *Aero Commander*, 1 *Beaver*.
6 T-41D trainers.
6 *Alouette* II/III, 42 UH-34, Mi-8 hel.

MALAYSIA

Population: 13,340,000.
Military service: voluntary.
Total armed forces: 64,000.
Estimated GNP 1976: \$US 8.6 bn.
Defence Expenditure 1977: \$M 1.35 bn (\$US 544 m).
\$1 = \$M 2.48 (1977), \$M 2.55 (1976).

Army: 52,500.
2 div HQ.
9 inf bdes, consisting of:
29 inf bns.
3 recce regts.
3 arty regts, 2 AD btys.
1 special service unit.
5 engr, 4 sigs regts, and administrative units.
200 *Commando*, 140 Panhard, M-3 armd, 60 *Ferret* scout cars, 80 105mm how; 120mm RCL; 35 40mm AA guns. (132 *Commando*, 12 105mm how on order.)

Reserves: About 26,000.

Navy: 5,500.
2 frigates (1 ASW with *Seacat* SAM, 1 training).
8 FPBG (4 with SS-12, 4 with *Exocet* SSM).
27 patrol craft.
6 coastal minesweepers.
3 LST (2 on order).
(10 FPBG, 4 *Spica* MTB, *Exocet* SSM on order.)

Reserves: 1,000.

Air Force: 6,000; 34 combat aircraft.
1 FB sqn with 14 F-5E.
2 COIN sqns with 20 CL-41G *Tebuan*.
4 tpt, 1 liaison sqns with 6 C-130H, 17 DHC-4A, 5 *Dove*, 3 *Heron*, 2 HS-125, 2 F-28-100, 12 Cessna, 402B.
4 hel sqns with 21 S-61A-4, 30 *Alouette* III, 12 Bell 47G, 5 Bell 206B, AB-212.
1 trg sqn with 2 F-5B, 15 *Bulldog* 102, 4 Cessna 402B.
(20 *Gazelle* hel on order.)

Para-Military Forces: Police Field Force of 13,000, 17 bns, 40 patrol boats; People's Volunteer Corps more than 200,000.

MONGOLIA

Population: 1,535,000.
Military service: 2 years.
Total armed forces: 30,000.
Estimated GNP 1974: \$2.8 bn.
Defence expenditure 1977: 405 m tugrik (\$120.5 m).
\$1 = 3.36 tugrik (1977), 4.00 tugrik (1974).

Army: 28,000.
2 inf bdes.
1 construction bde.
30 T-34, 100 T-54/-55 med tks; 40 BTR-60, 50 BTR-152 APC; 76mm, 100mm, 130mm, 152mm guns/how; 10 SU-100 SP guns; *Snapper* ATGW; 37mm, 57mm AA guns.

Reserves: 30,000.

Air Force: 2,000 (excluding expatriate personnel); 10 combat aircraft.
1 fighter sqn with 10 MiG-15.
20 An-2, 6 Il-14, 4 An-24 tpts.
10 Mi-1 and Mi-4 hel.
Yak-11/-18 trainers.
1 SAM bn with SA-2.

Para-Military Forces: about 18,000 frontier guards and security police.

NEPAL

Population: 13,185,000.
Military service: voluntary.
Total armed forces: 20,000.
Estimated GNP 1972: \$1.0 bn.
Defence expenditure 1975: 146 m rupees (\$13.2 m).
\$1 = 11.05 rupees (1975), 10.1 rupees (1972).

Army: 20,000. (There is no Air Force: the 70-man Army Air Flight Department operates the aircraft.)
5 inf bdes (1 Palace Guard).
1 para bn.
1 arty regt.
1 engr regt.
1 sigs regt.
AMX-13 lt tks, 4 3.7-in pack how; 4 4.2-in, 18 120mm mor; 2 40mm AA guns; 2 *Skyvan*, 3 DHC-3, 1 HS-748 tpts; 3 *Alouette* III, 2 *Puma* hel.

Para-Military Forces: 12,000 Nepalese Police Force.

NEW ZEALAND

Population: 3,200,000.
Military service: voluntary, supplemented by Territorial service of 12 weeks for the Army.
Total armed forces: 12,466.
Estimated GNP 1977: \$US 12.56 bn.
Defence expenditure 1976-77: \$NZ 221 m (\$US 210.5 m).
\$1 = \$NZ 1.05 (1977), \$NZ 0.99 (1976).

Army: 5,457.
2 inf bns.
1 arty bty.
Regular troops also form the nucleus of 2 bde gps and a log gp; these would be completed by mobilization of Territorials.
7 M-41 lt tks; 8 *Ferret* scout cars; 55 M-113 APC; 17 25-pdr, 10 5.5-in guns; 28 105mm how; 23 106mm RCL.

Deployment: *Singapore:* 1 inf bn with log support.

Reserves: 1,540 Regular, 5,834 Territorial.

Navy: 2,741.
4 frigates with *Seacat* SAM (2 Type 12, 2 *Leander*-class with *Wasp* hel).
4 patrol craft (under 100 tons).
1 survey ship.

Deployment: 1-2 frigates in Pacific area.

Reserves: 3,250 Regular, 302 Territorial.

Air Force: 4,268; 34 combat aircraft.
1 FB sqn with 10 A-4K, 3 TA-4K *Skyhawk*.
1 FB/trg sqn with 16 BAC-167.
1 MR sqn with 5 P-3B *Orion*.
3 med tpt sqns with 5 C-130H, 3 *Devon*, 10 *Andover*, 3 *Bristol Freighter*.
1 tpt hel sqn with 8 Bell 47G, 2 *Wasp*, 10 UH-1D/H.
Trainers: 6 *Devon*, 13 *Airtrainer*, 4 *Airtourer* ac, 4 *Sioux* hel.
(6 *Airtrainer* trainers on order.)

Deployment: Singapore: 1 tpt sqn (3 Bristol Freighter tpts, 4 UH-1 hel).

Rosorvos: 1,000 Regular, 139 Territorial.

PAKISTAN

Population: 74,190,000.
Military service: voluntary.
Total armed forces: 428,000.
Estimated GNP 1975: \$10.1 bn.
Defence expenditure 1977-78: 8.1 bn rupees (\$819 m).
\$1 = 9.89 rupees (1977), 9.72 rupees (1975).

Army: 400,000 (incl 29,000 Azad Kashmir troops).
2 armd divs.
14 inf divs.
3 indep armd bdes.
3 indep inf bdes.
2 AD bdes.
5 army aviation sqns.
M-4, 250 M-47/-48, 50 T-55, 700 T-59 med, PT-76, 50 M-24 lt tks; 550 M-113 APC; about 1,000 25 pdr, 100mm, 105mm, 130mm, and 155mm guns/how; 270 107mm, 120mm mor; 6-pdr ATK guns; 75mm, 106mm RCL; *Cobra* ATGW; 37mm, 40mm, 57mm, 3.7-in AA guns; *Crotale* SAM; 50 O-1E, 45 Saab *Supporter* lt ac; 12 Mi-8, 20 *Alouette* III, 20 Bell 47G hel. (35 *Puma* hel on order.)

Reserves: 500,000.

Navy: 11,000.
3 submarines (*Daphne*-class, 1 on order).
5 SX-404 midget submarines.
1 lt cruiser (trg ship).
4 destroyers (1 ex-British *Battle*-, 1 CH-, 2 CR-classes).
1 frigate (ex-British Type 16).
19 patrol boats (ex-Chinese, 6 *Hu Chwan* hydrofoil, 12 *Shanghai*-class).
7 coastal minesweepers.
2 UH-19, 4 *Alouette* III, 6 *Sea King* SAR hel.

Reserves: 5,000.

Air Force: 17,500; 247 combat aircraft.
1 lt bbr sqn with 11 B-57B.
4 fighter sqns with 30 *Mirage* III/EP/DP, 28 VPA.
8 FGA sqns with 60 F-86, 100 MiG-19/F-6.
1 recce sqn with 13 *Mirage* III/EP.
1 MR sqn with 3 *Atlantic*, 2 HU-16B.
Tpts incl 12 C-130B, 1 L-100, 1 *Falcon* 20, 1 F-27.
10 CH-47, 10 HH-43B, 14 *Alouette* III, 1 *Puma*, 12 Bell 47 hel.
Trainers incl 15 Saab *Supporter*, 26 T-33, 40 T-37.
(10 *Mirage* VPA fighters, 4 *Super Frelon* hel, *Sidewinder* AAM on order.)

Reserves: 8,000.

Para-Military Forces: 157,000: 60,000 Civil Armed Forces, 22,000 National Guard, 20,000 Federal Security Forces, 40,000 Frontier Corps, 15,000 Pakistan Rangers.

PHILIPPINES

Population: 45,295,000.
Military service: selective.
Total armed forces: 99,000.
Estimated GNP 1976: \$16.5 bn.
Defence expenditure 1977-78: 3.08 bn pesos (\$419 m).
\$1 = 7.35 pesos (1977), 7.43 pesos (1976).

Army: 63,000.
4 lt inf divs.
1 indep inf bde.
21 *Scorpion*, 7 M-41 lt tks; 35 M-113 APC; 100 105mm. 5 155mm how; 40 4.2-in mor; 75mm, 106mm RCL; *HAWK* SAM. (33 M-113 on order.)

Reserves: 17,000.

Navy: 20,000 (7,000 Marines and engr).
7 frigates.
3 destroyer escorts.
22 patrol craft.
24 inshore patrol craft (under 100 tons).
4 minesweepers.
2 command ships.
33 landing craft (22 LST, 5 med).
1 SAR sqn with 10 *Islander*.
6 marine bns.

Reserves: 12,000.

Air Force: 16,000; 104 combat aircraft.
2 FGA sqns with 20 F-5A/B.
2 fighter/trg sqns with 20 F-86F.
2 COIN sqns with 16 SF-260WP, 36 T-28A/D.
1 gunship sqn with 12 AC-47.
1 SAR sqn with 6 HU-16 ac, UH-19, 3 SH-34G, 12 UH-1H, H-13, Hughes 300 hel.
1 hel sqn with 18 UH-1H.
6 tpt sqns with 9 C-130H, 30 C-47, 9 F-27, 4 L-100-20, 4 YS-11, 15 C-123K, 12 *Nomad*.
1 liaison sqn with O-1E, Cessna 180, U-17A/B, Cessna 310K, 21 *Beaver*.
Other hel incl 12 UH-1D, 8 FH-1100, 5 UH-19, 2 H-34, 2 S-62.
Trainers incl 3 F-5B, 12 T-28A, 12 T-33, 17 T-34, 10 T-41D, 32 SF-260MP.
(11 F-5E FGA, 38 BO-105, 17 UH-1 hel on order.)

Reserves: 16,000.

Para-Military Forces: 65,000: 40,000 Philippine Constabulary, 25,000 Local Self-Defence Force.

SINGAPORE

Population: 2,340,000.
Military service: 24-36 months.
Total armed forces: 36,000.
Estimated GNP 1975: \$US 6.5 bn.
Defence expenditure 1976-77: \$S 840 m (\$US 340 m).
\$US 1 = \$S 2.47 (1976), \$S 2.28 (1975).

Army: 30,000.
1 armd bde (1 tk, 2 APC bns).
3 inf bdes (9 inf, 3 arty, 3 engr, 3 sigs bns).
75 AMX-13 tks; 250 V-200 *Commando*, 250 M-113 APC; some 6 25-pdr, 20 155mm guns/how; 50 120mm mor; 90 106mm RCL. (155mm how on order.)

Reserves: 45,000, 18 reserve battalions.

Navy: 3,000.
6 FPBG (*Jaguar*-class with *Gabriel* SSM).
6 MGB.
5 patrol craft (4 under 100 tons).
2 coastal minesweepers.
4 ex-US LST and 4 landing craft.
(2 minesweepers, 6 landing craft on order.)

Air Force: 3,000; 92 combat aircraft.
2 FGA/recce sqns with 32 *Hunter* FGA/FR74/T75.
3 FGA sqns with 40 A-4S.
1 COIN/trg sqn with 20 BAC-167.
2 tpt/SAR sqns: 1 with 6 *Airtourer*, 1 with 6 *Skyvan*.
1 SAR hel sqn with 8 *Alouette* III, 3 AB-212. Hel incl 15 UH-1H.

Trainers incl 4 T-66, 16 SF-260MS, 6 TA-4S.
2 SAM sqns: 1 with 28 *Bloodhound*, 1 with *Rapier*.
(21 F-5E/F FGA, 200 *Sidewinder* AAM on order.)

Para-Military Forces: 7,500 police/marine police; Gurkha guard units; Home Guard 30,000.

SRI LANKA (CEYLON)

Population: 14,650,000.
Military service: voluntary.
Total armed forces: 13,300.
Estimated GNP 1976: \$2.8 bn.
Defence expenditure 1977: 352.1 m rupees (\$48.4 m).
\$1 = 7.28 rupees (1977), 8.56 rupees (1976).

Army: 8,900.
1 bde of 3 bns.
1 recce regt.
1 arty regt.
1 engr regt.
1 sigs regt.
6 *Saladin* armd cars, 30 *Ferret* scout cars; 10 BTR-152 APC; 76mm, 85mm, 105mm how.

Reserves: 12,000; 7 bns and a Pioneer Corps.

Navy: 2,400.
1 frigate (ex-Canadian *River*-class).
5 fast gunboats (ex-Chinese *Shanghai*-class).
23 coastal patrol craft.

Air Force: 2,000; 10 combat aircraft.
1 FGA sqn with 5 MiG-17F, 1 MiG-15UTI, 4 *Jet Provost* Mk 51.
1 tpt sqn with 2 *Riley*, 2 *Heron*, 2 DC-3/1 CV-440.
1 comms sqn with 4 Cessna 337.
1 hel sqn with 7 AB-206, 2 Ka-26, 6 Bell 47G.
3 Cessna 150, 7 *Chipmunk*, 4 *Dove* trainers.

Reserves: 750; 4 sqns Air Force Regt, 1 sqn Airfield Construction Regt.

Para-Military Forces: 14,500 Police Force, 4,500 Volunteer Force.

THAILAND

Population: 45,090,000.
Military service: 2 years.
Total armed forces: 211,000.
Estimated GNP 1975: \$14.7 bn.
Defence expenditure 1976-77: 13.1 bn baht (\$639 m).
\$1 = 20.5 baht (1976), 20.6 baht (1975).

Army: 141,000.
1 cav div.
6 inf divs (incl 4 tk bns).
3 indep regimental combat teams.
4 AB and special forces bns.
1 SAM bn with *HAWK*.
5 aviation coys and some flts.
20 M-24, 150 M-41 lt tks; 20 *Saracen* armd cars; 250 M-113, LVTP-7 APC; 300 105mm, 50 155mm how; 57mm, 106mm RCL; 40mm AA guns; 40 *HAWK* SAM; 90 O-1 lt ac; 120 UH-1B/D, 4 CH-47, 24 OH-13, 16 FH-1100, 3 Bell 206, 2 Bell 212, 6 OH-23F, 28 KH-4 hel. (24 how, 80 APC, and armd cars on order.)

Reserves: 500,000.

Navy: 28,000 (7,000 Marines).



Above is a Mirage III reconnaissance plane of the Pakistani Air Force. At left, a MiG-21M fighter manufactured in India under license from the USSR. With the exception of the People's Republic of China, India, with 670 combat aircraft, has the largest air force in Asia.

107mm, 122mm, 140mm RL; Sagger ATGW; 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-2, SA-3, SA-6, SA-7 SAM.

Deployment: 40,000 in Laos (numbers fluctuate).

Navy: 3,000.

3 coastal escorts (ex-Soviet SO-1 type).
3 Komar-class FPBG with Styx SSM.
22 MGB (Shanghai- and Swatow-class).
4 MTB (ex-Soviet P-4-, P-6-classes).
About 30 small patrol boats (under 100 tons).
Some 20 landing craft.
10 Mi-4 SAR hel.

Air Force: 12,000; 310 combat aircraft.

1 lt bbr sqn with 10 Il-28.
8 FGA sqns with 120 MiG-15/-17, 30 Su-7.
6 interceptor sqns with 80 MiG-19, 70 MiG-21.
20 An-2, 4 An-24, 12 Il-14, 1 Il-18, 20 Li-2 tpts.
20 Mi-4, 10 Mi-6, 9 Mi-8 hel.
About 30 trainers incl Yak-11/-18, MiG-15/21 UTI.

(Equipment of the former forces of South Vietnam is not included above. It is estimated to have included up to 550 M-48 med and M-41 lt tks; 1,200 M-113 APC; 1,330 105mm and 155mm guns/how (some SP); 2 frigates; 2 patrol vessels; 42 patrol gunboats; 13 landing ships; 17 landing craft; 800 riverine craft; 11 support vessels; 1,000 ac of all types, incl 73 F-5A, 95 A-37B, 10 C-130, 25 A-1H/J, 37 AC-119C/K, 10 AC-47, 114 O-1, 33 Beaver, 13 C-47; 36 CH-47, 434 UH-1 hel.)

Para-Military Forces: 70,000 Frontier, Coast Security, and People's Armed Security Forces; Armed Militia of about 1,500,000.

Para-Military Forces: 52,000 Volunteer Defence Corps, 14,000 Border Police, hel and lt ac.

VIETNAM: SOCIALIST REPUBLIC OF

Population: 46,855,000.
Military service: 2 years minimum.
Total armed forces: 615,000.

Army: 600,000.

25 inf divs, 2 trg divs. (Inf divs, normally totalling 8-10,000 men, include 1 tk bn, 3 inf, 1 arty regts, and support elements.)
1 arty comd (of 10 regts).
1 engr comd.
About 15 indep inf regts.
20 SAM regts (each with 18 SA-2 launchers).
50 AA arty regts.
15 indep engr regts.
900 T-34, T-54, and T-59 med, PT-76, Type 60 lt tks; BTR-40/-60 APC; SU-76, ISU-122 SP guns; 85mm, 100mm, 105mm, 122mm, 130mm, 152mm, 155mm guns/how; 82mm, 100mm, 107mm, 120mm, 160mm mor;

7 frigates (1 with Seacat SAM).
14 patrol vessels.
3 FPBG with Gabriel SSM.
18 mine warfare ships.
28 river patrol boats.
30 coastal gunboats (29 under 100 tons).
5 LST (1 trg ship), 15 landing craft.
1 MR sqn with 10 S-2F Tracker, 2 HU-16B Albatross.
1 Marine bde (3 inf, 1 arty bns).
(24 patrol craft, Exocet SSM on order.)

Air Force: 42,000; 184 combat aircraft.
1 FGA sqn with 12 F-5A/E, 2 F-5B.
7 COIN sqns with 45 T-28D, 20 T-6G, 32 OV-10C, 16 A-37B, 32 AU-23A Peacemaker.
1 recce sqn with 17 T-33, 4 RT-33A, 4 RF-5A.
1 utility sqn with 25 O-1 lt ac.
3 tpt sqns with 20 C-47, 30 C-123B, 2 HS-748, 1 Islander, 3 Skyvan, 10 Turbo-Porter.
2 hel sqns with 20 CH-34C, 30 UH-1H.
Trainers incl 15 Chipmunk, 14 T-33A, 14 T-37B, 10 T-41, 12 SF-260, 15 CT-4.
4 bns of airfield defence troops.
(16 F-5E/F FGA, 4 CASA C-212 tpts, 18 Sidewinder AAM on order.)

Latin America

CONTINENTAL TREATIES AND AGREEMENTS

In March and April 1945, the Act of Chapultepec was signed by Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the United States, Uruguay, and Venezuela. This Act declared that any attack upon a member party would be considered an attack upon all and provided for the collective use of armed force to prevent or repel such aggression.

In September 1947, all the parties to the Chapultepec Act—except Ecuador and Nicaragua—signed the Inter-American Treaty of Reciprocal Assistance, otherwise known as the Rio Defence Treaty (Cuba withdrew from the Treaty in March 1960). This Treaty constrained signatories to the peaceful settlement of disputes among themselves and provided for collective self-defence should any member party be subject to external attack.

The Charter of the Organization of American States (OAS), drawn up in 1948, embraced declarations based upon the Rio Defence Treaty. The member parties—the signatories to the Act of Chapultepec plus Barbados, El Salvador, Jamaica, and Trinidad and Tobago—are bound to peaceful settlement of internal disputes and to collective action in the event of external attack upon one or more signatory states. (Legally, Cuba is a member of the OAS but has been excluded—by a decision of OAS Foreign Ministers—since January 1962. Barbados and Trinidad and Tobago signed the Charter in 1967.)

The United States is also a party to two multilateral defence treaties: the Act of Havana (1940), signed by representatives of all of the then 21 American Republics, which provides for the collective trusteeship by American nations of European colonies and possessions in the Americas should any attempt be made to transfer the sovereignty of these colonies from one non-American power to another; and the Havana Convention, which corresponds with the Act of Havana, signed in 1940 by the same states, with the exception of Bolivia, Chile, Cuba, and Uruguay.

A Treaty for the Prohibition of Nuclear Weapons in

Latin America (The Tlatelolco Treaty) was signed in February 1967 by 22 Latin American countries; 20 countries have now ratified it (Argentina has signed but not ratified, and Brazil has ratified but reserved her position on peaceful nuclear explosions). Britain and the Netherlands have ratified it for the territories within the Treaty area for which they are internationally responsible. Britain and the Netherlands have signed Protocol I (which commits states outside the region to accept, for their territories within it, the Treaty restrictions regarding the emplacement or storage of nuclear weapons); France has not; the United States has announced her intention of doing so. The United States, Britain, France, and China have signed Protocol II to the Treaty (an undertaking not to use or threaten to use nuclear weapons against the parties to the Treaty); the Soviet Union has not. An Agency has been set up by the contracting parties to ensure compliance with the Treaty.

OTHER AGREEMENTS

In July 1965, El Salvador, Guatemala, Honduras, and Nicaragua agreed to form a military bloc for the co-ordination of all resistance against possible Communist aggression.

The United States has bilateral military assistance agreements or representation with Argentina, Bolivia, Brazil, Chile, Colombia, the Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela. She has a bilateral agreement with Cuba for jurisdiction and control over Guantanamo Bay. (This agreement was confirmed in 1934. In 1960 the United States stated that it could be modified or abrogated only by agreement between the parties, and that she had no intention of agreeing to modification or abrogation.) She also has a treaty with the Republic of Panama granting her, in perpetuity, full sovereign rights over the Canal Zone, but negotiations on its revision are at an advanced stage.

The Soviet Union has no defence agreements with any of the states in this area, although she has supplied military equipment to Cuba and Peru.

ARGENTINA

Population: 26,045,000.

Military service: Army and Air Force, 1 year, Navy 14 months.

Total armed forces: 129,900.

Estimated GNP 1976: \$52.1 bn. (Rapid inflation makes defence expenditure and GNP figures in local currency and dollar terms unreliable.)

Defence expenditure 1977: 466.24 bn pesos (\$1.42 bn).

\$1 = 329 pesos (1977), 149 pesos (1976).

Army: 80,000.

1 armd bde.
1 mech bde.
3 mot inf bdes.
4 inf bdes.
2 mountain bdes.
1 airmobile bde.
5 AD bns.
1 aviation bn.
200 M-4 *Sherman* med, 120 AMX-13 lt tks;
140 M-113, 150 Mowag, AMX-VCI, M-3,
M-16 APC; 200 105mm and 155mm guns;
105mm pack, 155mm towed, 24 French
Mk F3, some US M-7 155mm SP how;
120mm mor; 75mm, 90mm, 105mm RCL;
SS-11/-12, *Bantam*, *Cobra* ATGW; 35mm,

40mm, 90mm AA guns; *Tigercat* SAM; 4
Turbo Navajo, 2 DHC-6, 2 G-222, 1 *Queen
Air*, 1 *Sabreliner*, 5 Cessna 207, 5 T-41
ac; 7 AB-206, 7 FH-1100, 20 UH-1H, Bell
47G, 2 Bell 212 hel. (5 *Turbo Commander*,
1 G-222, 4 *Swearingen Metro IIIA* on
order.)

Reserves: 250,000: 200,000 National Guard,
50,000 Territorial Guard.

Navy: 32,900, incl Naval Air Force and
Marines.
4 submarines (2 Type 209, 2 ex-US *Guppy*-
class).

1 aircraft carrier (15 S-2A/A-4Q/SH-3D).
 2 cruisers with *Seacat* SAM, 2 hel.
 10 destroyers (2 Type 42 with *Sea Dart* SAM,
 5 *Fletcher*-class, 3 ex-US).
 11 patrol vessels (2 trg, 1 coastguard).
 5 large patrol craft (3 in coastguard).
 6 coastal minesweepers/minehunters.
 2 FPB.
 5 landing ships, 28 landing craft (1 LCT).
 (6 Type 21 frigates, 2 Type 148 FPBG,
Exocet SSM, *Sea Dart* SAM on order.)

Naval Air Force: 4,000; 60 combat aircraft.
 1 FB sqn with 14 A-4Q *Skyhawk*.
 2 FB/trg sqns with 8 MB-326GB, 28 T-28.
 1 MR sqn with 6 S-2A, 4 P-2H, PBV-5A
Catalina.
 1 SAR sqn with 3 HU-16B *Albatross*.
 1 ASW/SAR sqn with 9 *Alouette* III, 4 S-61D
 hel.
 Tpts incl 3 C-45, 8 C-47, 3 C-54, 3 *Electra*,
 2 DC-4, 1 *Guarani* II, 1 HS-125, 3 *Beaver*,
 1 DHC-6, 2 *Super King Air* 200, 15 Cessna
 U-17A.
 Hel incl 5 S-55, 6 Bell 47G (3 *Lynx* on
 order).
 Trainers incl 12 T-6, AT-11.

Marines: 7,000.
 5 bns.
 1 cdo bn.
 1 fd arty bn.
 1 AD regt.
 1 engr bn.
 1 sigs bn.
 7 indep inf coys.
 20 LVTP-7, 15 LARC-5 APC; 105mm how;
 106mm, 120mm mor; 75mm, 105mm RCL;
Bantam ATGW; 88mm AA guns; 10 *Tiger-*
cat SAM.

Air Force: 17,000; 146 combat aircraft.
 1 bbr sqn with 9 *Canberra* B62 and 2 T64.
 2 FB sqns with 45 A-4P *Skyhawk*.
 1 interceptor sqn with 12 *Mirage* IIIIA, 2
 IIIDA.
 3 FGA sqns with 16 MS-760A *Paris* I, 25 A-
 4P.
 1 COIN sqn with 15 IA-58 *Pucará*.
 1 recce sqn with 20 IA-35 *Huanquero*.
 1 hel sqn with 14 Hughes 500M, 6 Bell UH-
 1H.
 1 SAR sqn with 3 HU-16B ac, 6 *Lama* hel.
 Tpts incl 1 Boeing 707-320B, 7 C-130E/H,
 1 *Sabreliner*, 1 HS-748, 8 F-27, 6 F-28,
 10 C-47, 7 DHC-6, 22 IA-50 *Guarani* II,
 4 *Commander*, 14 *Shrike Commander*.
 Hel incl 2 S-61NR, 1 S-61R, 12 UH-1D/F,
 6 UH-19, 4 Bell 47G.
 Trainers incl 35 T-34, 12 MS-760, *Mirage*,
Canberra.
 (15 *Pucará* COIN, 2 *Merlin* IVA, 16 *Turbo*
Commander tpts on order.)

Para-Military Forces: 42,000. Gendarmerie:
 11,000; M-113 APC, 20 lt ac, 10 hel under
 Army command; mainly for frontier duties.
 National Maritime Prefecture: 9,000. *Poli-*
cia Federal: 22,000; APC, 4 BO-105 hel.

BOLIVIA

Population: 5,910,000.
 Military service: 12 months selective.
 Total armed forces: 22,500.
 Estimated GNP 1976: \$2.5 bn.
 Defence expenditure 1977: 1.5 bn pesos
 (\$74.2 m).
 \$1 = 20.2 pesos (1977), 20 pesos (1976).

Army: 17,000.
 4 cav regts.
 1 mech regt.
 1 mot regt.

13 inf regts (1 *Palace Guard*).
 2 ranger regts.
 1 para bn.
 3 arty regts.
 6 engr bns.
 10 *Commando* armd cars; 10 M-706, 18 M-
 113, 20 Mowag APC; 6 75mm guns; 25
 75mm pack, 20 FH-18, 25 M-101 105mm
 how.

Navy: 1,500.
 16 small patrol craft.
 1 river transport.

Air Force: 4,000; 45 combat aircraft.
 1 fighter/trg sqn with 12 T-33A/N, 4 F-86F.
 3 COIN sqns with 10 F-51D *Mustang*, 13
 AT-26D *Xavante*, 6 T-28A/D.
 Tpts incl 1 C-130H, 1 *Electra*, 2 C-54, 1
Learjet, 6 *Arava*, 4 CV-440, 12 C-47, C-45,
 2 Cessna 402, 1 *Turbo-Porter*, 2 *Turbo*
Centurion, 15 Cessna 185.
 1 hel sqn with 12 Hughes 500M, 3 Hiller OH-
 23C/D.
 Trainers incl Cessna 310, 10 T-6, 6 T-41D,
 18 T-23 *Uirapuru*, 8 Fokker S-11.
 (1 *Arava*, 1 C-130H tpts on order.)

BRAZIL

Population: 113,240,000.
 Military service: 1 year.
 Total armed forces: 271,800 (113,000 con-
 scripts).
 Estimated GNP 1976: \$131 bn.
 Defence expenditure 1977: 26.95 bn cruzei-
 ros (\$2.07 bn).
 \$1 = 13.0 cruzeiros (1977), 10.3 cruzei-
 ros (1976).

Army: 180,000 (110,000 conscripts).
 8 divs: each up to 4 armd, mech, or mot inf
 bdes.
 2 indep inf bdes.
 1 indep para bde.
 5 lt 'jungle' inf bns.
 60 M-4 med, 220 M-3A1, 250 M-41, 25 X-1
 lt tks; 120 *Cascavel*, M-8 armd cars; *Urutu*,
 M-59, 600 M-113 APC; 500 75mm pack,
 450 105mm (some SP), 90 155mm how;
 108-R, 114mm RL; 106mm RCL; *Cobra*
 ATGW; 40mm, 90mm AA guns; 40 Neiva
 L-42 *Regente*, O-1E lt ac; 10 AB-206A hel.
 (4 *Roland* SAM on order.)

Navy: 49,000 (3,000 conscripts, 13,500 Naval
 Air Force, Marines, and Auxiliary Corps).
 8 submarines (1 *Oberon*-, 7 *Guppy* II/III-
 class).
 1 aircraft carrier.
 12 destroyers (1 with *Seacat* SAM).
 2 frigates (with *Exocet* SSM, *Seacat* SAM, 1
 hel).
 10 corvettes (fleet tugs).
 5 river patrol ships, 1 river monitor.
 6 gunboats.
 6 coastal minesweepers.
 2 coastal auxiliaries, 2 LST, 39 small landing
 craft.
 (2 *Oberon* submarines, 4 frigates on order.)

Naval Air Force:
 1 ASW sqn with 5 SH-3D *Sea King*.
 1 utility sqn with 5 *Whirlwind*, 4 *Wasp*, 4 FH-
 100, 2 Bell 47G, 18 AB-206B.
 1 trg sqn with 10 Hughes 269/300.
 (16 EMB-111 MR ac, 9 *Lynx* hel on order.)

Air Force: 42,800; 131 combat aircraft.
 1 interceptor sqn with 11 *Mirage* IIIIEBR, 4
 DBR.
 2 FGA sqns with 33 F-5E.
 7 COIN/recce sqns with 60 AT-26 *Xavante*
 ac, 5 UH-1D, 4 Bell 206, 4 OH-6A hel.
 1 ASW sqn with 8 S-2A, 8 S2-E (6 in car-
 rier).

1 MR sqn with 7 P-2E *Neptune*.
 3 SAR sqns with 12 SA-16 *Albatross*, 3 RC-
 130E, 5 SH-1D, 36 UH-1H hel.
 10 tpt sqns; some 120 tpts, incl 2 Boeing
 737, 13 C-130E/H, 2 KC-130H, 2 BAC-
 111, 10 HS-25, 12 HS-748, 21 DHC-5,
 35 C-47, 6 *Catalina*, 60 C-95 *Bandeirante*,
 C-119, 5 *Porter*.
 60 Bell 47, 11 Bell 206A, 4 OH-4 hel.
 Trainers incl 6 F-5B, 100 T-23 *Uirapuru*, 150
 T-25 *Universal*, 25 Cessna T-37C, 8 TC-
 45T, 50 AT-26; 34 H-13J hel.
 (45 AT-26, 8 T-25, 28 EMB-110 on order.)

Para-Military Forces: Public security forces
 about 200,000; state militias in addition.

CHILE

Population: 10,940,000.
 Military service: 1 year.
 Total armed forces: 85,000 (21,600 con-
 scripts).
 Estimated GNP 1976: \$9.0 bn. (Rapid infla-
 tion makes defence expenditure and GNP
 figures in local currency and dollar terms
 unreliable.)
 Defence expenditure 1977: 10.93 bn pesos
 (\$614 m).
 \$1 = 17.8 pesos (1977), 12.5 pesos
 (1976).

Army: 50,000 (20,000 conscripts).
 6 divs, incl 7 cav regts (3 armd, 3 horsed, 1
 hel-borne), 20 inf regts (incl 9 mot, 3
 mountain), 6 arty regts, some AA arty,
 support dets.
 76 M-4 med, 10 M-3, 60 M-41 lt tks; M-113,
 Mowag MR-8 APC; 105mm, M-56 105mm
 pack how; 120mm mor; 106mm RCL;
 20mm, 40mm AA guns; 9 T-25 trg ac, 9
Puma, 3 UH-1H, 2 AB-206 hel. (8 T-25
 trg ac, AS-11/-12 ASM on order.)

Reserves: 160,000.

Navy: 24,000 (1,600 conscripts), incl Naval
 Air and Marines.
 3 submarines (2 *Oberon*, 1 ex-US *Fleet* type).
 2 cruisers (1 ex-US *Brooklyn*-, 1 ex-Swedish
Tre Kroner-class).
 6 destroyers (2 ex-US *Sumner*-, 2 *Fletcher*-,
 2 *Almirante*-class with *Exocet* SSM, *Sea-*
cat SAM).
 2 frigates (*Leander*-class) with *Exocet* SSM,
Seacat SAM.
 3 destroyer escorts (ex-US fast transport).
 4 corvettes.
 2 large patrol craft.
 4 MTB.
 7 landing ships/craft (4 ex-US LST, 3
 medium).

Naval Air Force: 500.
 Tpts incl 4 C-47, 5 Beech D-18S, 3 EMB-
 110 *Bandeirante*, 1 *Navajo* (1 F-27 on
 order).
 Hel incl 4 AB-206, 4 UH-19, 2 UH-1D, 14
 Bell 47G.
 5 T-34 trainers.

Marines: 3,800.
 1 bde; coast-defence units.

Air Force: 11,000; 70 combat aircraft.
 3 fighter sqns with 32 *Hunter* F71, 18 F-
 5E/F.
 1 COIN sqn with 20 T-6G.
 1 SAR/ASW sqn with 8 HU-16B *Albatross*.
 Tpts incl 2 C-130H, 5 C-118, 6 DC-6B, 25
 C-47, 10 C-45, 11 DHC-6, 3 EMB-110, 5
Twin Bonanza, 1 *King Air*, 10 Cessna 180.
 Hel incl 6 S-55T, 6 SL-4, 2 UH-1H, 6 UH-
 12E, 6 *Lama*.
 Trainers incl 30 T-34, 30 T-37B, 8 T-41, 11

Vampire T22/55, 4 Hunter T77, T-6, 9 Beech 99.
1 AA arty regt.
(16 A-37B COIN, 6 EMB-111 MR ac, 1 F-27 tpt, *Shafirir* AAM on order.)

Para-Military Forces: 30,000 *Carabineros*, with 15 Mowag MR-8 APC, 25 lt ac.

COLOMBIA

Population: 26,320,000.
Military service: 2 years.
Total armed forces: 56,500.
Estimated GNP 1976: \$15.2 bn.
Defence expenditure 1977: 5.12 bn pesos (\$140.3 m).
\$1 = 36.5 pesos (1977), 34.9 pesos (1976).

Army: 42,000.
10 inf bdes ('Regional Bdes').
1 Presidential Guard.
1 ranger bn.
1 AB bn.
1 AA arty bn.
Some mech cav, 20 inf, 5 arty, 6 engr units.
M-4A3 med, M-3A1 lt tks; M-8, M-20 armd cars; M-101 105mm how; mor; 40mm AA guns.

Reserves: 250,000.

Navy: 8,000 (1,500 Marines).
6 submarines (4 midget, 2 Type 209).
4 destroyers (2 Swedish *Holland-class*, 2 ex-US *Sumner-class*).
3 frigates.
21 coastal patrol craft (13 under 100 tons).
1 marine bn.

Air Force: 6,500; 28 combat aircraft.
1 bbr/recce sqn with 8 B-26K/RB-26C.
1 fighter/recce sqn with 14 *Mirage* VCOA, 2 VCOA.
4 *PBY-5A Catalina* MR ac.
Tpts incl 2 C-130B, 10 C-54, C-45, 6 C-47, 3 HS-748, 1 F-28, 7 *Beaver*, 4 *Otter*, 6 *Porter*.
Hel incl 16 Bell 47, 6 UH-1B, 12 OH-6A, 6 TH-55, 4 H-23, 6 HH-43B, 27 *Lama*, 1 AB-212, 10 Hughes 500D.
Trainers incl 2 *Mirage* VCOD, 10 T-37, 30 T-41D, 10 AT-33, 30 T-34.

Para-Military Forces: 5,000 National Police Force.

CUBA

Population: 9,580,000.
Military service: 3 years.
Total armed forces: 189,000.
Estimated GNP 1970: \$4.5 bn.
Estimated defence expenditure 1971: 290 m pesos (\$290 m).
\$1 = 1 peso.

Army: 160,000.
15 inf 'divs' (bdes).
3 armd regts.
Some indep 'regts' (bn gps).
Over 600 tks, incl 60 IS-2 hy, T-34/-54/-55, 50 T-62 med, PT-76 lt; BRDM-1 armd cars; 200 BTR-40/-60/-152 APC; 75mm pack, 105mm, 122mm, 130mm, 152mm guns/how; 100 SU-100 SP guns; 30 *FROG-4* SSM; 57mm, 76mm, 85mm ATK guns; 57mm RCL; *Snapper* ATGW; ZU-23, 37mm, 57mm, 85mm, 100mm AA guns.

Deployment: *Angola*: 15,000. (Cuban advisers and technicians are reported in Congo, Ethiopia, Guinea, Mozambique, Sierra Leone, Somalia, Tanzania, Uganda,

South Yemen.)

Reserves: 90,000.

Navy: 9,000.
1 escort patrol vessel (ex-US).
18 submarine chasers (12 ex-Soviet SO-1, 6 *Kronstadt*).
5 *Osa-I*, 2 *Osa-II*, 18 *Komar-class* FPBG with *Styx* SSM.
24 MTB (ex-Soviet P-4 and P-6).
29 armed patrol boats (under 100 tons).
Some 50 *Samlet* coast-defence SSM.

Air Force: 20,000, incl Air Defence Forces; 210 combat aircraft.
4 FB sqns with 75 MiG-17.
5 interceptor sqns with 50 MiG-21, 30 MiG-21MF.
2 interceptor sqns with 40 MiG-19.
1 trg sqn with 15 MiG-15.
Tpts incl 50 Il-14, An-24, and An-2.
Hel incl 30 Mi-1, 24 Mi-4.
Trainers incl MiG-15UTI, Zlin 326.
24 SAM bns with 144 SA-2 *Guideline* and SA-3 *Goa*.

Para-Military Forces: 10,000 State Security troops; 3,000 border guards; 100,000 People's Militia.

DOMINICAN REPUBLIC

Population: 4,970,000.
Military service: voluntary.
Total armed forces: 18,500.
Estimated GNP 1976: \$4.0 bn.
Defence expenditure 1977: 43.2 m pesos (\$43.2 m).
\$1 = 1 peso.

Army: 11,000.
3 inf bdes.
1 mixed armd bn.
1 mountain inf bn.
1 para 'bn'.
1 Presidential Guard bn.
1 arty regt.
1 AA arty regt.
1 engr bn.
1 armd recce sqn.
20 AMX-13 lt tks; AML, 20 *Lynx* armd cars; APC; 75mm, 105mm, 122mm how; 40mm AA guns.

Navy: 4,000.
3 frigates (2 ex-US *Tacoma-*, 1 ex-Canadian *River-class*).
2 corvettes (ex-Canadian *Flower-class*).
2 fleet minesweepers.
14 patrol craft (12 under 100 tons).
1 landing ship (med), 2 landing craft.
1 cdo bn.

Air Force: 3,500; 45 combat aircraft.
1 FB sqn with 7 B-26, 10 *Vampire*, 20 F-51D *Mustang*.
1 COIN/trg sqn with 6 T-28D.
2 *PBY-5 Catalina* MR aircraft.
1 tpt sqn with 6 C-46, 6 C-47, 3 *Beaver*.
Trainers incl 4 T-6, T-11, 2 T-33, 4 Cessna 172.
2 UH-12, 7 OH-6A, 2 UH-19, 3 *Alouette II/III* hel.

Para-Military Forces: 10,000 Gendarmerie.

ECUADOR

Population: 7,680,000.
Military service: 2 years, selective.
Total armed forces: 23,900.
Estimated GNP 1976: \$4.7 bn.
Defence expenditure 1977: 2.85 bn sucres (\$114 m).
\$1 = 25 sucres (1977), 25 sucres (1976).

Army: 17,500.
11 inf bns (2 mot).
1 para bn.
3 recce, 4 horsed cav sqns.
1 Presidential Guard sqn.
10 indep inf coys.
3 arty gps, 1 AA arty bn.
2 engr bns.
15 M-3, 25 M-41, 41 AMX-13 lt tks; 27 AML-60/-90 armd cars; M-113, AMX-VCI APC; 105mm, 6 155mm SP how; 40mm AA guns; 1 *Skyvan*, 5 *Arava*, 3 *Porter* tpts, 7 lt ac, 2 hel.

Navy: 3,800 (700 marines).
3 destroyers (1 ex-US fast transport, 2 ex-British *Hunt-class*).
2 coastal escorts (ex-US).
3 FPBG with *Exocet* SSM, 3 FPB.
8 patrol craft (6 under 100 tons).
2 landing ships (med).
1 *Arava*, 3 DHC-6, 1 *Cardinal* lt tpts, 2 *Alouette* hel.
(2 Type 209 submarines, 3 FPBG on order.)

Air Force: 2,600; 48 combat aircraft.
1 lt bbr sqn with 5 *Canberra* B6.
1 FB sqn with 6 *Jaguar* A/B.
1 COIN sqn with 12 A-37B.
1 recce sqn with 7 *Meteor* FR9.
1 FGA/trg sqn with 16 BAC-167 *Strikemaster*.
2 *PBY-5A Catalina* MR aircraft.
Tpts incl 4 *Electra*, 2 C-130H, 4 DC-6B, 3 *Learjet*, 5 HS-748, 1 *Skyvan* 3M, 12 C-47, 6 C-45, 2 DHC-5, 3 *Turbo-Porter*.
Hel incl 2 *Puma*, 6 *Alouette III*, 4 *Lama*, 3 Bell 47G, 1 FH-1100.
Trainers incl T-28, 12 T-33, 20 T-41, 24 Cessna A150.
(6 *Jaguar* A/B, 12 *Super Mystère B2* FB, 2 DHC-5 tpts, 14 T-34, 12 SF-260 trainers on order.)

Para-Military Forces: 5,800.

HONDURAS

Population: 3,295,000.
Military service: voluntary.
Total armed forces: 14,200.
Estimated GNP 1976: \$1.1 bn.
Defence expenditure 1977: 50.5 m lempira (\$25.3 m).
\$1 = 2 lempira (1977), 2 lempira (1976).

Army: 13,000.
10 inf bns.
1 Presidential Guard bn.
2 arty btys.
1 engr, 1 sigs bn.
12 75mm pack, 8 105mm how; 57mm RCL; 81mm, 120mm mor.

Air Force: 1,200; 22 combat aircraft.
1 FB sqn with 9 F-4U, 4 F-86K, 1 B-26, 8 *Super Mystère B2*.
Tpts incl 1 C-54, C-45, 3 *Arava*, 1 *Westwind*, 2 Cessna 180.
Trainers incl T-6G, 4 T-28E, 9 T-41, 6 AT-37B, 1 RT-33A.
(4 *Super Mystère B2* FB on order.)

Para-Military Forces: 3,000.

MEXICO

Population: 64,440,000.
Military service: voluntary, with part-time conscript militia.
Total armed forces: 95,500 regular, 250,000 part-time conscripts.
Estimated GNP 1976: \$93.2 bn.
Defence expenditure 1977: 12.26 bn pesos (\$543 m).
\$1 = 22.6 pesos (1977), 15.4 pesos ('76).

Army: 72,000 regular, 250,000 conscripts.
1 mech bde gp (Presidential Guard).
1 inf bde gp.
1 para bde.

Zonal Garrisons incl:
23 indep cav regts, 64 indep inf bns, 1 arty regt, AA, engr, and support units.
M-3 lt tks; 100 M-3A1, M-8 armd cars; HWK-11 APC; 75mm, 105mm how (some SP).

Navy: 17,500, incl Naval Air Force and Marines.
2 destroyers (ex-US *Fletcher*-class).
1 frigate (ex-US *Edsall*-class).
18 corvettes (ex-US *Auk*-class).
6 transports (5 ex-US, 1 training ship).
16 fleet minesweepers.
23 *Azteca*-class patrol craft (8 on order).
15 river and coastal patrol boats.
2 LST.

Naval Air Force: 350.
4 HU-16 *Albatross* MR ac.
Other ac incl 1 *Learjet* 24D, 4 DC-3, 3 Cessna 180.
4 *Alouette* II, 5 Bell 47 hel.

Marines: 2,000; 19 security companies.

Air Force: 6,000; 105 combat aircraft.
1 COIN sqn with 15 AT-33A.
5 COIN/trg sqns with 45 T-6, 30 T-28.
1 recce sqn with 15 AT-11.
1 SAR sqn with 18 *LASA-60* ac, 9 *Alouette* III, 1 Hiller 12E hel.
Tpts incl 1 DC-7, 2 C-118, 5 C-54, 1 *JetStar*, 7 C-47, 3 *Skyvan*, 12 *Islander*, 10 *Arava*.
Hel incl 14 Bell 47G, 5 AB-206B, 1 AB-212, 10 Bell 205.
Trainers incl 3 T-55, 45 T-6, 30 T-28, T-33, 20 Beech F33-19, 20 *Musketeer*.
1 para bn.

PARAGUAY

Population: 2,765,000.
Military service: 18 months.
Total armed forces: 17,000.
Estimated GNP 1976: \$1.7 bn.
Defence expenditure 1977: 4.55 bn guaranies (\$36.1 m).
\$1 = 126 guaranies (1977), 124 guaranies (1976).

Army: 12,500.
1 cav 'div' (bde) with 1 med, 1 lt tk regt.
6 inf 'divs' (bn gps).
2 indep horsed cav regts.
2 indep inf bns.
1 Presidential Guard bn.
1 arty regt.
5 engr bns.
9 M-4 med, 6 M-3 lt tks; APC; 75mm guns; 75mm, 105mm how.

Navy: 2,000 (500 Marines and Naval Air).
2 large patrol vessels with 1 hel.
3 patrol boats (ex-Argentinian minesweepers).
8 coastal, 2 river patrol craft (under 20 tons).
2 LCT.
1 marine 'regt' (bn).
2 AT-6 *Texan* ac, 4 UH-13 hel.

Air Force: 2,500; 12 combat aircraft.
1 COIN sqn with 12 AT-6 *Texan*.
Tpts incl 5 DC-6B, 2 C-54, 1 CV-240, 10 C-47, 1 DHC-6, 1 *Dove*, 1 DHC-3.
14 Bell UH-13A, 3 H-12E hel.
Trainers incl 8 Fokker S-11, 8 T-23 *Uirapuru*, T-6, 1 MS-760, Cessna 185.
1 para 'regt' (bn).

Para-Military Forces: 4,000 security forces.

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PERU

Population: 16,900,000.
Military service: 2 years, selective.
Total armed forces: 70,000 (40,000 conscripts).
Estimated GNP 1976: \$10.7 bn. (Rapid inflation makes the defence expenditure and GNP figures in local currency and dollars unreliable.)
Defence expenditure 1977: 30.03 bn soles (\$406 m).
\$1 = 74 soles (1977), 57.4 soles (1976).

Army: 46,000 (40,000 conscripts).
1 armd 'div' (bde).
2 armd, 2 horsed regts (cav 'div').
8 inf and mech 'divs' (bdes).
1 para-cdo 'AB div' (bde).
1 jungle 'div' (bde).
3 armd recce sqns.
Arty and engr bns.
250 T-54/-55, 60 M-4 med, 110 AMX-13 lt tks; M-8, *Commando* armd cars; 50 M-3A1 scout cars; 300 M-113, UR-416, Mowag APC; 75mm, 105mm, 122mm, 130mm, 155mm how; 120mm mor; 28 40mm, 76mm towed, ZSU-23-4 SP AA guns; SA-3 SAM; 5 Helio U-10B, 5 Cessna 185 lt ac; 8 Bell 47G hel. (200 T-62 tks, 122mm, 130mm guns, SA-3/-7 SAM, 2 *Nomad* lt tpt ac on order.)

Navy: 14,000 (incl Naval Air, 1,000 Marines).
8 submarines (2 ex-US *Guppy* I, 4 ex-US *Mackerel*-class, 2 Type 209).
4 light cruisers (2 ex-Dutch, 2 ex-British).
4 destroyers (2 with *Exocet* SSM).
2 destroyer escorts (ex-US *Bostwick*-class).
3 river patrol craft.
6 river gunboats.
2 coastal minesweepers.
4 landing ships/craft (2 LST, 2 med).
9 S-2A *Tracker* ASW, 7 C-47, 2 F-27, 1 Aztec tpt ac; 8 Bell 47G, 10 Bell 206, 6 UH-1D, 4 *Alouette* III hel; 2 T-34 trainers.
(2 Type 209 submarines, 4 *Lupo*-class frigates with *Otomat* SSM and *Albatros* SAM, 6 PR72P FPBG, 2 F-27 ac, 6 AB-212 hel on order).
1 marine bn.

Air Force: 10,000; 136 combat aircraft.
2 lt bbr sqns with 34 *Canberra* B2, B(l)8, B(l)56.
5 fighter sqns: 2 with 36 *Mirage* VP, 1 with 12 F-86F, 1 with 10 *Hunter* F52, 1 with 12 MiG-21.
2 COIN sqns with 24 A-37B.
1 MR sqn with 4 HU-16B *Albatross*, 4 PV-2.
Tpts incl 6 *Hercules*, 4 C-54, 2 *Learjet*, 6 C-47, 2 F-27, 4 F-28, 12 DHC-6, 16 DHC-5, 18 *Queen Air*, 12 *Turbo-Porter*, 5 Cessna 185.
Hel incl 12 *Alouette* III, 20 Bell 47G, 17 Bell 212, 30 Mi-8.
Trainers incl 2 *Canberra* T4, 1 *Mirage* VDP, 15 T-6, 6 T-34, 8 T-33A, 19 T-41, 24 T-37B, 6 *Pitts Special*.
(36 Su-22 FB on order).

Para-Military Forces: 20,000 *Guardia Civil*.

URUGUAY

Population: 3,140,000.
Military service: voluntary.
Total armed forces: 27,000.
Estimated GNP 1976: \$3.5 bn. (Rapid inflation makes defence expenditure and GNP figures in local currency and dollars unreliable.)
Defence expenditure 1977: 316.4 bn pesos (\$75 m).
\$1 = 4,220 pesos (1977), 3,300 pesos (1976).

Army: 20,000.
4 regional 'Armies' (divs) comprising:
3 armd regts, 13 inf bns, 6 cav regts, 4 arty 'bns' (btys), 1 AD bn, 5 engr bns.
17 M-24, 18 M-3A1 lt tks; 10 M-3A1 scout cars; 15 M-113 APC; 25 105mm how.

Navy: 4,000 (incl naval air, naval infantry, coastguard).
3 destroyer escorts.
2 escorts (ex-US minesweepers).
6 patrol craft (all under 100 tons).
1 coastal minesweeper.
3 S-2A, MR ac, 3 SNB-5 (C-45) tpts, T-34B, 4 SNJ-4, 4 T-6 trainers, 2 Bell 47G hel.

Air Force: 3,000; 48 combat aircraft.
1 fighter sqn with 8 F-80, 6 AT-33A.
1 COIN sqn with 8 A-37B.
1 recce sqn with 10 T-6, 10 AT-11, 6 U-17.
Tpts incl 12 C-47, 2 F-27, 3 FH-227, 2 *Queen Air*, 5 EMB-110.
Hel incl 6 Bell UH-1H, 2 Hiller UH-12.
Trainers incl 6 T-41.

Para-Military Forces: 2,200.

VENEZUELA

Population: 12,745,000.
Military service: 2 years, selective.
Total armed forces: 44,000.
Estimated GNP 1976: \$32.5 bn.
Defence expenditure 1977: 2.2 bn bolivares (\$513 m).
\$1 = 4.29 bolivares (1977), 4.29 bolivares (1976).

Army: 28,000.
2 med, 1 lt tk bns.
2 mech, 11 inf bns.
13 ranger bns.
1 horsed cav bn.
7 arty gps.
5 AA arty and engr bns.
142 AMX-30 med, 40 AMX-13 lt tks; 12 M-8, 15 *Shorland* armd cars; AMX-VCI, 20 UR-416 APC; 20 AMX 155mm SP guns; 75mm pack, 105mm how; 120mm mor; 35 M-18 76mm SP ATK guns; 106mm RCL; 40mm AA guns; some 20 hel incl 2 UH-19D, *Alouette* III, Bell 47G.

Navy: 8,000, incl 4,000 Marines.
4 submarines (1 *Balao*, 2 *Guppy* II, 1 Type 209).
4 destroyers (1 with *Seacat* SAM).
6 destroyer escorts.
3 FPBG, 3 FPB.
10 patrol craft.
16 coastal patrol craft (21 on order).
6 landing ships (1 LST, 4 med, 1 tpt).
6 S-2E *Tracker*, 4 HU-16 SAR ac, 3 C-47 tpts, 2 Bell 47J hel.
(1 Type 209 submarine, 6 *Lupo*-class frigates with *Albatros* SAM, 6 AB-212 ASW hel on order.)

Marines: 3 bns.

Air Force: 8,000; 99 combat aircraft.
2 lt bbr sqns with 29 *Canberra*, 16 OV-10E.
3 fighter sqns: 1 with 15 CF-5A, 4 F-5B, 1 with 9 *Mirage* IIIIEV, 4 VV, 2 VDV; 1 with 20 F-86K.
2 tpt sqns with 6 C-130H, 1 Boeing 737, 20 C-47, 12 C-123B *Provider*, 1 *Skyvan*.
Hel incl 15 *Alouette* III, 12 UH-1, 10 UH-19.
Trainers incl 12 *Jet Provost* T-52, 24 T-2D *Buckeye*, 25 T-34 *Mentor*, 2 Beech 95, 9 *Queen Air*, 12 Cessna 182.
1 para bn.
(2 *Skyvan* tpts, 7 Bell 206, 8 A-109 hel on order.)

Para-Military Forces: 10,000 National Guard.

The Military Balance 1977/78

Tables of Comparative Strengths

1. Nuclear Delivery Vehicles Comparative Strengths and Characteristics (A) UNITED STATES AND SOVIET UNION

(i) Missiles and Artillery

	Category ^a	United States						Soviet Union						
		Type	Range (mi) ^b	Warhead yield range ^c	Throw-weight range ^d (000 lb)	First deployment	Number deployed (7/77)	Type ^e	Range (mi) ^b	Warhead yield range ^c	Throw-weight range ^d (000 lb)	First deployment	Number deployed (7/77)	
Land-based	ICBM	<i>Titan II</i>	7,000	5-10 MT	7.5	1962	54	<i>SS-7 Saddler</i>	6,900	5 MT	3-4	1961	} 109	
		<i>Minuteman II</i>	7,000	1-2 MT	1-1.5	1966	450	<i>SS-8 Sasin</i>	6,900	5 MT	3-4	1963		
		<i>Minuteman III</i>	7,500	3 × 170 KT	1.5-2	1970	550	<i>SS-9 Scarp</i>	7,500	18-25 MT or 3 × 5 MT ^f	12-15	1965	238	
									<i>SS-11 Sego</i>	6,500	1-2 MT or 3 × KT ^g	1.5-2	1966	840
									<i>SS-13 Savage^h</i>	5,000	1 MT	1	1968	60
									<i>SS-17</i>	6,500	4 × KT or 1 × 5 MT ⁱ	6	1975	40
									<i>SS-18</i>	7,500	15-25 MT or 8 × MT ^j	15-18	1975	50
									<i>SS-19</i>	6,500	6 × KT or 1 × 5 MT ⁱ	7	1975	140
			M/IRBM						<i>SS-4 Sandal</i>	1,200	1 MT	n.a.	1959	500
									<i>SS-5 Skean</i>	2,300	1 MT	n.a.	1961	100
							<i>SS-20</i>	3,000	3 × KT ^k	1.2	1977	(20)		
	SRBM	<i>Pershing^l</i>	450	high KT	n.a.	1962	108 ^m	<i>SS-1b Scud A^l</i>	50	KT	n.a.	1957	} (750)	
		<i>Lance^l</i>	70	low KT ^l	n.a.	1972	36 ^m	<i>SS-1c Scud B^l</i>	185	KT	n.a.	1965		
		<i>Honest John^l</i>	25	KT	n.a.	1953	n.a.	<i>SS-12 Scaleboard</i>	500	MT	n.a.	1969		
							<i>FROG 7^l</i>	10-45	KT	n.a.	1957-65	(450)		
	LRCM						<i>SS-N-3 Shaddock</i>	450	KT	n.a.	1962	(100)		
Sea-based	SLBM	<i>Polaris A3</i>	2,880	3 × 200 KT	1,000	1964	160	<i>SS-N-4 Sark</i>	350	1-2 MT	n.a.	1961	27	
		<i>Poseidon C3</i>	2,880	10 × 50 KT ⁿ	2,000	1971	496	<i>SS-N-5 Serb</i>	750	1-2 MT	n.a.	1964	54	
	SLCM							<i>SS-N-6 Sawfly^o</i>	1,750	1-2 MT or 3 × KT ^p	1,500	1969	544	
								<i>SS-N-8^o</i>	4,800	1-2 MT	1,500	1972	284	
								<i>SS-N-3 Shaddock^r</i>	450	KT	n.a.	1962	324	
Air-launched	ALCM	<i>Hound Dog</i>	600	KT	n.a.	1961	(400)	<i>AS-3 Kangaroo</i>	400	KT	n.a.	1961	n.a.	
	ALBM	SRAM	150	KT	n.a.	1972	1,500	<i>AS-4 Kitchen</i>	450	KT	n.a.	1962	(800)	
Artillery	SP	M-110 203mm how ^t	10	KT	—	1962	200 ^m							
		M-109 155mm how ^t	10	2 KT	—	1964	300 ^m							
	Towed	M-115 203mm how ^t	10	KT	—	1950s	n.a.	M-55 203mm gun/how ^t	18	KT	—	1950s	n.a.	

(ii) Aircraft*

Category ¹	United States						Soviet Union					
	Type	Range (mi) ^a	Speed (Mach no.)	Weapons load (000 lb)	First deployment	Number deployed (7/77)	Type ^o	Range (mi) ^a	Speed (Mach no.)	Weapons load (000 lb)	First deployment	Number deployed (7/77)
Long-range bombers	B-52D B-52G-H	11,500 12,500	0.95 0.95	60 70	1956 1959	373 ^w	Tu-95 <i>Bear</i> Mya-4 <i>Bison</i>	8,000 6,000	0.78 0.87	40 20	1956 1956	100 35 ^z
Medium-range bombers	FB-111A	3,800	2.5	37.5	1969		68	Tu-16 <i>Badger</i> Tu-? <i>Backfire B</i>	4,000 5,500	0.8 2.5	20 20	1955 1974
Land-based strike (incl short-range bombers)	F-105D F-4C-J F-111A/E A-7D	2,100 2,300 3,800 3,400	2.25 2.4 2.2/2.5 0.9	16.5 16 25 15	1960 1962 1967 1968	(350) ^m	Il-28 <i>Beagle</i> Su-7 <i>Fitter A</i> Tu-22 <i>Blinder</i> MiG-21 <i>Fishbed</i> J/K/L MiG-27 <i>Flogger D</i> Su-17-20 <i>Fitter C</i> Su-19 <i>Fencer A</i>	2,500 900 1,400 1,150 1,800 1,100 1,800	0.8 1.7 1.5 2.2 2.5 1.6 2.3	4.85 4.5 12 2 2.8 5 8	1950 1959 1962 1970 1971 1974 1974	(1,000) ^m
Carrier-based strike	A-4 A-6A A-7A/B/E F-4	2,055 3,225 3,400 2,000	0.9 0.9 0.9 2.4	10 18 15 16	1956 1963 1966 1962		(200) ^m					

^a ICBM range = 4,000+ statute miles; IRBM range = 1,500-4,000 miles; MRBM range = 500-1,500 miles; SRBM range = under 500 miles; LRCM range = over 350 miles.
^b Statute miles. Operational range depends upon the payload carried; use of maximum payload may reduce missile range by up to 25 per cent.
^c Estimated maxima; warhead yields vary greatly. KR range = less than 1 MT.
^d Figures given are estimated maxima. Throw-weight is the weight of the post-boost vehicle (warheads, guidance systems, penetration aids) that can be delivered over a given range. At maximum range throw-weight will be less than shown here.
^e Numerical designations of Soviet missiles (e.g. SS-9) are of US origin; names (e.g. *Scarp*) are of NATO origin.
^f The SS-9 exists in three operational modes; 18- or 25-MT single-warhead and 3 MRV of 4-5 MT each.
^g A 3-MRV version of the SS-11 has replaced some of the single-warhead systems.
^h A solid-fuel replacement for the SS-13, the SS-X-16, which has about twice the throw-weight and may also be deployed in a land-mobile mode, is undergoing tests.
ⁱ The SS-17 and SS-19 have begun deployment in modified SS-11 silos. Operational missiles are equipped with MRV, but single-warhead versions have been tested.
^j The SS-18, a follow-on to the SS-9, has been tested in two single-warhead and 5-8-MRV versions.
^k The SS-20 has been tested at longer ranges with a single, lower-yield warhead.
^l Dual-capable (able to deliver conventional or nuclear warheads). Conventional warheads for US *Lance* and *Pershing* under development. Though shown in the table, it is

uncertain whether Soviet 203mm arty is nuclear-capable.
^m Figures for systems in Europe only.
ⁿ *Poseidon* can carry up to 14 RV over a reduced range.
^o A solid propellant replacement for the SS-N-6, the SS-NX-17, has been tested and is thought to be capable of deploying MRV.
^p The SS-N-6 has been tested with new single warhead (MT range) and with 3 MRV.
^q A 3-warhead MRV replacement for the SS-N-8, the SS-NX-18, has been tested.
^r A longer-range version of the SS-N-3, the SS-X-12, is reportedly under development.
^s All aircraft are dual-capable, but some in the strike aircraft categories are not presently configured for the nuclear role.
^t Long-range bomber = maximum range 6,000+ miles; medium-range bomber = maximum range 3,500-6,000 miles, primarily designed for bombing missions. *Backfire* is classified as a medium-range bomber on the basis of reported range characteristics.
^u Theoretical maximum range in statute miles, with internal fuel only, at optimum altitude and speed. Ranges of strike aircraft assume no weapons load. Especially in the case of strike aircraft, therefore, range falls sharply for flights at higher speeds, lower altitude or with full weapons load.
^v Names of Soviet aircraft (e.g. *Bear*) are of NATO origin.
^w Excluding aircraft in storage or reserve.
^x Excluding approximately 45 Mya-4 configured as tankers.
^y Including aircraft in the Naval Air Force (some 280 Tu-16 and 30 *Backfire*) but excluding Tu-16 tankers.

(iii) US-Soviet Strategic Balance: Static Measurements^a

		Deliverable warheads ^b	Equivalent megatonnage ^c	Missile throw-weight (million lb) ^d	Bomber payload (million lb) ^d
USA	ICBM	2,154	1,460	2.2	
	SLBM	5,120	830	1.1	
	Long-range bombers	4,056	4,400		
	Totals	11,330	6,690	3.3	22.8
USSR	ICBM	2,647	2,950	7.8	
	SLBM	909	860	1.3	
	Long-range bombers	270	780		
	Totals	3,826	4,590	9.1	4.7

^a These are estimates of static strategic capability derived from Table 1 (i) and (ii) above. These measurements are useful in comparing force size, but provide limited information about force effectiveness. More elaborate dynamic presentations of the balance can be used to portray effectiveness, but this requires the enumeration of factors not shown here, such as accuracy and defensive capability. For a more detailed portrayal of the balance and the problems of depicting it, see 'Measuring the Strategic Balance', *Military Balance 1976-1977*, pp. 106-108.
^b This measures the number of targets each side can attack. Only separately-targetable delivery vehicles are included in missile totals. Bomber totals assume both stand-off missile and gravity bomb deployment.
^c Equivalent megatonnage (EMT) measures damage to unprotected area targets. Assum-

ing that a warhead falls within the boundary of the target area, the EMT of a specific weapon is expressed as the two-thirds power of its explosive yield, or Y^{2/3}. Totals assume maximum yield values shown in Table 1 (i) and (ii).
^d Neither missile throw-weight nor bomber payload provides a measure of destructive power, but both give some indication of the capacity of a given system to be exploited for different purposes. An ICBM, for example, can be used to deliver a small number of larger-yield warheads (to maximize EMT) or a larger number of smaller warheads (to maximize target coverage). The same is true for bombers, but calculations are complicated by the range versatility of aircraft and the large choice of weapons they can carry. Because bomber payload is a less precise index of potential military capacity than missile throw-weight, the table gives separate estimates for missiles and bombers.

(iv) Historical Changes in Launcher Strength

		1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
USA	ICBM	424	834	854	904	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054
	SLBM	224	416	496	592	656	656	656	656	656	656	656	656	656	656	656
	Long-range bombers	630	630	630	630	600	545	560	550	505	455	442	437	432	387	373
USSR	ICBM	90	190	224	292	570	858	1,028	1,299	1,513	1,527	1,527	1,575	1,618	1,527	1,477
	SLBM	107	107	107	107	107	121	196	304	448	500	628	720	784	845	909
	Long-range bombers	190	175	160	155	160	155	145	145	145	140	140	140	135	135	135

(B) OTHER NATO AND WARSAW PACT COUNTRIES

(i) Missiles and Artillery

	Category ^a	NATO (excluding USA)						Warsaw Pact (excluding USSR)					
		Type ^b	Operated by ^c	Range (mi) ^d	Warhead yield range ^e	First deployment	Number deployed (7/77)	Type ^f	Operated by ^c	Range (mi) ^d	Warhead yield range ^e	First deployment	Number deployed (7/77)
Land-based missiles	IRBM	SSBS S-2	FR	1,875	150 KT	1971	18	SS-1b Scud A ^h SS-1c Scud B ^h	All	50	KT	1957	(130)
	SRBM	Sergeant ^g	GE	85	KT	1962	20						
		Pershing ^g	GE	450	KT	1962	72 (44)						
		Lance	BR, GER, IT	70	KT	1976				185	KT	1965	
		Pluton	FR	75	15-25 KT	1974	24 (112)	FROG 3-7 ^h	All	10-45	KT	1957-65	(200)
		Honest John	FR	25	KT	1953							
SLBM	SLBM	Polaris A3	BR	2,880	3 x 200 KT	1967	64						
		MSBS M-1	FR	1,550	500 KT	1972	32						
		MSBS M-2	FR	1,900	500 KT	1974	16						
		MSBS M-20	FR	3,000	1 MT	1977	16						
Artillery	SP	M-110	^j	10	KT	1962	n.a.						
		203mm how											
	Towed	M-109	^k	10	2 KT	1964	n.a.						
		155mm how											
	M-115	^j	10	KT	1950s	n.a.							
		203mm how											

^a IRBM range 1,500-4,000 miles; SRBM range under 500 miles.
^b All NATO vehicles are of American origin, with the exception of the SSBS IRBM, MSBS SLBM and Pluton, which are of French origin.
^c BR = Britain, FR = France, GE = Germany, IT = Italy.
^d Statute miles. Use of maximum payload may reduce range by up to 25 per cent.
^e Figures given are estimated maxima. KT range = less than 1 MT.
^f All Warsaw Pact vehicles are of Soviet origin. Numerical designations (e.g., SS-1b) are of American origin, names (Scud A, FROG) of NATO origin.
^g These SRBM are operated by Germany but the nuclear warheads for them are in American custody. Sergeant and Honest John are dual-capable.
^h These dual-capable systems are operated by the countries shown, but nuclear war-

heads for them are in Soviet custody.
ⁱ Honest John is dual-capable and is operated by Belgium, Germany, Greece, the Netherlands and Turkey, but with the nuclear warheads held in American custody.
^j The 203mm (8-in.) how is dual capable. It is operated by Belgium, Britain, Denmark, Germany, Greece, Italy, the Netherlands and Turkey, but any nuclear warheads for it are in American custody. There are no nuclear warheads on Danish soil.
^k The 155mm how is primarily a conventional artillery weapon but is dual-capable. It is operated by Belgium, Britain, Canada, Denmark, Germany, Greece, Italy, the Netherlands, Norway and Turkey, but in very few cases is it likely to have a nuclear role, certainly not in the case of Canada. Any nuclear warheads would be in American custody, none of them being held on either Danish or Norwegian soil.

(ii) Aircraft^a

Category ^b	NATO (excluding USA)							Warsaw Pact (excluding USSR)						
	Type ^c	Operated by ^d	Range (mi) ^e	Speed (Mach no.) ^f	Weapons load (000 lb)	First deployment	Deployed (7/77)	Type ^g	Operated by ^d	Range (mi) ^e	Speed (Mach no.) ^f	Weapons load (000 lb)	First deployment	Deployed (7/77)
Medium-range bombers	Vulcan B2	BR	4,000	0.95	21	1960	50							
Strike aircraft (incl short-range bombers) ^h	F-104	^h	1,300	2.2	4	1958	n.a. ^j	Il-28 Beagle ⁱ	PO	2,500	0.81	4.85	1950	n.a. ^j
	F-4	{ BR GE }	1,600	2.4	16	1962	n.a. ^j	Su-7 Fitter A ⁱ	{ CZ HY PO }	900	1.7	4.5	1959	n.a. ^j
	Buccaneer	BR	2,300	0.95	8	1962	70							
	Mirage IVA	FR	2,000	2.2	8	1964	50	Su-20 Fitter C ⁱ	PO	1,100	1.6	5	1974	n.a. ^j
Jaguar	{ BR FR }	1,000	1.1	8	{ 1973 1974 }	120								

^a All aircraft listed are dual-capable but many would be more likely to carry conventional than nuclear weapons.
^b Medium-range bomber = maximum range 3,500-6,000 miles, primarily designed for bombing missions.
^c Vulcan and Buccaneer are of British origin; F-104 and F-4 are of American origin; Mirage is of French origin; Jaguar is Anglo-French.
^d BR = Britain, FR = France, GE = Germany, CZ = Czechoslovakia, HY = Hungary, PO = Poland.
^e Theoretical maximum range in statute miles, with internal fuel only, at optimum altitude and speed. Ranges for strike aircraft assume no weapons load. Especially in the case of strike aircraft, therefore, range falls sharply for flights at lower altitude, at higher speed or with full weapons load (e.g., combat radius of F-104, at operational

height and speed, with typical weapons load, is approximately 420 miles).
^f Mach 1 = speed of sound.
^g Warsaw Pact aircraft are of Soviet origin; the names listed (e.g., Beagle) are of NATO origin.
^h The dual-capable F-104 is operated by Belgium, Canada, Denmark, Germany, Greece, Italy, the Netherlands, Norway and Turkey, but the Canadian aircraft no longer have a nuclear role. The nuclear warheads are held in American custody.
ⁱ Nuclear warheads for these dual-capable aircraft are held in Soviet custody.
^j The absence of figures here reflects the uncertainty as to how many of these dual-capable aircraft actually have a nuclear role.
^k Certain other aircraft, such as the Mirage III, may also be capable of carrying tactical nuclear weapons.

3. Comparisons of Military Manpower 1973-77 (in thousands)

Country	1973-77					1977						
	Numbers in armed forces					Armed forces				Estimated reservists ^a	Para-military forces	
	1973	1974	1975	1976	1977	Army	Navy	Air	% of men 18-45			
Warsaw Pact												
Bulgaria	152.0	152.0	152.0	164.5	148.5	115.0	8.5	25.0	8.3	235.0	40.0	
Czechoslovakia	190.0	200.0	200.0	180.0	181.0	135.0	—	46.0	6.0	350.0	10.0	
Germany, East	132.0	145.0	143.0	157.0	157.0	105.0	16.0	36.0	4.7	255.0	73.0	
Hungary	103.0	103.0	105.0	100.0	103.0	83.0	—	20.0	4.7	143.0	20.0	
Poland	280.0	303.0	293.0	290.0	307.0	220.0	25.0	62.0	4.1	605.0	97.0	
Romania	170.0	171.0	171.0	181.0	180.0	140.0	10.0	30.0	4.0	345.5	37.0	
Soviet Union	3,425.0	3,525.0	3,575.0	3,650.0	3,675.0	1,825.0 ^b	450.0 ^b	475.0 ^b	6.9	4,200.0	450.0	
NATO												
Belgium	89.6	89.7	87.0	88.3	85.7	62.1	4.2	19.4	4.5	55.5	16.0	
Britain ^c	361.5	354.6	345.1	344.2	339.2	175.3	76.7	87.2	3.2	248.6	—	
Canada	83.0	83.0	77.0	77.9	80.0	28.5	13.4	36.6	1.6	19.1	—	
Denmark	39.8	37.1	34.4	34.7	34.7	21.8	5.8	7.1	3.4	153.2	—	
France	503.6	502.5	502.5	512.9	502.1	330.0	68.5	103.6	4.8	450.0	76.2	
Germany	475.0	490.0	495.0	495.0	489.0	341.0	38.0	110.0	3.8	1,179.5	20.0	
Greece	160.0	161.2	161.2	199.5	200.0	160.0	17.5	22.5	11.6	310.0	118.0	
Italy	427.5	421.0	421.0	352.0	330.0	218.0	42.0	70.0	3.0	694.8	90.0	
Luxembourg	0.6	0.6	0.6	0.6	0.6	0.6	—	—	0.2	—	0.4	
Netherlands	112.2	113.9	112.5	112.2	109.7	75.0	17.0	17.7	3.9	176.5	7.7	
Norway	35.4	34.9	35.0	39.0	39.0	20.0	9.0	10.0	5.2	240.0	—	
Portugal	204.0	217.0	217.0	59.8	58.8	36.0	12.8	10.0	3.7	n.a.	23.4	
Turkey	455.0	453.0	453.0	460.0	465.0	375.0	43.0	47.0	5.6	725.0	75.0	
United States	2,252.9	2,174.0	2,130.0	2,086.7	2,088.0	789.0	728.0	571.0	4.9	870.5	—	
Other European												
Austria	52.0	37.3	38.0	37.3	37.3	33.0	—	4.3	2.7	112.7	11.3	
Eire	10.6	12.3	12.1	14.0	14.7	13.4	0.6	0.7	2.6	18.7	—	
Finland	39.5	35.8	36.3	35.8	39.9	34.4	2.5	3.0	3.9	690.0	4.0	
Spain	293.0	284.0	302.3	302.3	309.0	220.0	48.0	41.0	4.5	n.a.	65.0	
Sweden	74.8	72.2	69.8	65.4	68.6	46.0	12.0	10.6	4.3	500.0	—	
Switzerland	18.5	18.5	18.5	18.5	18.5	18.5	—	—	1.0	621.5	—	
Yugoslavia	240.0	230.0	230.0	250.0	260.0	193.0	27.0	40.0	5.5	500.0	616.0	
Middle East												
Algeria	63.0	63.0	63.0	69.3	75.8	67.0	3.8	5.0	2.5	100.0	10.0	
Egypt	323.0	323.0	322.5	342.5	345.0	300.0	20.0	25.0	4.4	515.0	50.0	
Iran	211.5	238.0	250.0	300.0	342.0	220.0	22.0	100.0	5.1	300.0	70.0	
Iraq	101.8	112.5	135.0	158.0	188.0	160.0	3.0	25.0	9.6	250.0	54.8	
Israel	115.0	145.5	156.0	158.5	164.0	138.0	5.0	21.0	24.0	460.0	9.5	
Jordan	72.9	74.9	80.2	67.9	67.8	61.0	0.2	6.7	13.1	30.0	10.0	
Libya	25.0	32.0	32.0	29.7	29.2	22.0	2.7	4.5	n.a.	n.a.	n.a.	
Morocco	56.0	56.0	61.0	73.0	84.7	75.0	4.0	5.7	2.6	n.a.	30.0	
Saudi Arabia	42.5	43.0	47.0	51.5	61.5	45.0	1.5	15.0	n.a.	n.a.	41.5	
Sudan	38.6	43.6	48.6	52.6	52.1	50.0	0.6	1.5	n.a.	n.a.	3.5	
Syria	132.0	137.5	177.5	227.0	227.5	200.0	2.5	25.0	18.1	102.5	9.5	
Africa												
Ethiopia	44.6	44.6	44.8	50.8	53.5	50.0	1.5	2.0	0.9	20.0	84.0	
Nigeria	157.0	210.0	208.0	230.0	230.5	221.0	3.5	6.0	n.a.	2.0	—	
Rhodesia	4.7	4.7	5.7	9.2	9.6	9.3	—	1.3	0.9	55.0	44.0	
South Africa	46.0	47.5	50.5	51.5	55.0	41.0	5.5	8.5	1.1	165.5	125.5	
Asia												
Australia	73.3	68.9	69.1	69.4	69.7	31.8	16.2	21.7	2.5	32.2	—	
China	2,900.0	3,000.0	3,250.0	3,525.0	3,950.0	3,250.0	300.0	400.0	2.2	n.a.	n.a.	
China (Taiwan)	503.0	491.0	494.0	470.0	460.0	320.0	70.0	70.0	n.a.	1,170.0	100.0	
India	948.0	956.0	956.0	1,055.5	1,096.0	950.0	46.0	100.0	0.8	240.0	300.0	
Indonesia	322.0	270.0	266.0	246.0	247.0	180.0	39.0	28.0	1.0	n.a.	112.0	
Japan	266.0	233.0	236.0	235.0	238.0	155.0	40.0	43.0	0.9	39.6	—	
Korea, South	633.5	625.0	625.0	595.0	635.0	560.0	45.0	30.0	8.6	1,240.0	1,000.0	
Malaysia	56.0	66.2	61.1	62.3	64.0	52.5	5.5	6.0	2.7	27.0	213.0	
New Zealand	12.8	12.6	12.7	12.5	12.5	5.5	2.7	4.3	2.0	12.2	—	
Pakistan	420.0	392.0	392.0	428.0	428.0	400.0	11.0	17.0	4.0	513.0	157.0	
Philippines	42.7	55.0	67.0	78.0	99.0	63.0	20.0	16.0	1.2	45.0	65.0	
Singapore	20.6	21.7	30.0	31.0	36.0	30.0	3.0	3.0	7.0	45.0	37.5	
Thailand	180.0	195.0	204.0	210.0	211.0	141.0	28.0	42.0	2.8	500.0	66.0	
Latin America												
Argentina	135.0	135.0	133.5	132.8	129.9	80.0	32.9	17.0	2.5	250.0	51.0	
Brazil	208.0	208.0	254.5	257.2	271.8	180.0	49.0	42.8	1.2	n.a.	200.0	
Colombia	63.2	63.2	64.3	54.3	56.5	42.0	8.0	6.5	n.a.	250.0	5.0	
Mexico	71.0	82.0	82.5	89.5	95.5	72.0	17.5	6.0	0.8	n.a.	n.a.	
Peru	54.0	54.0	56.0	63.0	70.0	46.0	14.0	10.0	2.3	n.a.	20.0	
Uruguay	21.0	21.0	22.0	23.0	27.0	20.0	4.0	3.0	4.4	n.a.	2.2	
Venezuela	37.5	39.5	44.0	42.0	44.0	28.0	8.0	8.0	1.9	n.a.	10.0	

^a Reservists with recent training. ^b Excludes PVO-Strany and Strategic Rocket Forces. ^c Includes men enlisted outside Britain.

4. Indices of NATO Defence Expenditure, Current and *Constant Prices*^a
(in local currency, 1970 = 100)

Country	1960	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976 ^b	% Growth ^c	
													1960-70	1971-76
Belgium	53.9	75.1	81.1	87.1	90.4	100.0	105.8	117.7	130.5	153.0	186.5	212.0	6.4	14.9
	72.5	85.6	89.8	93.9	94.0	100.0	101.3	107.0	110.9	115.4	124.7	129.8	3.3	5.0
Britain	67.7	88.1	93.1	95.4	94.2	100.0	115.2	133.3	143.4	172.1	211.3	253.1	4.0	17.0
	100.6	106.0	109.3	106.9	100.2	100.0	105.2	113.7	112.0	115.9	114.6	117.8	0	1.4
Canada	80.3	85.7	95.3	93.5	92.1	100.0	103.4	108.6	116.7	138.9	151.7	174.4	2.2	10.9
	105.3	99.8	107.2	101.1	95.2	100.0	100.6	100.8	100.6	108.0	106.6	114.0	-0.5	2.5
Denmark	40.4	75.4	81.6	94.0	95.8	100.0	115.9	122.8	127.7	161.0	191.3	206.0	9.5	12.2
	71.4	97.0	97.3	103.7	102.0	100.0	109.4	108.9	103.6	113.2	122.9	121.3	3.4	2.1
France	57.7	80.5	87.1	91.0	95.5	100.0	105.4	110.8	121.2	147.4	171.3	196.2	5.6	13.2
	85.7	97.1	102.3	102.3	101.1	100.0	99.8	99.2	101.1	108.1	112.5	116.5	1.6	3.0
Germany	53.7	89.7	94.8	85.5	95.6	100.0	112.7	127.2	141.4	157.9	166.5	172.0	6.4	8.9
	70.2	98.7	102.6	91.1	99.2	100.0	107.2	114.6	119.0	124.2	123.6	122.2	3.6	2.7
Greece	36.0	50.5	66.1	77.4	89.8	100.0	109.0	121.1	139.8	169.8	309.1	401.8	10.8	24.3
	44.2	54.3	70.0	81.7	92.6	100.0	105.8	112.6	112.9	108.1	122.6	198.4	8.5	11.0
Italy	45.5	85.9	87.0	89.8	90.4	100.0	118.6	138.4	153.1	182.6	198.7	227.9	8.2	13.9
	67.0	97.1	95.0	96.8	94.8	100.0	113.1	125.0	124.7	124.8	116.7	113.0	4.1	0
Luxembourg	63.2	119.5	99.3	89.9	94.0	100.0	106.3	124.3	144.5	170.7	201.0	236.3	4.7	17.3
	81.5	134.1	109.1	96.3	98.3	100.0	101.6	112.9	124.1	133.5	141.8	151.9	2.1	8.6
Netherlands	43.5	70.3	80.6	82.7	92.8	100.0	112.6	125.4	137.7	161.9	182.6	194.4	8.7	11.6
	65.6	84.0	93.1	92.0	96.1	100.0	104.7	108.2	110.0	117.9	120.7	118.1	4.3	2.5
Norway	38.1	70.2	75.6	82.9	90.2	100.0	108.9	116.8	126.4	142.0	171.0	188.2	10.1	11.6
	59.2	86.5	89.3	94.5	99.8	100.0	102.5	102.6	103.3	106.0	115.0	115.3	5.4	2.5
Portugal	24.1	59.0	76.4	85.3	86.0	100.0	117.2	128.0	133.5	200.3	158.0	147.6	15.3	4.6
	37.3	76.4	93.7	98.7	91.0	100.0	104.7	103.3	95.4	114.4	78.6	60.5	10.4	-11.6
Turkey	38.6	64.1	73.7	82.7	86.5	100.0	136.1	159.7	195.5	253.8	532.6	699.2	10.0	31.0
	68.4	87.0	87.7	93.0	92.6	100.0	114.3	123.6	131.1	147.0	259.8	253.2	3.9	13.3
United States	58.3	81.7	96.9	103.7	104.6	100.0	96.2	99.7	100.8	110.3	116.8	127.3	5.5	5.7
	76.5	97.6	112.7	115.7	110.8	100.0	92.3	92.6	88.1	86.9	84.3	86.8	2.7	-1.2

^a To produce constant price series (in italics) defence expenditures are deflated by consumer price indices. These reflect general rates of inflation, not rates in the defence sector.

^b 1976 figures are provisional, those for Greece and Turkey being estimates; hence 1971-76 growth rates are approximate

^c Average annual compound growth rates over periods shown.

5. Comparative Strengths of Armed Forces 1956-1977 (in thousands)

Year	USA	Japan	Germany	France	Britain ^a	USSR
1956	2,857	188	66	785	760	4,500
1957	2,800	202	122	836	700	4,200
1958	2,637	214	175	797	615	4,000
1959	2,552	215	249	770	565	3,900
1960	2,514	206	270	781	520	3,623
1961	2,572	209	325	778	455	3,800
1962	2,827	216	389	742	445	3,600
1963	2,737	213	403	632	430	3,300
1964	2,687	216	435	555	425	3,300
1965	2,723	225	441	510	424	3,150
1966	3,123	227	455	500	418	3,165
1967	3,446	231	452	500	417	3,220
1968	3,547	235	440	505	405	3,220
1969	3,454	236	465	503	383	3,300
1970	3,066	259	466	506	373	3,305
1971	2,699	259	467	502	365	3,375
1972	2,391	260	467	501	363	3,375
1973	2,253	266	475	504	352	3,425
1974	2,174	233	490	503	345	3,525
1975	2,130	236	495	503	345	3,573
1976	2,087	235	495	513	335	3,650
1977	2,088	238	489	502	330	3,675

^a Excluding forces enlisted outside Britain.

6. Average Strength of Military Formations (in thousands)

	Division					Brigade				Squadron Fighter aircraft
	Armoured		Mechanized		Airborne	Armoured		Mechanized		
	Men	Tanks	Men	Tanks	Men	Men	Tanks	Men	Tanks	
United States	16,500	324	16,000	216	15,000	4,200	108	4,500	54	12-14
Soviet Union	11,000	325 ^a	12,700	266 ^a	7,000	1,300 ^b	95 ^b	2,300 ^b	40 ^b	10-14
China	10,000	270	12,000 ^c	30 ^c	9,000	1,200 ^b	90 ^b	2,000 ^b	—	9-10
Britain ^d	11,700	212	—	—	—	4-5,000	106	—	—	8-15
Germany	17,000	300	17,500	250	8-9,000	4,500 ^e	108 ^e	5,000 ^e	54 ^e	15-21
India	15,000	200	17,500 ^e	—	—	6,000	150	4,500	—	12-20
Israel	—	—	—	—	—	3,500	80-100	3,500	36-40	15-20
Egypt	11,000	300	12,000	190	—	3,500	96	3,500	36	10-12

^a These tank strengths are for Soviet divisions in Eastern Europe; other Soviet divisions have fewer.

^b Strength of a regiment, which is the equivalent formation in the Soviet and Chinese command structures. (The term 'regiment' is, however, often employed, particularly in West European countries, to describe a battalion-size unit, and it is so used in *The Military Balance*.)

^c Infantry division.

^d Britain is proposing to eliminate the brigade as a formation and have armoured divisions smaller than above and a new infantry formation of about brigade size, known as a Field Force.

^e Proposed new armoured brigades will have 3,026 men and 99 tanks, mechanized brigades 3,730 men and 66 tanks.

7. Offensive Support Aircraft Characteristics

Model ^a	Country of origin and name	Date in service	Crew	No. of engines	Take-off weight (kg)		Take-off run, typical load (m)	Max level speed (Mach or mph)	Typical combat radius (km)	Ceiling (ft)	Roles ^a
					Clean	Max					
Britain											
BAC-167	Hunter FGA Mk 9	1960	1	1	7,000	10,800	685	0.92	980	53,000	FGA/trainer
	Lightning F53	1960	1	2	18,144	22,680	1,203	2.00	740	57,000	AWX, AD
	Strikemaster	1968	2	1	2,810	5,125	1,067	410	656	40,000	lt attack
	Buccaneer S2	1969	2	2	20,800	28,123	720	0.95	1,500	40,000	naval strike, FB
	Harrier GR3	1969	1	1	5,896	11,339	VTOL	0.96	540	45,000	VTOL FGA
BAC-145	Jet Provost Mk5	1969	1-2	1	3,170	4,173	410	440	480	36,750	lt attack/trainer
BAC-1182	Hawk	1976	1-2	1	5,035	7,843	549	1.16	920	48,500	lt attack/trainer
Canada											
CF-5A		1968	1	2	6,600	10,923	808	1.04	346	50,000+	FGA
China											
F-9	Fantan A	1975	1	2	9,200	10,700	620	2.00	790	51,200	AD
France											
	Mirage IIIE	1964	1	1	7,050	13,500	700	2.02	1,200	55,775	FGA, AD, strike
	Mirage V	1967	1	1	6,600	13,500	700	2.02	1,300	55,775	FGA
	Mirage FIC	1973	1	1	10,900	14,900	640	1.02	740	65,600	multi-role
International											
MRCA	Jaguar	1973	1	2	10,500	15,500	880	1.4	850	48,000	FGA, strike
	AlphaJet	(1978)	2	2	4,890	7,300	480	0.85	630	46,000	close support/trainer
	Tornado	(1978)	2	2	n.a.	20,385	700	2.00	925	50,000+	multi-role (VG), strike
Israel											
	Kfir	1972	1	1	7,200	14,600	700	2.2	370-535	50,000+	AD, FGA
	Kfir C2	1976	1	1	7,285	14,600	700	2.3	1,300	50,000+	FGA, AD
Italy											
G-91Y		1971	1	2	7,800	8,700	914	0.95	600	41,000	FB
MB-326K		1972	1-2	1	4,645	5,897	411	553	648	39,000	lt attack/trainer
Soviet Union											
MiG-15	Fagot	1948	1	1	3,773	6,464	n.a.	0.87	300	48,000	FGA
MiG-17	Fresco C	1952	1	1	n.a.	5,669	n.a.	0.96	500	57,000	FGA, AD
MiG-19	Farmer C	1955	1	2	n.a.	9,000	n.a.	1.3	322	58,000	FGA, AD
Yak-25	Flashlight D	1957	2	2	n.a.	11,350	n.a.	0.95	1,100	n.a.	AD, FB
Yak-28	Brewer	1961	2	2	n.a.	15,875	n.a.	1.1	800	55,000	AD, FB
Su-7B	Fitter A	1961	1	1	12,000	13,500	n.a.	1.2	480	49,700	FGA/strike
Tu-28P	Fiddler	1962	2-3	2	n.a.	45,000	n.a.	1.75	970	65,000	AWX
Yak-28P	Firebar	1962	2	2	n.a.	15,875	n.a.	1.1	925	55,000	AD
Su-11	Fishpot C	1967	1	1	8,300	12,457	900	1.8	508	50,000	AD
Su-15	Flagon A	1967	1	2	8,720	16,000	n.a.	2.5	650	55,000	AD
MiG-21F	Fishbed J	1970	1	1	7,840	9,400	800	2.1	550	46,000	FGA
MiG-23	Flogger B	1971	1	1	14,800	20,400	650	2.3	1,017	50,000	FB, AD (VG)
MiG-25	Foxbat A	1971	1	2	15,425	33,995	1,380	3.2	462	75,000	AWX
MiG-27	Flogger D	1971	1	1	14,400	20,400	775	1.6	1,017	45,000	FB/strike
Su-17	Fitter C	1972	1	1	14,000	19,000	620	1.3	600	50,000	FGA (VG)
Su-19	Fencer A	1974	2	2	16,000	30,804	600	2.0	740	44,000	strike (VG)
Yak-36	Forger A	1976	1	1+2	5,215	9,977	VTOL	0.9	370	n.a.	VTOL naval FGA
Sweden											
J35A	Draken	1960	1	1	11,400	15,000	650	2.0	635	55,000+	AD
AJ-37	Viggen	1971	1	1	16,500	22,500	400	2.0	1,000	50,000	FGA, AD
Saab 105G		1973	1-2	2	4,860	6,500	700	0.86	695	42,650	lt attack/trainer
United States											
F-106	Delta Dart	1956	1	1	12,471	15,875	n.a.	2.31	920	57,000	AWX
F-8	Crusader	1957	1	1	8,150	13,300	n.a.	2.0	965	55,000	naval FB
F-4B	Phantom	1958	2	2	20,865	24,765	1,525	2.0+	1,450	58,050	multi-role, strike, naval
F-105	Thunderchief	1958	1	1	n.a.	24,495	610	2.25	1,110	52,000	FB, strike
A-6A	Intruder	1963	2	2	11,900	27,500	497	620	600	41,660	naval strike, tanker
F-104G	Starfighter ^b	1963	1	2	6,387	13,054	902	2.2	1,200	58,500	AD, strike
F-111A		1964	2	2	35,400	41,500	915	2.2	1,700	51,000	FGA, strike (VG)
A-7D	Corsair II	1968	1	1	8,972	19,050	1,525	698	825	n.a.	FB, strike, naval
A-37B	Dragonfly	1968	1-2	2	4,200	6,350	531	524	245	41,765	lt attack
A-4M	Skyhawk	1970	1	1	4,747	11,113	823	645	1,100	45,000	naval strike, FGA
F-14A	Tomcat	1972	2	2	25,007	33,724	366	2.3	n.a.	50,000	naval AD (VG)
F-5E	Tiger II	1973	1	2	4,275	11,561	610	1.57	1,080	52,000	FGA
F-15	Eagle	1974	1	2	18,900	25,400	274	2.5	1,100	65,000	multi-role, strike (VG)
A-10A		1977	1	2	16,800	21,148	1,152	518	485	45,000	close support
F-16A		(1978)	1	1	9,850	14,968	533	2.0	925	50,000+	FGA

VG = variable geometry.

^a The characteristics quoted are for the particular mark or model shown (e.g., F-104G). The alternative roles shown may be performed by other marks/models.

Recce and ECM roles not listed, since many ac can be adapted to them.

^b Built as F-104S (interceptor) in Italy. F-104G were also built in Belgium, Netherlands and West Germany, in Canada as CF-104, and in Japan as F-104J (fighter-bomber).

8. Comparison of Divisional Establishments, Present and Proposed ^a

	Armoured Divisions						Mechanized Divisions					
	USSR ^b	USA		West Germany		Britain		USSR ^b	USA		West Germany	
		Present	New ^c	Present	New ^d	Present ^e	New ^f		Present	New ^c	Present	New ^d
Personnel in div	11,000	16,500	17,800	17,000	15,000	11,700	8,500	12,700	16,000	18,000	17,500	15,000
Armd bdes/regts ^g	3	3 ^h	3	2	2	2	—	1	—	1	1	1
each of: tk bns	3	2	3	2	3	2	—	4 ⁱ	—	3	2	3
inf bns	—	1	2	1	1	2	—	—	—	2	1	1
Mech bdes/regts ^g	1	—	—	1	1	—	—	3	3 ^h	2	2	2
each of: tk bns	1	—	—	1	2	—	—	1	1	2	1	2
inf bns	3	—	—	2	3	—	—	3	2	3	2	3
Major units in div:												
tk bns	10	6 ^h	9	5	8	4	2	7	4 ^h	7	4	7
inf bns	3	5 ^h	6	4	5	4	3	9	6 ^h	8	5	7
recce bns	1	1 ^f	1 ^f	1	1	— ^k	1	1	1 ^f	1 ^f	1	1
ATK bns	—	—	—	—	—	—	—	1	—	—	—	—
arty bns	4	4	4	5	5	2	2	4	4	4	5	5
Major equipments in div:												
<i>Tanks</i>												
med	325 ^l	324	360	300	264	212	148	266 ^l	216	288	250	231
lt	22	54 ^m	—	—	—	—	72	22	54 ^m	—	—	—
<i>Anti-tank weapons</i>												
Tank destroyers	—	—	—	16	—	—	—	18	—	—	32	n.a.
ATGW ⁿ	153 ^o	380 ^p	480	34	186	72 ^q	78 ^r	165 ^s	426 ^t	534	29	222
<i>Artillery</i>												
hy guns ^u	—	12	16	18	18	— ^v	3	—	12	16	18	18
med guns ^u	60	54	96	54	54	36	36	96	54	96	54	54
hy mor	18	53	—	30	30	—	—	54	49	—	36	36
multiple RL	18	—	— ^w	16	16	—	—	18	—	— ^w	16	16
SSM	4	— ^x	— ^x	4	4	— ^x	— ^x	4	— ^x	— ^x	4	4

^a Countries tend to have more than one manpower establishment for a div (e.g. peacetime and wartime) or variations to fit different theatre requirements. The figures shown here apply to Central Europe, and to operations rather than peacetime. They include only regular units that are a permanent part of the formation.

^b Figures refer to tk divs with 1 BMP mech regt and to mech divs with 1 BMP and 2 PTR-60 mech regts.

^c Figures for new US divs refer to div structures being tested, based on more but smaller bns and an increase in arty and ATGW; details may well change.

^d Figures for new West German divs refer to divs based on a new bde structure; several bdes have already converted. Figures for numbers of weapons are provisional only and may change.

^e The div strength would be increased in war to 12,700 by inclusion of reservists.

^f Britain is converting her divs into smaller ones, eliminating the bde. One has already been converted. Div strength will be increased in war to 11,500 by inclusion of reserve units.

^g The number of bdes in a div and, in particular, the number of bns in a bde, will vary with operational needs; regrouping of units would be normal. The composition given here is only a guide in each case to standard peacetime dispositions. Soviet regts are the equivalent formation to bdes in the West.

^h US bdes in the armd div have a total of 11 tk and inf bns; those in the mech div have a total of 10 tk and inf bns, flexibly assigned according to need.

ⁱ Incl one indep tk bn.

^j An armd cav sqn, strength 860.

^k Recce bns are Corps units, allotted one to a div. They include 8 ATGW AFV.

^l Divs in Eastern Europe only; others have fewer tks, particularly in mech divs.

^m In Europe; elsewhere normally 27.

ⁿ AFV with multiple launchers counted as one ATGW. Figures exclude weapons carried in tks shown in this table or on hel.

^o 12 manpack, 132 BMP-, 9 BRDM-mounted Sagger.

^p 134 TOW, 246 Dragon.

^q 40 Swingfire AFV with armd regts and recce bn plus 32 Milan (16 per inf bn).

^r 30 Swingfire AFV, 48 Milan.

^s 36 manpack, 102 BMP-, 27 BRDM-mounted Sagger.

^t 148 TOW, 278 Dragon.

^u Med guns incl 105mm and 155mm; larger calibres are classified as hy.

^v Hy guns are held at Corps level, the div share would be 8 175mm, 4 203mm.

^w A multiple RL system is being developed.

^x Held at Corps level.

9. Index of NATO Code Names for Soviet Aircraft

Name	Aircraft	Role	Name	Aircraft	Role	Name	Aircraft	Role
<i>Backfire</i>	Tu-?	med bbr	<i>Fagot</i>	MiG-15	FGA	<i>Homer</i>	Mi-12	hy GP hel
<i>Badger</i>	Tu-16	med bbr, MR, ECM, tanker	<i>Farmer</i>	MiG-19	FGA	<i>Hoodlum</i>	Ka-26	lt hel
<i>Beagle</i>	Il-28	lt bbr, recce, ECM	<i>Fencer</i>	Su-19	FGA	<i>Hook</i>	Mi-6	hy tpt hel
<i>Bear</i>	Tu-95	LR* bbr, MR	<i>Fiddler</i>	Tu-28P	interceptor	<i>Hoplite</i>	Mi-2	GP lt hel
<i>Bison</i>	Mya-4	LR bbr, tanker	<i>Firebar</i>	Yak-28P	interceptor	<i>Hormone</i>	Ka-25	ASW, GP hel
<i>Blinder</i>	Tu-22	med bbr, recce, ECM	<i>Fishbed</i>	MiG-21	multi-role fighter	<i>Hound</i>	Mi-4	tpt, ASW, GP hel
<i>Brewer</i>	Yak-28	FGA, recce, ECM	<i>Fishpot B</i>	Su-9	interceptor			
<i>Cab</i>	Li-2	2-engine tpt	<i>Fishpot C</i>	Su-11	interceptor	<i>Maestro</i>	Yak-28U	trainer
<i>Camel</i>	Tu-104	2-engine tpt	<i>Fitter A</i>	Su-7	FGA	<i>Maiden</i>	Su-9U	fighter/trainer
<i>Candid</i>	Il-76	4-engine tpt	<i>Fitter C</i>	Su-17/-20/-22	FGA	<i>Mail</i>	Be-12	2-engine MR amphibian
<i>Careless</i>	Tu-154	3-engine tpt	<i>Flagon</i>	Su-15	interceptor	<i>Mandrake</i>	Yak-?	LR recce
<i>Clank</i>	An-30	2-engine aerial survey	<i>Flashlight A-D</i>	Yak-25	interceptor, FB, recce	<i>Mangrove</i>	Yak-26	fighter, recce
<i>Classic</i>	Il-62	4-engine tpt	<i>Flogger A, B, C, E</i>	MiG-23	interceptor	<i>Mantis</i>	Yak-30	basic trainer
<i>Cleat</i>	Tu-114	4-engine tpt	<i>Flogger D, F</i>	MiG-27	FGA	<i>Mascot</i>	Il-28UTI	bbr/trainer
<i>Clod</i>	An-14	2-engine lt GP	<i>Fresco</i>	MiG-17	FGA, interceptor	<i>May</i>	Il-38	4-engine ASW, MR
<i>Cock</i>	An-22	4-engine tpt	<i>Forger</i>	Yak-36	VTOL FGA	<i>Maya</i>	L-29	trainer
<i>Codling</i>	Yak-40	3-engine tpt	<i>Foxbat</i>	MiG-25	interceptor, recce	<i>Max</i>	Yak-18	trainer
<i>Coke</i>	An-24	2-engine tpt				<i>Midget</i>	MiG-15UTI	fighter/trainer
<i>Coot</i>	Il-18	4-engine tpt	<i>Hare</i>	Mi-1	lt hel	<i>Mongol</i>	MiG-21UTI	fighter/trainer
<i>Crate</i>	Il-14	2-engine tpt	<i>Harke</i>	Mi-10	flying crane hel	<i>Moss</i>	Tu-126	airborne control
<i>Crusty</i>	Tu-134	2-engine tpt	<i>Haze</i>	Mi-14	ASW hel	<i>Moose</i>	Yak-11	trainer
<i>Cub A, C</i>	An-12	4-engine tpt, ECM	<i>Hind</i>	Mi-24	assault hel	<i>Moujik</i>	Su-7BUTI	fighter/trainer
<i>Curl</i>	An-26	2-engine tpt	<i>Hip</i>	Mi-8	tpt hel	<i>Mouse</i>	Yak-18A/P	fighter/trainer

* Long-range.

The Military Balance 1977/78

The Theatre Balance Between NATO And the Warsaw Pact

Any assessment of the military balance between NATO and the Warsaw Pact involves comparison of the strengths of both men and equipment, consideration of qualitative characteristics, factors such as geographical advantages, deployment, training and logistic support, and of differences in doctrine and philosophy. It must be set within the context of the strategic nuclear balance, of military forces world wide and, in particular, of the relative strengths of the navies of the two sides.

Certain elements in the equation are of special importance. Warsaw Pact equipment is standardized, whereas that of NATO is not and is therefore subject to limitations on interoperability and thus flexibility. NATO has certain strengths, such as the striking power of its tactical air forces, but there is little depth in the NATO central sector, which presents problems in its defence. On the other hand, the Warsaw Pact has its own vulnerabilities, and there may be doubts about the reliability of some of its members and the value of their forces.

The appraisal which follows should therefore be regarded as primarily a quantitative guide, since there are difficulties in giving, in so short a space, values to qualitative factors and deciding on their relevance. It is military only, and thus one-dimensional. Furthermore, any single, static comparison of opposing forces can only give a limited insight into what might happen under the dynamic conditions of conflict. The two sides do not have the same military requirements: Soviet forces are designed for an offensive; NATO forces for defence, for creating at least a reasonable Soviet doubt about the possibility of the speedy success of a conventional attack and the nuclear consequences that might follow. This presentation necessarily oversimplifies what is by its nature a complex problem, not easily responsive to analysis.

The characteristics of the military balance are central to any consideration of Mutual and Balanced Force Reductions (MBFR), but the geographical area covered by the MBFR negotiations is only part of NATO territory to be defended. A section at the end of this essay shows the figures relating to this area with which MBFR negotiators will be concerned.

LAND AND AIR FORCES

The three major NATO subordinate commands, Northern, Central, and Southern Europe, at first seem to offer a convenient basis for making a direct comparison with the opposing forces of the Warsaw Pact, but there are problems. The Northern European Command covers not only Norway but also the Baltic area, including Denmark, Schleswig-Holstein, and the Baltic Approaches, which is intimately linked with the Central sector. It is not possible to make precise judgments as to which Warsaw Pact formations would be committed towards NATO's Northern rather than towards its Central European Command, since in both land and air forces there is a considerable degree of flexibility to do either. For the Warsaw Pact this geographical area is a coherent front, though a number of Soviet divisions stationed well to the north, discussed later, are undoubtedly directed towards Norway. Northern and Central Europe have therefore been grouped together in the tables which follow. Southern Europe is shown separately.

GROUND FORMATIONS

A traditional basis of comparing strengths is the number of combat divisions that the two sides have, shown in the table below. This is far from an adequate guide by itself, since not only do divisions vary greatly in their organization, size, and equipment (see the comparisons on page 117), but there are many combat units outside divisional structures. As one very broad indication of the front-line combat resources on the ground in peacetime a divisional count has some utility provided it is taken in conjunction with the various tables which follow, in particular that for combat manpower.

Ground Forces Available In Peacetime (div equivalents)	Northern and Central Europe			Southern Europe		
	NATO	Warsaw Pact	(of which USSR)	NATO	Warsaw Pact	(of which USSR)
Armd	10	32	22	4	6	2
Mech	13	33	20	7	24	7
Inf and AB	4	5	3	26	3	2

In this table (and the ones that follow in this section), the portion headed 'Northern and Central Europe' includes (on the NATO side) the commands for which AFCENT and AFNORTH commanders have responsibility. France is not included, nor are any allied ground forces in Portugal or Britain. On the Warsaw Pact side it includes the command for which the Pact High Commander has responsibility, but excludes the armed forces of Bulgaria, Hungary, and Romania. Certain Soviet units normally stationed in western USSR and such troops as might be committed to the Baltic and Norwegian theatre of operations have, however, been included on the Warsaw Pact side. The entries under the heading 'Southern Europe' include, on the NATO side, the Italian, Greek, and Turkish land forces (including those in Asian Turkey) and such American and British units as would be committed to the Mediterranean theatre of operations, and on the Warsaw Pact side, the land forces of Bulgaria, Hungary, and Romania and such Soviet units normally stationed in Hungary and southwestern USSR as might be committed to the Mediterranean theatre. (In the table, all divisions, brigades, and similar formations are aggregated on the basis of three brigades per division.)

Greek forces are included in the table, since their withdrawal from the integrated military organization is still under discussion. French formations are not; if included they would add two mechanized divisions to the NATO totals. (These are the two divisions stationed in Germany. There are eight more in France, outside the area of the NATO command. French divisions are in process of reorganization, however.) Though these divisions are stationed in Germany and there has been some joint planning with NATO military commanders, they are not committed to NATO; they have no operational sectors, and there has been far from full agreement on the military strategy under which they might be employed. All the appropriate forces of the East European Warsaw Pact countries are included, though the military value of some of them might be suspect for political reasons, dependent on circumstances. In addition to the Soviet divisions in Eastern Europe, a number that are stationed in the Western military districts of the Soviet Union are included in the table. They consist of those Category 1 and 2 formations that are judged to be intended for immediate or very early operations in the NATO area; they total about one-third of the divisions listed under Northern and Central Europe and one-half of those in Southern Europe. A proportion of the Warsaw Pact strength shown is, therefore, some distance away in the Soviet Union, while the NATO divisions in the central sector are mainly in Germany, where they are wanted. The figures for Northern and Central Europe therefore show what is, from a NATO viewpoint, the worst case; those for Southern Europe, for different reasons, show the best, as noted below.

There are a number of disparities which the table does not bring out. The first is a marked

imbalance in North Norway. In Norway there are only Norwegian forces, a brigade group being located in the north. There are strong Soviet forces in the Kola peninsula, some two divisions and a marine brigade, and some nine divisions in the Leningrad Military District, with more formations to the south in the Baltic states. While many of these formations may have other missions, it is clear that large forces could be brought against Norway (and indeed Denmark) and could be rapidly reinforced. The Soviet naval strength in the region is massive, and sea power, including amphibious capacity, is an important element in the military and, particularly, regional balance. The wide disparity highlights the problem of the defence of North Norway against surprise attack. To meet this difficulty a system of self-defence, based on a strong Home Guard and rapid mobilization, has been designed to take maximum advantage of the ruggedness of the country and the poor road and rail communications, but it is clear that defence against attack of any size depends on timely external assistance, including air and naval support.

Two further imbalances are worth noting. In Southern Europe the whole of the Italian land forces, included in the table under Southern Europe, are stationed in Italy and are thus at some distance from the areas of potential confrontation in the South-east and the Centre. Indeed the NATO forces in the South are effectively in three separate land sectors, with scant possibility of being able to move reinforcing units from one national contingent to assist another. It will also be noted that the Warsaw Pact is much stronger in mechanized formations.

The third imbalance, a legacy from the post-war occupation zones, is a certain maldeployment in the Central European Command, where the strong US formations are stationed in the southern sector, where the terrain often lends itself to defence, while in the north German plain, across which the routes to allied capitals run and where there are fewer obstacles, certain of the forces are less powerful. (This pattern of deployment also leaves US forces reliant on logistic communications running north-south, since they can no longer use French territory.) In wartime, lateral movement of forces might have to be made and, in particular, reinforcements would have to be directed to the sector where they were most needed rather than to existing national sectors. A partial adjustment of this maldeployment is now taking place with the stationing of one of the two additional US brigades in the north, making emergency reinforcement of this area by US troops easier.

MANPOWER

A comparison of front-line combat manpower deployed on the ground in normal peacetime circumstances (as distinct from total manpower, which is referred to later) fills out the picture further. The figures shown reflect the variations in divisional establishments mentioned above but also include combat troops in formations higher than divisions. They take some account of under-manning as well—many NATO and Warsaw Pact divisions are kept well below strength in peacetime. Figures calculated on this basis, which can only be very approximate, are shown in the table which follows. The figures do not include French forces; if those stationed in Germany are counted, the NATO figure for Northern and Central Europe might be increased by perhaps 40,000. Again, they include Greece.

	Northern and Central Europe			Southern Europe		
	NATO	Warsaw Pact	(of which USSR)	NATO	Warsaw Pact	(of which USSR)
Combat manning in all types of formations (000)	630	945	640	560	390	145

The table still reveals a marked advantage to the Warsaw Pact in Northern and Central Europe (subject to the caveat about the value to be placed on the forces of the East European countries). It does not, of course, include the men in the US dual-based brigades, because they are not physically present in Europe, but does include on the Warsaw Pact side combat troops in Category 1 and 2 divisions and higher formations in the western military districts of the Soviet Union, since they are clearly designed for operations in the NATO area.

In Southern Europe the figures appear to favour NATO but do not, of course, show that the forces are widely separated while those of the Warsaw Pact can be more flexibly deployed.

It must be remembered that the figures only cover land forces. Of course, any operations would be heavily influenced by air forces, the figures for which are given later, and indeed by naval action as well.

REINFORCEMENTS

The movement of external reinforcements to the theatre and the mobilization of indigenous first-line reserves would materially alter the above figures. Indeed there is only limited utility

comparing just peacetime strengths, since in crisis or conflict the total combat manpower that can be brought to bear in time becomes the key indicator. There are, however, acute difficulties in making a numerical comparison of anything other than the numbers of reinforcements potentially available, since there are so many variables and a good many unknowns

	Divs			Bdes/regts			Marines
	Armd	Mech	Other	Armd	Mech	Other	Divs
<i>Active Formations</i>							
United States	2	3	5	1	1	1	2
Britain	—	—	1	—	—	2	—
Canada	—	—	—	—	—	1	—
Germany	—	—	—	—	—	—	—
France	—	3	2	—	—	—	—
Totals	2	6	8	1	1	4	2
<i>Reserve Formations</i>							
United States	2	1	5	3	6	13	1
Belgium	—	—	—	—	1	1	—
Britain	—	—	—	—	—	—	—
Canada	—	—	—	—	—	—	—
Germany	—	—	—	—	—	6	—
Netherlands	—	1	—	—	—	1	—
Norway	—	—	—	—	—	11	—
Totals	2	2	5	3	7	32	1
Grand Totals	4	8	13	4	8	36	3

US reinforcements include light (infantry and airborne) divisions. Some countries, particularly Britain, Canada, the Netherlands, and France, have plans to mobilize battalion-sized units in some numbers in addition to the formations shown here. France also has formations earmarked for territorial defence.

affecting the speed with which reinforcements and reserves could or would be deployed operationally.

Implicit in NATO defence plans is the concept of political warning time: that there will be enough warning of a possible attack for forces to be brought to a higher state of readiness and for reinforcement and mobilization to take place. This does, of course, assume the willingness—which applies to both sides—to reinforce in a crisis situation, at the risk of heightening tension by doing so. Advantage here will generally lie with an attacker, who can start mobilization first, hope to conceal his intentions, and finally achieve some degree of tactical surprise. The point of attack can be chosen and a significant local superiority built up. The defender is likely to start more slowly and will have to remain on guard at all points.

There is obvious military advantage in surprise, and there has been speculation that the Warsaw Pact forces is designed to enable them to launch an attack without being reinforced beforehand, so as to give no warning to NATO through the movement of mobilization of Soviet reserves. This would involve attacking with only those forces now in place, forfeiting the possibility of building up greater superiority and of making preparations beforehand that could not be made later (for example, the moving to sea of missile submarines and other naval forces that are kept in port rather than at operational stations, thus giving warning). It would assume that these forces were considered certain to be adequate to the task, and perhaps also that the alternative setting, of both sides carrying out a degree of reinforcement first, yielded less advantage. In fact Warsaw Pact reinforcement in the early stages could be significantly faster than that of NATO (a point to which NATO is paying much attention).

NATO forces would be built up from two sources: the mobilization of reserves to increase the strength or the number of existing formations, and external reinforcement by the movement of active army formations stationed outside the theatre in peacetime.

Potentially the most rapid build-up of any size would be that from the mobilization of reserves in Europe, which could occur within days. This applies particularly to Germany, where reserves would bring units up to wartime strength (but not increase their number) and mobilize the Territorial Army of some 500,000 men, designed to assist with rear area defence. Other European nations could also use mobilized reserves to strengthen units and, in certain cases, increase their number. Formations from outside the immediate area would come from Canada, Britain, and possibly France, but principally from the United States. There are two divisions and an armoured cavalry regiment in the United States with equipment stockpiled

in Germany; their personnel could be moved very quickly, using the very considerable airlift available. (Equipment is nominally stockpiled for 2½ divisions, but two newly-formed brigades have been equipped from this stockpile.) There are in the United States another 10, largely infantry, active divisions (some with heavy equipment) and 2 brigades also available for use in Europe, but though they might be available very early, much of their equipment would have to be moved by sea. The same would apply to the 8 divisions and some 19 independent brigades in the National Guard (excluding 4 incorporated in active divisions); these could nominally be ready perhaps five weeks after mobilization but might need further training (as might some Soviet reserves). The table above summarizes the formations that NATO countries have available to provide reinforcements for the critical Central and Northern sectors.

Warsaw Pact reinforcement plans follow a rather different pattern. There are a large number of active Soviet divisions, but they are kept at three different manning levels, as are Warsaw Pact formations (see pp. 69 and 71). Reinforcement depends on filling out these divisions by mobilization and on moving some forward from the Soviet Union. All Soviet divisions stationed in East Germany, Poland, or Czechoslovakia are in Category 1 and would need little if any reinforcement, but some of the East European countries' divisions in the central sector are at a much lower level. The divisions in the Soviet Union which would move forward first would be those in the western part of the country, of which about a half of those designed for use in the central sector are normally in Category 1 or 2. While Category 2 divisions might take 72 hours or so to be ready, it is possible that they might be committed to battle early, even if only at three-quarter strength, leaving reinforcements to come behind. With more time and risk, reinforcing divisions could also be deployed from elsewhere in the Soviet Union, even from as far away as the Sino-Soviet Border area. The total number and state of readiness of Soviet and East European divisions (which, it will be remembered, are smaller than those of NATO) are shown in the next table.

As far as can be judged, mobilization by the Soviet Union in particular could be very speed (though it would be impossible to conceal it on any scale); it has been estimated that the 27 Soviet divisions in Eastern Europe could be increased in a few weeks to between 50-60, and the total number of Warsaw Pact divisions to perhaps 80—if mobilization were unimpeded. Of course it might not be. If hostilities had already started, movement by rail and road could be

	Armd divs			Mech divs			Other divs		
	Category			Category			Category		
	1	2	3	1	2	3	1	2	3
Czechoslovakia	3	—	2	3	—	2	—	—	—
East Germany	2	—	—	4	—	—	—	—	—
Poland	5	—	—	3	2	3	—	2	—
Soviet divs.									
In above area	14	—	—	13	—	—	—	—	—
Elsewhere	5	13	13	18	20	64	8	—	—
Soviet totals	19	13	13	31	20	64	8	—	—

Included among the divisions deployed "elsewhere" are four Category 1 divisions in Hungary and a number of divisions that might reinforce Southern Europe rather than the central sector. Soviet naval infantry are not included.

interdicted and the build-up slowed considerably. Nonetheless, the Soviet Union, a European power operating on interior lines, has geographical advantages and in the early weeks should be able to move reinforcements with heavy equipment faster overland than the United States could by sea, and she could also use heavy airlift. American ability to bring back the men of the dual-based brigades in days by air has been demonstrated on exercises, and for the two divisions with equipment in Germany the airlift of personnel would be a matter of another week or so. As with Soviet Forces, this would depend on movement not being hindered, on a secure air environment and safe airfields to fly into; and quick dispersal from airfields could be difficult once fighting had started. The increase of manpower strengths of combatant units (as distinct from an increase in their number) could take place rapidly, both from the United States and from the European NATO countries, but the real problem for NATO in achieving a fast build-up of the number of combat divisions lies in the inevitable time-lag before the American follow-up formations, dependent on sealift for their heavy weapons, could be ready for operations.

A fair summary of the initial reinforcement position might be that the Warsaw Pact is intrinsically capable of a much faster build-up of formations in the first two or three weeks, particularly if local surprise is achieved, having a large pool of reserves on which to draw and the formations to absorb them; that NATO can only attempt to match such a build-up if it has

and takes advantage of, sufficient warning time; that the subsequent rate of build-up of formations also favours the Warsaw Pact substantially, suggesting that comparative advantage is to be found in this. Only if the crisis develops slowly enough to permit full reinforcement could the West eventually reach a better position. Apart from having greater economic resources, Alliance countries, including France, maintain rather more men under arms than the Warsaw Pact. For Army/Marines the figures (in thousands) are: NATO 2,842; Warsaw Pact 2,647. And the Soviet Union has a large number of her divisions and men on her border with China. Clearly, Soviet plans will put a premium on exploiting a fast build-up of forces, and NATO'S on having adequate standing forces to meet any attack and on augmenting them in good time.

EQUIPMENT

In a comparison of equipment one point stands out: the Warsaw Pact is armed almost completely with Soviet or Soviet-designed material and enjoys the flexibility, simplicity of training, and economy that standardization brings. NATO forces have a wide variety of everything from weapons systems to vehicles, with consequent duplication of supply systems and some difficulties of interoperability; they do, however, have some weapons qualitatively superior. As to numbers of weapons, there are some notable disparities, of which that in tanks is perhaps the most significant. The relative strengths are:

	Northern and Central Europe			Southern Europe		
	NATO	Warsaw Pact	(of which USSR)	NATO	Warsaw Pact	(of which USSR)
Main battle tanks in operational service	7,000	20,500	13,500	4,000	6,700	2,500

These are tanks with formations or earmarked for the use of dual-based or immediate reinforcing formations (some 600). They do not include those in reserve or small stocks held to replace tanks damaged or destroyed. In this latter category NATO has perhaps 2,500 tanks in Central Europe. There are tanks in reserve in the Warsaw Pact area, but the figures are difficult to establish. The total Pact tank holdings are, however, materially higher than the formation totals shown in the table.

Tanks in French formations are not included in the above figures. If the two divisions stationed in Germany are taken into account, 325 tanks should be added to the NATO total; if the three divisions in eastern France are also counted, a further 485 should be added.

It will be seen that in Northern and Central Europe NATO has only a third as many operational tanks as the Warsaw Pact, though NATO tanks are generally superior (not, perhaps, to the T-72 now being issued to the Soviet forces. Soviet tank production is high; more than 2,000 T-72s have been built in the last two years). This numerical weakness in tanks (and in other armoured fighting vehicles, where the Soviet forces are notably well-equipped both in numbers and quality) reflects NATO's essentially defensive role and has in the past been offset to some extent by a superiority in heavy anti-tank weapons, a field in which new air- and ground-launched missiles rapidly coming into service could increasingly give more strength to the defence. NATO is indeed introducing large numbers of such weapons, but so is the Warsaw Pact (see the comparison of divisional weapons on p. 117). At the moment the Pact probably has more ground-launched weapons (and anti-tank guns), but NATO has more effective airborne anti-tank (and other precision air-to-ground) weapons carried by fighter aircraft and helicopters.

The Warsaw Pact has also built up a marked advantage in conventional artillery in Northern and Central Europe: counting field, medium, and heavy guns, mortars and rocket launchers with formations, NATO has only some 2,700 against a Warsaw Pact total of more than 10,000. In Southern Europe the position is more nearly equal, NATO having 3,500 against some 4,000 in the Warsaw Pact, though about one-third of the NATO total is in Italy. To some extent the imbalance is redressed by the greater lethality of NATO ammunition, and hitherto by a greater logistic capacity to sustain higher rates of fire, stemming from a relatively higher transport lift. Soviet forces have, however, been augmenting their logistics substantially, particularly with formations, and new self-propelled guns are replacing older towed models. NATO is also modernizing its artillery, in which it has achieved a fair degree of standardization, and in particular is developing a precision-guided shell and other munitions which would give artillery, *inter alia*, a much improved anti-tank capability.

LOGISTICS

NATO has an inflexible logistic system, based almost entirely on national supply lines with

little central co-ordination. It cannot now use French territory and has many lines of communication running north to south near the area of forward deployment. Certain NATO countries are, furthermore, short of supplies for sustained combat, but Warsaw Pact countries may well be no better off. The Soviet logistic system has been greatly augmented in recent years. The organization has been improved and formations have been given more support. The former NATO superiority in forward-area logistics has probably now gone, though there is some inherent advantage in operating on home territory.

AIR POWER

If NATO ground formations are to be able to exploit the mobility they possess by day as well as by night, they must have a greater degree of air cover over the battlefield than they now have. Such cover is provided by a combination of rapid warning and communications systems, fighter aircraft, and air defence weapons both for defence of key areas or in the hands of forward troops. In numbers of aircraft NATO is inferior but has, however, a higher proportion of multi-purpose aircraft of good performance over their full mission profiles, especially in range, payload, and all-weather capability; considerable power can be deployed in the ground-attack role in particular. Both sides are modernizing their inventories. The Soviet Union is producing multi-role fighters to replace the large numbers of aircraft at present used only in an air defence role, thus giving increased ground-attack capacity. In addition, fighters have for the first time been specifically designed for deep strike and interdiction, bringing European capitals within range of tactical aircraft. (The latest versions of the MiG-23/-27 *Flogger*, Su-17/-20 *Fitter*, and Su-19 *Fencer* are reported to have substantially improved range, payload, avionics, and ECM capabilities. This may well be at the expense of overall numbers in future, since there has been an increase of some 1,300 tactical aircraft in the Warsaw Pact during the last seven years or so.) NATO is also bringing into service new fighter aircraft of many types, and the United States has recently substantially augmented her F-15 and F-111 squadrons in Europe. US aircraft in particular can now be assumed to have available very advanced air-delivered weapons, such as laser-guided and other precision-guided munitions.

Tactical Aircraft in Operational Service	Northern and Central Europe			Southern Europe		
	NATO	Warsaw Pact	(of which USSR)	NATO	Warsaw Pact	(of which USSR)
Light bombers	150	125	125	—	50	50
Fighter/ground-attack	1,500	1,350	925	625	325	125
Interceptors	400	2,050	900	200	1,000	425
Reconnaissance	300	550	350	125	200	150

The area of Northern and Central Europe in the table above is slightly wider than for ground troops as described previously. Many aircraft have a long-range capability and in any case can be redeployed very quickly. Accordingly, the figures here include the appropriate British and American aircraft in Britain, American aircraft in Spain, and Soviet aircraft in the Western USSR. They do not, however, include the American dual-based squadrons, which would add about 100 fighter-type aircraft to the NATO totals, nor French squadrons with perhaps another 400 fighters. Carrier-borne aircraft of the US Navy are excluded, but so are the medium bombers in the Soviet Air Force, which could operate in a tactical role.

The air forces of the two sides have tended to have rather different roles; long range and payload have in the past had lower priority for the Warsaw Pact, while NATO has maintained a long-range deep-strike tactical aircraft capability. (The Soviet Union has chosen to build an MRBM force which could, under certain circumstances, perform analogous missions—though not in a conventional phase of any battle.) The introduction of more advanced, longer-range, Soviet aircraft now presents a much greater air defence problem for NATO, whose strike aircraft have to meet the increased air defence capability that Soviet forces have built up. The Soviet Union has always placed heavy emphasis on air defence, evident not only from the large number of interceptor aircraft in the table but from the strength of her deployment of high-quality surface-to-air missiles and air defence artillery both in the Soviet Union and with units in the field. These defences would pose severe problems for NATO strike aircraft, drawing off much effort into defence suppression. NATO territory and forces are much less well provided with air defence, but heavy expenditure is now going into new systems of many sorts, both low- and high-level, missiles and artillery (and into electronic warfare equipment for aircraft).

The Warsaw Pact enjoys the advantage of interior lines of communication, which makes for ease of command and control and logistics. It has in the past had a relatively high capability to operate from dispersed natural airfields serviced by mobile systems, but the introduction of new high-performance fighters will reduce this. It does, however, have more airfields with protective shelters and the great advantage of standard ground support equipment which

tems from having only Soviet-designed aircraft. These factors make for greater flexibility than NATO has, with its wide variety of aircraft and support equipment. NATO suffers from having too few airfields, which are thus liable to be crowded, and has been slow to build shelters. Undoubtedly still has superiority in sophistication of equipment but this technological edge is being eroded as the newer Soviet aircraft, which are very advanced, are brought in. The capability of NATO air crews (which in general have higher training standards and fly more hours) and the versatility of its aircraft, give all-weather operational strength, and the quality of Western electronic technology is such that ground and airborne control equipment is almost certainly superior to that of the Warsaw Pact. The introduction of AWACS, so much discussed but not yet decided, would give NATO an airborne control system that would offer significant advantage. Since squadrons can be moved quickly, the NATO numerical inferiority shown above could rapidly be redressed if enough airfields were available. While the total tactical aircraft inventories of the two sides are not dissimilar in size, the Soviet Union keeps about a third of her force on the Chinese front.

THEATRE NUCLEAR WEAPONS

NATO has been said to have some 7,000 nuclear warheads, but the composition of this armoury has undoubtedly changed as weapon systems have been modernized and redeployed. They are deliverable by a variety of vehicles (more than 3,000 in all): aircraft, short-range missiles, and artillery of the types listed in Table 1 on pp. 110-112. (These nuclear weapons are in general designed for use against targets within the battlefield area or directly connected with the manoeuvre of combatant forces—which could be described as a 'tactical' use. However, the warheads include a substantial number carried by aircraft such as the F-4 or F-104, which could be delivered on targets outside the battlefield area or unconnected with the manoeuvre of combatant forces, and thus be put to 'strategic' use. There is inevitably some overlap when describing delivery vehicles, aircraft, and missiles capable of delivering conventional or nuclear warheads as 'tactical' or 'strategic'. The warhead total also includes nuclear warheads for certain air defence missiles and nuclear mines.) In the matter of nuclear mines, yields are variable but are mainly in the low kiloton range. The ground-based missile launchers and guns are in formations down to divisions and are operated both by American and allied troops, but in the latter case warheads are under double key (except in the case of France). The figure for Soviet warheads is probably about 3,500, similarly delivered by aircraft and missile systems (see Table 1). Soviet warheads are thought to be somewhat larger, on average, than those of NATO, and the delivery systems, both ground and air, notably less accurate. Soviet doctrine has concerned itself more with area targets than precision (it also appears to contemplate the use of launchers for the delivery of chemical weapons, with which Warsaw Pact forces are extensively equipped). Some of the delivery vehicles, but not the nuclear warheads, are in the hands of non-Soviet Warsaw Pact forces.

It is not appropriate to attempt to strike any balance of these theatre-based nuclear systems, since each side also has the ability to deliver warheads into the theatre from outside it, increasingly with accuracies and yields suitable for military targets. The Soviet Union has a large medium-bomber force being equipped with *Backfire*; Long-Range and Naval Air Force aircraft; IRBM and MRBM, including the new mobile SS-20, with its accurate multiple warhead; and cruise missiles on submarines and surface ships. NATO has strike aircraft on carriers and on airfields in Britain (now augmented by extra F-111 squadrons) and could use SLBM for certain theatre roles.

This comparison of nuclear weapons must not, though, be looked at in quite the same light as the conventional comparisons preceding it, since on the NATO side the strategic doctrine is not based on the use of such weapons on this sort of scale. The warhead numbers were accumulated to implement an earlier, predominantly nuclear, strategy, and an inventory of this size now has the chief merit of affording a wide range of choice of weapons, yield, and delivery system if controlled escalation has to be contemplated. A point that does emerge from the comparison, however, is that the Soviet Union has the ability to launch a battlefield nuclear offensive on a massive scale if she chooses, or to match any NATO escalation with broadly similar options, though at present with less ability to limit collateral damage.

CHANGES OVER TIME

The comparisons above begin to look rather different from those of a few years ago. The effect of small and slow changes can be marked, and the balance can alter. In 1962 the American land, sea, and air forces in Europe totalled 434,000; now the figure is around 300,000. There were 26 Soviet divisions in Eastern Europe in 1967; now there are 31, and they are larger in size (despite the increase of some 25 divisions on the Chinese front over the same period). The numerical pattern over the years so far has been a gradual shift in favour of the East, with NATO relying on offsetting this by a qualitative superiority in its weapons that is now being eroded as new Soviet equipment is introduced. While NATO has been modernizing its forces, the Warsaw Pact has been modernizing faster and expanding as well. In some areas (for example, SAM, certain armoured vehicles, and artillery) Soviet weapons are now superior, while in other fields

(such as tactical aircraft) the gap in quality is being closed. The advent of new weapons systems, particularly precision-guided munitions and new anti-tank and air defence missiles, may again cut into the Warsaw Pact's advantage in tank and aircraft numbers, but in general the pattern is one of a military balance moving steadily against the West.

SUMMARY

It will be clear from the foregoing analysis that a balance between NATO and the Warsaw Pact based on comparison of manpower, combat units, or equipment is an extraordinarily complex one, acutely difficult to analyse. In the first place, the Pact has superiority by some measures and NATO by others, and there is no fully satisfactory way to compare these asymmetrical advantages. Secondly, qualitative factors that cannot be reduced to numbers (such as training, morale, leadership, tactical initiative, and geographical positions) could prove dominant in warfare. However, three observations can be made by way of a summary:

First, the overall balance is such as to make military aggression appear unattractive. NATO defences are of such a size and quality that any attempt to breach them would require major attack. The consequences for an attacker would be incalculable, and the risks, including that of nuclear escalation, must impose caution. Nor can the theatre be seen in isolation: the central strategic balance and the maritime forces (not least because they are concerned to keep open sea lanes for reinforcements and supplies, and because of their obvious role in the North and in the Mediterranean) play a vital part in the equation as well.

Second, NATO has emphasized quality, particularly in equipment and training, to offset numbers, but this is now being matched. New technology has strengthened the defence, but it is increasingly expensive. If defence budgets in the West are maintained no higher than their present level and manpower costs continue to rise, the Warsaw Pact may be able to buy more of the new systems than NATO. Soviet spending has been increasing steadily, in real terms, for many years. Furthermore, technology cannot be counted on to offset numerical advantages entirely.

Third, while an overall balance can be said to exist today, the Warsaw Pact appears more content with the relationship of forces than is NATO. It is NATO that seeks to achieve equal manpower strengths through equal force reductions while the Pact seeks to maintain the existing correlation.

FORCE REDUCTIONS

Negotiations on the mutual reduction of forces and armaments and associated measures in Central Europe have been under way since 30 October 1973. 'Central Europe' was not defined in the communiqué agreed in the preparatory consultations, but the talks have been concerned with forces and armaments in Poland, Czechoslovakia, East Germany, West Germany, the Netherlands, Belgium, and Luxembourg (the so-called NATO Guidelines Area, or NGA). France is taking no part in the discussions, so her forces are presumably excluded (except that French forces in Germany might be taken into account), as are any Soviet or NATO troops not stationed in the area described. Forces stationed in Berlin under quadripartite jurisdiction are unlikely to be covered *per se*, but would almost certainly be embraced by overall ceilings.

Since the area is a narrower one than that with which this appraisal has largely been concerned, and total manpower rather than combat strength is a main yardstick, the table below has been constructed to show the broad figures with which NATO negotiators are concerned, so that they can be compared with the figures for the theatre as a whole. The manpower strengths are in thousands; those for ground forces exclude marines. The tanks represent those in formation establishments and exclude reserve stocks. Aircraft figures do not include naval aircraft. (The Warsaw Pact negotiators have offered significantly lower manpower figures for their forces, reported as 805,000 ground forces, 182,000 air forces, but the basis on which they have been calculated is unclear, and they may not be comparable with the figures given here.)

	Manpower		Equipment			Manpower		Equipment	
	Ground	Air	Tanks	Aircraft		Warsaw Pact	Ground	Air	Tanks
United States	193	35	2,000	335	Soviet Union	475	60	9,250	1,300
Britain	58	9	575	145	Czechoslovakia	135	46	2,500	550
Canada	3	2	30	50	East Germany	105	36	1,550	375
Belgium	62	19	300	145	Poland	220	62	2,900	850
Germany	341	110	3,000	509					
Netherlands	75	18	500	160					
	732	193	6,405	1,344					
France	50	—	325	—					
Totals	782	193	6,730	1,344	Totals	935	204	16,200	3,075

HIGH GOLF 1978

March AIR FORCE Magazine

Soviet Aerospace Almanac Issue—a comprehensive examination of Soviet aerospace forces, including organization, mission and concepts . . . key personnel . . . Soviet R&D . . . military space applications . . . statistical data on Soviet aerospace forces and budgets. A "Jane's" prepared Gallery of Soviet Weapon Systems, plus many other exclusive articles and features . . . a must for military planners . . . a year-round reference issue.

May AIR FORCE Magazine

Annual Air Force Almanac Issue—exclusive articles by the Secretary and Chief of Staff, USAF . . . reports and organization charts from all major commands and agencies . . . statistical data on budgets, forces and personnel . . . complete Gallery of USAF Weapon Systems. Must reading . . . important reference issue throughout the year.

July AIR FORCE Magazine

"The Electronic Air Force"—special editorial coverage on what is happening now and plans for the future. Must reading throughout the Air Force, particularly in AFSC, ASD, ESD and the Labs as well as all user Commands.

September AIR FORCE Magazine

Annual Convention, Aerospace Briefings and Displays Issue—Bonus distribution at event, including all military and civilian executives attending by special invitation for briefings. Marketing plus . . . inclusion of advertisement in "Industry Salutes the Air Force" display at show. Also, Annual Directory of key civilian and military Air Force leaders.

November AIR FORCE Magazine

Convention, Briefings and Displays Report Issue—Widely read for its comprehensive reports on the AFA Convention, addresses by key USAF leaders, and industry briefings and latest technical developments.

December AIR FORCE Magazine

"The Military Balance"—Exclusive US presentation of the annual report from The International Institute for Strategic Studies, London, England which documents, country-by-country, the world's military force and equipment. A desk-top reference sought after and referred to by military decision-makers in the US Air Force, DOD, NASA, the Congress and other military services.

AIR FORCE
PUBLISHED BY THE AIR FORCE ASSOCIATION
MAGAZINE

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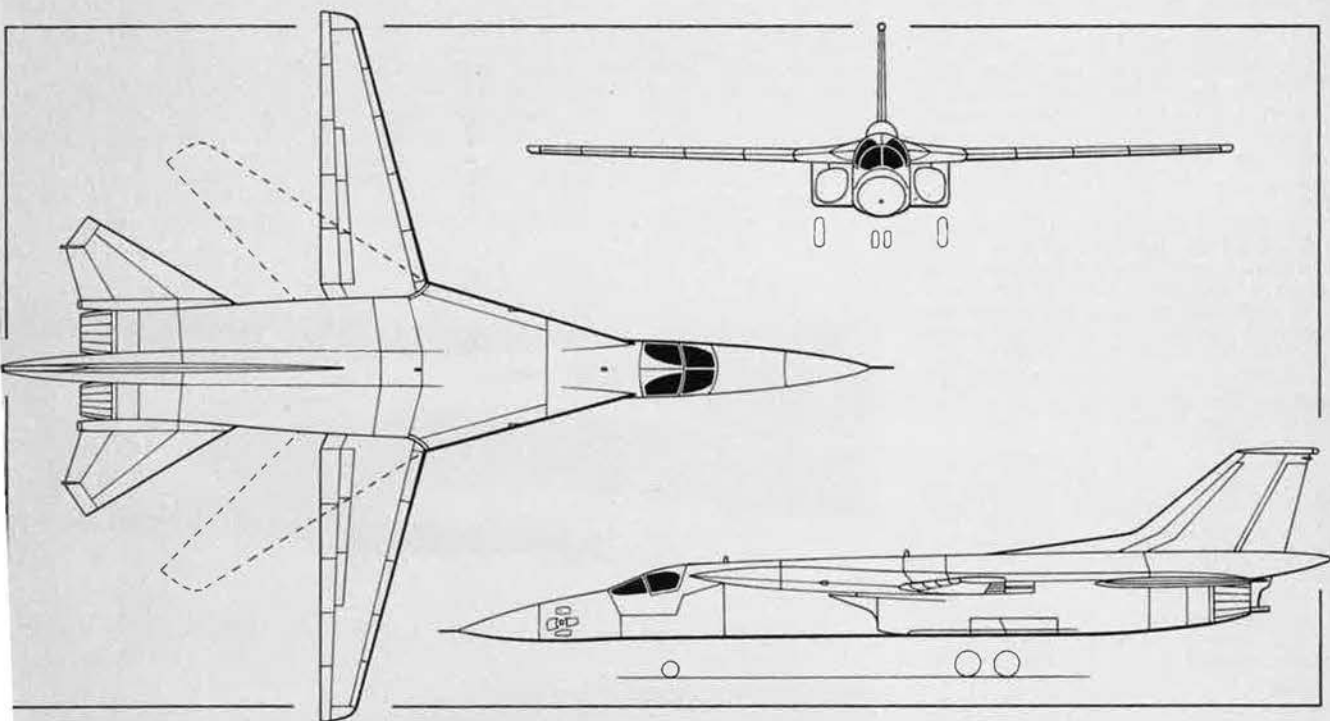
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JANE'S

ALL THE WORLD'S AIRCRAFT SUPPLEMENT



General Dynamics FB-111H strategic penetration bomber, a stretched and re-engined conversion of the FB-111A (Michael A. Badrocke)

GENERAL DYNAMICS

GENERAL DYNAMICS CORPORATION,
FORT WORTH DIVISION; Division HQ:
Box 748, Fort Worth, Texas 76101, USA

It became known in September 1977 that, parallel with development of the Rockwell International B-1, USAF Strategic Air Command has maintained discussions with General Dynamics on the possibility of evolving a new manned strategic penetration bomber from the FB-111A. Following President Carter's decision to abandon B-1 production, the Senate Armed Services Committee has approved the allocation of \$20 million to initiate development of prototypes of such aircraft, to be known as the FB-111H.

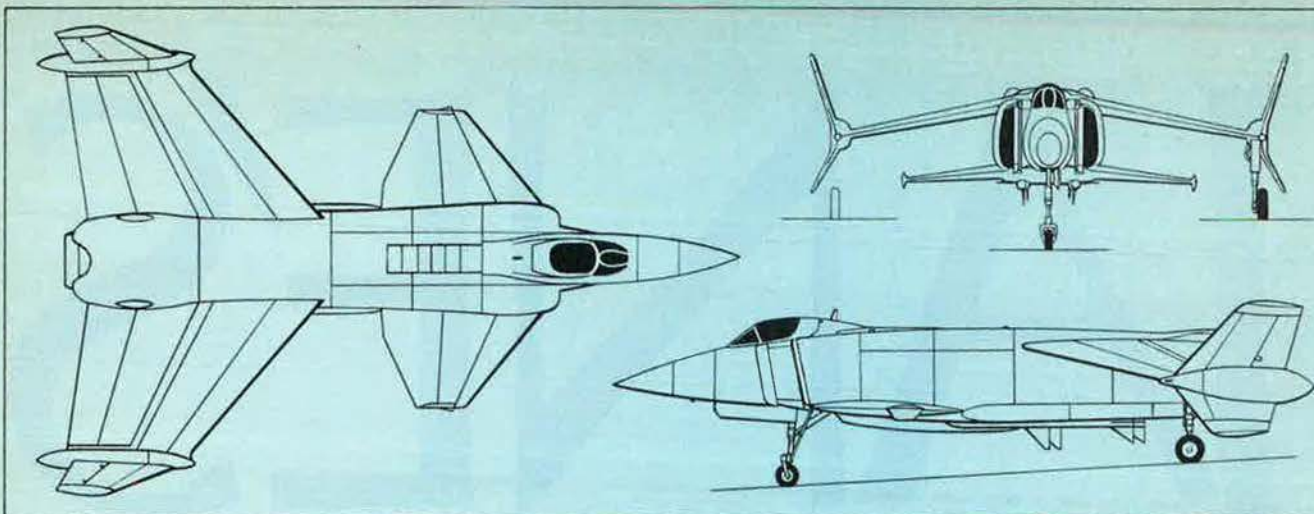
GENERAL DYNAMICS FB-111H

As conceived at the present time, the FB-111H will be a stretched and re-engined conversion of the existing FB-111A. As a first step, it is proposed to modify two FB-111As drawn from the SAC inventory into prototypes of the updated model. A further 65 'As' would then be available for subsequent conversion, should this prove desirable, and GD has pointed out that all tooling for the 'A' is still preserved at Fort Worth.

About 43% of the FB-111A structure is common to the FB-111H, and almost 80% of the 'A's' subsystems are retained. Primary changes include lengthening the aircraft by some 4.5 m (15 ft) and installation of two

General Electric F101-GE-100 turbofans, as specified originally for the B-1 at a rating of 133.4 kN (30,000 lb st) with afterburning. The existing variable-geometry intakes are replaced by circular fixed-geometry normal shock inlets. The new and simplified tandem-wheel main landing gear units retract rearward, allowing the weapons bay to be enlarged to carry up to five nuclear weapons, instead of two. Total number of nuclear weapons that may be carried increases from six to 15, with external stores carried conformally at six stations on the fuselage.

Electronics include APQ-144 advanced attack radar, APN-194 radar altimeter, APQ-134M terrain-following radar, APN-200 Doppler radar, AJN-16 INS with SKN-16 added



Three-view drawing of the XFV-12A V/STOL research aircraft (Pilot Press)

for dual capability, CP-2A computer with twice the memory capacity and processing speed of the FB-111A's CP-2, Collins Radio satcom, with APZ-78 transponder, and ARC-109, ARC-123, AIC-25, APY-64V, ARN-52V, and ARN-58A communications equipment.

The in-service FB-111A has a range of 5,300 nm (9,815 km; 6,100 miles) with 1,200 nm (2,220 km; 1,380 miles) high-speed low-level dash on a flight refuelled mission. Performance of the FB-111H is said to include 'better than twice the sea level dash range of the FB-111A, with increased payload'.

First flight of the first FB-111H prototype is scheduled for the last weeks of 1979; total cost of converting and testing the two aircraft is estimated at \$380 million, plus a further \$195 million for further work if the programme proceeds to production status. Unit cost of the main series of 65 'production' conversions is estimated at about \$42 million in 'then-year' dollars.

DIMENSIONS, EXTERNAL:

Wing span:	
fully spread	21.34 m (70 ft 0 in)
fully swept	13.67 m (44 ft 10 1/4 in)
Wing aspect ratio, spread	8.91
Wing sweepback:	
fixed glove portion	74° 40'
fully spread	16°
fully swept	60°
Wing area, spread	51.1 m ² (550 sq ft)
Length overall	26.88 m (88 ft 2 1/2 in)
Height overall	6.71 m (22 ft 0 in)

WEIGHTS:

Weight empty	23,511 kg (51,832 lb)
Internal fuel	29,290 kg (64,574 lb)
Max T-O weight	63,500 kg (140,000 lb)
Max in-flight weight, after flight refuelling	70,305 kg (155,000 lb)

PERFORMANCE (estimated):

Max level speed at height	Mach 1.75
Max level speed at S/L	high transonic
Service ceiling	above 15,250 m (50,000 ft)
T-O run	2,027 m (6,650 ft)
Landing run	975 m (3,200 ft)

ROCKWELL INTERNATIONAL CORPORATION, COLUMBUS AIRCRAFT DIVISION; Divisional HQ: 4300 East Fifth Avenue, Columbus, Ohio 43216, USA

Delayed by inadequate funding and other setbacks, the prototype of Rockwell International's XFV-12A V/STOL research aircraft was rolled out officially at Columbus

on 26 August 1977, more than two years later than its originally scheduled first flight.

ROCKWELL INTERNATIONAL XFV-12A

The US Navy initiated the XFV-12A V/STOL Fighter/Attack Technology Prototype programme to develop further the capability of such aircraft to operate from comparatively small carrier decks fitted with neither catapult nor arrester gear. It was intended to build and test two prototypes, but there are no current plans to complete the second, half-finished airframe.

The XFV-12A is roughly the size of a McDonnell Douglas A-4 Skyhawk. It employs the augmentor-wing concept, with

canard and aft semi-delta wings, and is powered by a single special version of the Pratt & Whitney F401-PW-400 advanced technology turbofan engine.

The augmentor system has a diverter valve to block off the turbofan nozzle and divert the exhaust gases through ducts to slot nozzles in the wings and canards for V/STOL operations. Three augmentor flaps across the full span of each canard and wing, direct the exhaust gases downward and the mixing of these airflow streams creates a low-pressure area within the augmentor which induces large masses of ambient airflow from above the lifting surface. Augmented sevenfold, the total airflow is



Two views of the Rockwell International XFV-12A single-seat all-weather V/STOL fighter attack research prototype



pected to provide about 1½ kg/lb of effective lift for each 1 kg/lb of engine thrust, letting the aircraft lift off vertically. Exceptional STOL characteristics are also anticipated. With the flaps set at about 60°, airflow induced over the leading-edge of the wing by the augmentor pumping action causes a rapid buildup in circulation lift at very slow forward speeds, with the result that total lift increases rapidly as the aircraft moves forward.

The thrust from each of the four augmentor-flap systems is modulated by flap movement to provide lift and attitude control with no change in engine setting. As the flaps are closed from their maximum lift position, the amount of entrained airflow is reduced. Simultaneous operation of all four augmentors provides height control; differential movement between wing and canard augmentors provides pitch control; roll control is achieved by differential operation of the port and starboard wing augmentors. Control in yaw is obtained by moving one set of wing flaps forward and the other set aft. All lift is under control at all times and no reaction control is required. In high-speed flight simultaneous use of both the wing and canard flaps for control generates a lifting force in the same direction, providing the XFV-12A with a manoeuvring agility which is expected to be superior to that of fighter aircraft with conventional wing and tail unit control surfaces.

Cost considerations limited the amount of test hardware associated with the development programme. To evaluate thrust augmentor components, a complete flight wing and canard with diffuser flaps were mounted on a rotary test rig. In January 1974 an F401 engine with thrust diverter was incorporated in this rig, allowing engine exhaust air to be ducted along the rig and exhausted through the augmentor flaps. This permitted early evaluation of static lift, and of lift components when the rig was rotated at high speed.

A full-size mockup was built first, embodying existing airframe assemblies from other aircraft that had been selected to limit development costs. These were assembled in their correct physical relationship, allowing full and careful study of the integration of the structures, systems, and power plant, before construction of the flying prototype began. In this latter aircraft some 35% of the structure comes from contemporary production aircraft, and includes the complete forward fuselage and landing gear from an A-4 Skyhawk, and the inlets, wing box/main fuel tank from an F-4 Phantom II.

Following completion of some 90% of its ground test programme, the XFV-12A prototype was rolled out at Columbus, Ohio, on 26 August 1977. When the remaining ground tests have been completed it was scheduled to be transported to Langley AFB, Virginia, where hover tests were to begin in the late Autumn at NASA's Langley Research Center. These will involve use of the Apollo LLV training gantry, with the aircraft initially suspended from above and restrained from below. After early tests, the lower restraint will be removed, leaving the XFV-12A free to fly vertically, with the upper cable being reeled in or out and offering little or no support except in an emergency situation.

If these initial tests at Langley are completed with little trouble, it is anticipated that the prototype will return to Columbus in 1978 for the beginning of conventional flight tests. Only when these have been completed satisfactorily, and depending upon the result of the hovering tests at Langley, will a decision be made to proceed with transition between the two flight modes.

TYPE: Single-seat all-weather V/STOL fighter/attack research prototype.

WINGS: Cantilever shoulder-wing monoplane. Wing section NACA 64 series (modified). Thickness/chord ratio 0.076 at root, 0.045 at tip. Anhedral 10°. Incidence 1° 30'. Sweepback at quarter-chord 35°. Light alloy structure of semi-delta configuration, forward portion of structure embodying an F-4 wing box. Titanium honeycomb is used for construction of the ejector flaps. Hydraulically-powered controls with irreversible actuators of Rockwell design and manufacture. Full-span trailing-edge flaps provide a lifting force for manoeuvrability in high-speed flight. Vertical endplate surfaces are mounted at each wingtip, comprising a fixed fin below the wing, outward-canted at 35°, and a fixed fin and rudder above the wing, outward-canted at 19°. Wing augmentor (ejector) flaps extend almost full span. They provide control of the vertical lift propulsion, acting as thrust vectors and so giving attitude and height control in hover and low-speed flight. The aft ejector flaps (together with those in the canard surfaces) serve as conventional

surface, aft of cockpit, augments air mass flow when aircraft is operating in vertical mode. A special electro-hydraulically actuated diverter valve, designed by Pratt & Whitney, has been installed in the tailpipe of the engine. When open, in the horizontal flight mode, it will allow free passage of engine exhaust gases for conventional propulsion. When closed, for vertical flight, the exhaust gases will be diverted to the ducts that feed the wing and canard augmentor nozzles. Fuel contained in two fuselage bladder tanks, capacity 1,590 litres (420 US gallons), and integral wing tanks, capacity 1,173 litres (310 US gallons). Total fuel capacity 2,763 litres (730 US gallons). Single-point refuelling. Oil capacity 11.4 litres (3 US gallons).

ACCOMMODATION: Pilot only, on McDonnell Douglas Escapac zero-zero ejection seat. Cockpit pressurised and air-conditioned. **SYSTEMS:** AirResearch air cycle air-conditioning and pressurisation system, maintaining sea level cockpit altitude to 2,440 m (8,000 ft). Two independent and simultaneously operating hydraulic systems, at a pressure of 207 bars (3,000 lb/sq in), to



STOL take-off with three 1,000 lb bombs by Harrier XV281 from the 6° ski jump ramp at RAE Bedford (see next page for item)

flight controls in cruising flight. The fore and aft ejector flaps can be used together as speed brakes.

CANARD SURFACES: Cantilever low-wing monoplane. Anhedral 5°. Full-span trailing-edge flaps provide a lifting force for manoeuvrability in high-speed flight. Full-span augmentor (ejector) flaps function in combination with those on wings.

FUSELAGE: Forward fuselage, to aft of cockpit, is that of an A-4. Broad-section fuselage aft of cockpit, to house engine intake ducts and augmentor system ducting, is of light alloy semi-monocoque construction. Engine mounted in aft fuselage, which incorporates titanium material in its structure.

LANDING GEAR: Hydraulically-retractable tricycle type. Main units retract rearward into wingtip fairings, nosewheel unit forward. Oleo-pneumatic shock-absorption. Hydraulic nosewheel steering. All units as for McDonnell Douglas A-4. Main-wheel tyres size 24 x 5.5-14, pressure 20.7 bars (300 lb/sq in). Nosewheel tyre size 18 x 5.7-8, pressure 14.82 bars (215 lb/sq in). Goodyear dual disc brakes.

POWER PLANT: One modified Pratt & Whitney F401-PW-400 afterburning turbofan engine in the 133.4 kN (30,000 lb) thrust class. Engine inlet ducts are modified from the F-4. Auxiliary inlet in fuselage upper

operate flight controls, landing gear, ejector flaps, and inlet ramps. Primary power source of the electrical system is a 30kVA integrated drive generator, the system providing 115/200V 400Hz AC power and 28V DC power. Emergency oxygen system with capacity of 5 litres (0.18 cu ft) of liquid oxygen, with converter. Anti-icing by engine bleed air.

ELECTRONICS AND EQUIPMENT: Collins AV/ARC-159 UHF radio. Radar system under study. Bendix RN-242A VOR; King KN-65 DME. Blind-flying instrumentation standard.

ARMAMENT: Ability to carry air-to-air and air-to-ground weapons. Space for internal gun in lower fuselage. Associated equipment is under study.

DIMENSIONS, EXTERNAL:

Wing span	8.69 m (28 ft 6¼ in)
Wing chord at root	4.98 m (16 ft 4¼ in)
Wing chord at tip	2.25 m (7 ft 4½ in)
Wing aspect ratio	2.09
Length overall	13.39 m (43 ft 11 in)
Height overall	3.15 m (10 ft 4 in)
Canard surface span	3.69 m (12 ft 1¼ in)
Wheel track	7.34 m (24 ft 1 in)
Wheelbase	7.62 m (25 ft 0 in)

AREAS:

Wings, gross	27.2 m ² (293 sq ft)
Elevons (total)	1.91 m ² (20.57 sq ft)
Fins (total)	5.08 m ² (54.64 sq ft)

Rudders (total)	1.23 m ² (13.20 sq ft)
Canard surface, gross	7.72 m ² (83.05 sq ft)
Elevators (total)	2.75 m ² (29.62 sq ft)
WEIGHTS (estimated):	
Basic operating weight	6,259 kg (13,800 lb)
Max vertical T-O weight	8,845 kg (19,500 lb)
Max short-field T-O weight	11,000 kg (24,250 lb)
PERFORMANCE (estimated, at max T-O weight):	
Max level speed	in excess of Mach 2
T-O run at 11,000 kg (24,250 lb)	91 m (300 ft)

BRITISH AEROSPACE

HAWKER SIDDELEY AVIATION LTD;
Head Office: Richmond Road, Kingston upon
Thames, Surrey KT2 5QS, England

HSA/RAE HARRIER SKI JUMP TRIALS

First-phase testing of the 'ski jump' launch technique proposed for Royal Navy Sea Harriers was completed successfully in more than 70 take-offs performed from a 6° ramp at the Royal Aircraft Establishment airfield, Bedford, between 5 and 31 August 1977. After initial flights by John Farley, deputy chief test pilot at Hawker Siddeley Dunsfold, the trials were continued by company test pilot Mike Snelling. Three RAF test pilots also made ski launches, which look spectacular but are described as 'non-events' for the pilot, with no apparent increase in g as the aircraft rolls up the ramp.

This method of launching VTOL combat aircraft was first suggested by Lt Cdr D.R. Taylor, RN, in 1973, as a simple, safe, and inexpensive means of achieving a major increase in the aircraft's weapons/fuel load. As any artilleryman, or even bowman, has known for centuries, the time of flight of a projected body can be increased by imparting to it an initial upward momentum. Taylor argued that, provided an aircraft had adequate thrust to accelerate during an initial upward trajectory, the increased time of flight would enable it to be launched at a lower airspeed and with a poorer lift:weight ratio. By building up airspeed throughout the upward as well as the downward leg of the part-ballistic trajectory, Taylor calculated that the aircraft would be easily capable of sustained flight by the time it had lost height to a level approaching that of the initial launch point.

Always suspicious of a proposal which appears to offer 'something for nothing', engineers at Hawker Siddeley investigated the

idea warily at first. By mid-1974, their studies confirmed that a standard Harrier which left the end of a 20° ramp at a mere 60 knots (111 km/h; 69 mph), into a 20 knot (37 km/h; 23 mph) wind, ought to reach an airspeed of 95 knots (176 km/h; 109 mph) at a height of about 150 ft (45 m) within 5 seconds, and at least 110 knots (204 km/h; 127 mph) at a height of 200 ft (60 m) within 8 seconds. In practical terms, applying a payload trade-off of 30 kg (66 lb) per knot of launch airspeed, a Harrier making such a take-off might be expected to carry a 900 kg (2,000 lb) greater payload than from the same length of flat take-off deck.

Small Ministry of Defence study contracts enabled the project to progress to the stage where it seemed worthwhile to erect the present test ramp at Bedford. Early take-offs from the 6° ramp were made at an exit speed of about 50 knots (93 km/h; 58 mph) at an AUW of 6,940 kg (15,300 lb). Before the end of the same month, exit speeds were made at up to 100 knots (185 km/h; 115 mph) and an AUW of more than 9,075 kg (20,000 lb) carrying three 1,000 lb bombs. The longest take-off runs were within the limits imposed by the flight deck of the Royal Navy's command cruiser *Invincible*, from which Sea Harriers will operate. It appeared to be of no consequence whether the aircraft's jet nozzles were rotated to the STOL 50° setting on entering the 30 m (100 ft) long ramp or in clear air immediately after leaving it.

Current and future testing involves a gradual increase in the angle of the ramp, probably in 3° increments, at the Aeroplane & Armament Experimental Establishment, Boscombe Down, and RAE Bedford, with the aim of reaching an optimum 20° in day and night launches by Summer 1978. This would permit the installation of a 20° ramp on the bow of HMS *Hermes* during its planned major refit, in time for the first operations of the Sea Harrier at sea in 1980.

AERMACCHI/EMBRAER

AERONAUTICA MACCHI SpA; Head Office: Corso Vittorio Emanuele 15, 20122 Milan, Italy; and **EMPRESA BRASILEIRA DE AERONAUTICA SA;** Head Office and Works: Av Brig Faria Lima, Caixa Postal 343, 12200 São José dos Campos, São Paulo State, Brazil

M.B.340/A-X

Aermacchi and EMBRAER are collabo-

rating in the design of a long-range single seat attack aircraft to meet the Brazilian Air Force's A-X requirement. Details revealed mid-1977 indicated that the aircraft, which Aermacchi has designated M.B.340, might be powered by a military version of the Rolls-Royce M45H turbofan engine, and would have empty and mission T-O weight in the region of 3,630 kg (8,000 lb); 7,985 kg (17,600 lb), with a maximum weight of approx 9,070 kg (20,000 lb). It likely to have a secondary capability air-to-air combat, equipped with Sidewinder or similar missiles and a built-in armament of two 30 mm cannon.

Typical A-X mission requirements are for an 810 nm (1,500 km; 932 mile) hi-lo radius with 1,000 kg (2,200 lb) of external weapons and 10 minutes reserve fuel; or for a lo-lo-lo radius, under the same condition of 300 nm (555 km; 345 miles). A max level speed of Mach 0.93, and the ability to operate from semi-prepared runways, are also required.

A decision on whether to proceed with this proposal was anticipated by the end of 1977. Subject to a favourable decision, two prototypes would be built by Aermacchi and one by EMBRAER. Aermacchi would design and build the fuselage, internal systems, and weapon systems, and conduct the weapon trials; EMBRAER would be responsible for the supercritical wing, the tail unit, and static and fatigue testing. Entry into service would be in the middle 1980s; the Brazilian Air Force requirement is said to be for 100-150 A-X aircraft, to supplement rather than replace the AT-26 (M.B.326GB) Xavante.

AGUSTA

COSTRUZIONI AERONAUTICHE GIOVANNI AGUSTA SpA; Head Office and Works: Casella Postale 193, 21017 Cascina Costa, Gallarate, Italy

AGUSTA A 109 (NAVAL VERSION)

A naval version of the Agusta A 109A is under construction for several navies, for the primary missions of anti-surface-vessel, anti-submarine electronic warfare, armed patrol coast guard patrol, search and rescue, aerial ambulance, and utility.

The naval A 109, retaining the general configuration, structure, power plant, reliability, and performance of the A 109A described in the current edition of *Jane's*, has been specially designed for shipboard compatibility. Besides the armament system

Single-seat Harrier XV281 leaving the 6° ramp with two 455 litre (100 Imp gallon) fuel tanks and two BL755 cluster bombs underwing



RAE Bedford's own Harrier T.Mk 2A two-seater, XW715, leaving the 6° ramp during initial ski jump trials





The TOW-equipped anti-armour version of the Agusta A 109 for the Italian Army. The naval version will be basically similar but will carry extensive armament and equipment for ASW, ASV, SAR, and other duties

necessary for the accomplishment of its missions, the helicopter is equipped with four-axis automatic stabilisation equipment (ASE), radar altimeter, internal auxiliary fuel tanks, rotor brake, dual controls and instrumentation, particle separator, heavy duty battery, non-retractable landing gear, rescue hoist, universal supports for external loads, search radar, emergency flotation gear, anchorage points for deck tiedown, and an automatic navigation system.

ACCOMMODATION: Standard seating for a crew of three or four. Ambulance version accommodates two stretchers and two medical attendants.

SYSTEMS: Standard duplicated hydraulic systems for flight controls, as in A 109A. The hydraulic system operates the automatic stabilisation equipment. Third, self-contained system for MAD and other utilities. Electrical system capacity increased to cater for higher power demand.

ELECTRONICS AND EQUIPMENT: Complete instrumentation for day and night sea operation in all weathers. Equipment common to all roles includes navigation, cabin, and cockpit lights, two fixed landing lights, two anti-collision beacons, first aid kits, and hand-type fire extinguisher for cabin. Optional equipment common to all roles includes a four-axis cross-country autopilot system, UHF/VHF transceiver with homing, AG 03 crew intercom, VOR/ILS, DME, LF/ADF, radar altimeter, tactical air navigation system with Doppler radar, dual controls, and emergency flotation gear.

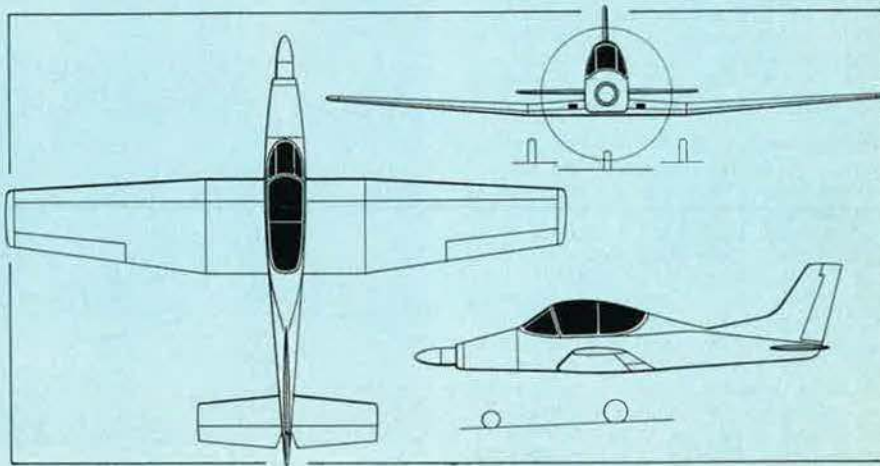
ARMAMENT AND OPERATIONAL EQUIPMENT: The naval A 109 has specialised equipment to carry out its primary duties. For the ASW role this includes two homing torpedoes and six marine markers. Detection of the submarine can be carried out either by the parent ship (in which case the A 109 is acting as a weapon carrier system), or by the helicopter's onboard retractable classification and localisation equipment (MAD). For the ASV role the naval A 109 carries a high-performance long-range search radar with high discrimination in rough sea conditions. The surface attack is performed with AS.12 air-to-surface wire-guided missiles. Provisions are also incorporated for the installation of the most advanced ESM systems. A special ECM version of the naval A 109 has been studied by Agusta, and the equipment that can be installed in the helicopter includes a radar warning display, direction finder equipment, an interferom-

eter, an electromagnetic emission analyser, and jamming equipment. For armed patrol, the naval A 109 is equipped with a search radar and armament to customer's requirements. The coast guard patrol configuration includes a search radar, a low light level TV camera, and a special installation for external high-efficiency loudspeakers. For the search and rescue role, the naval A 109 is fitted with a 150 kg (330 lb) capacity electrically operated hoist, emergency flotation gear, and search radar. The naval A 109 can be equipped for several other duties, including firefighting and crash rescue, reconnaissance, military command post, and liaison.

FMA
FÁBRICA MILITAR DE AVIONES (AREA DE MATERIAL CÓRDOBA); Address: Avenida Fuerza Aérea Argentina Km 5½, Córdoba, Argentine Republic

FMA IA 62
Details of this new two-seat primary trainer were released in mid-1977. An all-metal cantilever low-wing monoplane, with dihedral on the outer wing panels, it has a retractable tricycle landing gear and tandem crew seating. The airframe will be stressed to +6g and -3g. Subject to government approval by the end of 1977 for the construction of

FMA IA 62, offered as a new turboprop primary trainer for the Argentine armed forces (Pilot Press)



prototypes, first flight would be scheduled for 1979 and the start of production for 1980/81.

POWER PLANT: One 440 kW (590 shp) Turboméca Astazou XIVR turboprop engine, driving a Ratier Forest 23LF variable- and reversible-pitch three-blade propeller with spinner.

ARMAMENT: Provision for one 7.62 mm machine-gun in each wing, and for a hard-point beneath each wing, for armament training duties.

DIMENSIONS, EXTERNAL (approx):
Wing span 13.38 m (43 ft 10¾ in)
Length overall 10.50 m (34 ft 5½ in)
Propeller diameter 2.44 m (8 ft 0 in)

WEIGHTS:
Weight empty, equipped 1,300 kg (2,866 lb)
Max T-O weight:
'clean' 1,950 kg (4,299 lb)
with external stores 2,600 kg (5,732 lb)

PERFORMANCE (estimated):
Never-exceed speed 324 knots (600 km/h; 373 mph)
Max level speed at 3,000 m (9,845 ft) 194 knots (360 km/h; 224 mph)
Max cruising speed 162 knots (300 km/h; 186 mph)
Stalling speed at 2,600 kg (5,732 lb) AUW 59.5 knots (110 km/h; 68.5 mph)
Service ceiling at 1,950 kg (4,299 lb) AUW 8,000 m (26,250 ft)
T-O to 15 m (50 ft) at 2,600 kg (5,732 lb) AUW 550 m (1,805 ft)
Landing from 15 m (50 ft) at max landing weight 500 m (1,640 ft)
Range with max fuel 647 nm (1,200 km; 745 miles)
Endurance with max fuel 5 hr
g limits:
'clean' +6; -3
with external stores +6; -2

DOWTY
DOWTY ROTOL LTD; Head Office: Cheltenham Road East, Gloucester GL2 9QH, England

Best known as a manufacturer of propellers and related rotary devices, Dowty Rotol has developed a new propulsion system, known as a Ducted Propulsor, which is finding applications in a number of new aircraft, including the German RFB/Grumman American Fanliner two-seat light aircraft, and RFB AWI-2 Fantrainer basic and IFR training aircraft built under Federal German Defence Ministry contract.

To develop and demonstrate the Ducted Propulsor, Dowty Rotol is using a converted



G-FANS, the appropriately-registered demonstrator for Dowty Rotol's Ducted Propulsors

Islander light transport, of which details follow:

DOWTY ROTOL DUCTED PROPULSOR ISLANDER

Starting with the premise that propeller-driven aircraft are too noisy to meet future noise legislation, and in many cases even existing limits (80 dBA flyover), Dowty began in 1972 to seek an answer. One is the propeller of increased diameter, turning at lower rpm and driven through a large gearbox. This was soon discarded as too costly, heavy, and limited in noise reduction, and as generally inapplicable to existing general-aviation aircraft because of propeller-blade clearance and landing gear height. A much better answer was found to be the multi-blade ducted fan, looking superficially like a high by-pass ratio turbofan, which can produce not only dramatic reduction in noise but also markedly increased aircraft performance.

In the Spring of 1976 a static test rig was run, driven by a 224 kW (300 hp) Continental IO-520. The fan had seven blades and a diameter of 1,219 mm (48.0 in). The target static thrust was 5.38 kN (1,200 lb st) and the achieved figure at first build was 5.56 kN (1,250 lb st). The target noise at 305 m (1,000 ft) was 65 dB; the achieved figure was 62 dB. Further development showed how to obtain substantial net thrust from the engine cooling air and exhaust, ducted to a propulsive nozzle at the rear of the nacelle. Very good engine cooling was achieved, despite the extra-light cowling, and vibration was reduced well below that with a propeller.

In the Autumn of 1976 the Islander was selected as a suitable research and demonstrator aircraft, and Miles-Dufon at Shoreham handled the conversion of both engines (224 kW/300 hp Lycoming IO-540), each being lowered on a pylon below the wing and coupled directly to a fan with large spinner and seven aluminium variable-pitch blades running inside a specially profiled duct carried on six downstream flow-straightener vanes. At full power the 1,219 mm (48 in) fan has a tip speed of only 172 m (565 ft)/sec, compared with 287 m (942 ft)/sec for the original 2,032 mm (80.0 in) propeller. The reduction in noise is exceptional, and

there is a gain in thrust. The Ducted Propulsor Islander flew for the first time on 10 June 1977, and has given remarkable demonstrations of quietness and improved performance in the hands of the test pilot, Neville Duke. Noise in the cabin and on the ground has been reduced from about 85 to 65 dB, far below any future environmentalist goal. There are many side benefits, such as reduced pollution from leaner mixture.

SIKORSKY

SIKORSKY AIRCRAFT, DIVISION OF UNITED TECHNOLOGIES CORPORATION; Head Office and Works: Stratford, Connecticut 06602, USA

SIKORSKY S-70 BLACK HAWK

US Army designation: UH-60A

At the end of August 1972, the US Army selected Sikorsky and Boeing Vertol as competitors to build prototypes of their submissions for the Utility Tactical Transport Aircraft System (UTTAS) requirement. Sikorsky's \$61.2 million contract called for flight



Close-up of one of the seven-blade Ducted Propulsor units fitted to Islander G-FANS

trials to begin in November 1974. However, the first YUH-60A (72-1650) made its first flight on 17 October 1974, six weeks ahead of schedule. The second prototype (72-1651) flew for the first time on 21 January 1975, followed by the third (72-1652) on 28 February 1975. One ground test vehicle and one static airframe were also completed.

Fly-off evaluation against Boeing Vertol's YUH-61A prototypes began in early 1976 and occupied a period of seven months; development testing was carried out at Fort Rucker, Alabama, and operational testing at Fort Campbell, Kentucky. On 23 December 1976 Sikorsky's design was declared the winner, and by mid-1977 the three prototypes had accumulated more than 1,500 flights, during which they demonstrated their ability to exceed several of the performance parameters of the UTTAS specification.

Designed to carry 11 fully-equipped troops plus a crew of three, the UH-60A has a large cabin which enables it to be used without modification for medical evacuation, reconnaissance, command and control purposes, or troop resupply. For external lift missions, its cargo hook has a capacity of up to 3,630 kg (8,000 lb). Other features of the UH-60A include a capability for nap-of-the-earth flying, and a high degree of survivability. The entire airframe has the ability to survive hits from armour-piercing rounds of up to 7.62 mm calibre, and the main rotor blades can survive hits from 12.7 mm or 23 mm armour-piercing shells.

One of the Sikorsky YUH-60A Black Hawk prototypes demonstrates its capability to perform nap-of-the-earth flying



The UH-60A has a single main rotor, a canted tail rotor, twin turbine engines, and is of compact design so that it can be airlifted over long ranges. One can be accommodated in a C-130, two in a C-141, and three in a C-5A.

The UTTAS is intended to serve as the Army's primary combat assault helicopter, and the Army plans to procure a total of 1,107 UH-60As by 1985. The basic \$4 million production contract awarded already to Sikorsky is for the first 15 aircraft, but the Army has options for an additional 353 helicopters, with 56 to be built in the second year, 129 in the third, and 168 in the fourth. Production rates for the ensuing years will be established later. Production began in the Autumn of 1977, and first deliveries are slated to be made next August. Variants of the UH-60A currently under development include the S-70L for the US Navy (see next entry), and a commercial derivative, designated S-78 (see current edition of Jane's). By the time the first production S-70L LAMPS helicopter is ready for the US Navy, Sikorsky expects to have delivered about 600 UH-60As.

The following description applies to the UH-60A:

TYPE: Twin-turbine combat assault squad transport helicopter.

ROTOR SYSTEM: Four-blade main rotor. Ballistically tolerant main rotor blades, pressurised and equipped with gauges providing fail-safe confirmation of blade structural integrity. Each blade is of Sikorsky SC 1095 aerofoil section, with thickness/chord ratio of 9%, and has a partially-cambered leading-edge. Construction consists of a Ti-6Al-4V flat-oval titanium alloy spar, with an aerodynamic shell of Nomex honeycomb core covered with glassfibre/epoxy composite skin. The outer 5% of each blade span is swept back 20°, and has an electro-formed nickel leading-edge to resist erosion. Hollow cruciform hub, of titanium alloy, with C/R Industries elastomeric bearings which require no lubrication and reduce hub maintenance by 60%. Bearings assembled to blade root spindle, which passes through hole in spherical lag/flap bearing to a fitting inboard which transmits centrifugal loads to a cylindrical pitch bearing. Self-lubricating radial bearing between bearing assembly and spindle. Bifilar self-tuning vibration absorbers on rotor head. Manual blade folding. Canted tail rotor (to port) increases vertical lift and allows greater CG travel. Four-blade graphite/epoxy tail rotor of cross-beam type (two pairs of blades opposed at 90°) eliminates all rotor head bearings. De-icing system for main and tail rotor blades.

ROTOR DRIVE: Conventional transmission system, with both turbines driving through freewheeling units to main gearbox. This is of modular construction to simplify maintenance. Transmission can operate for 30 min following total oil loss. Intermediate and tail rotor gearboxes are oil-lubricated.

USELAGE: Conventional semi-monocoque light alloy crashworthy structure. Titanium alloy cabin floor.

TAIL UNIT: Pylon structure with port-canted tail rotor mounted on the starboard side. Large one-piece tailplane, recessed into cutout in pylon trailing-edge, serves also to keep troops clear of tail rotor. Tailplane incidence adjustable automatically in flight.

LANDING GEAR: Non-retractable tailwheel type, with single wheel on each unit. Energy-absorbing main gear, with a tailwheel which gives protection for the tail rotor in taxiing over rough terrain or



Max payload of the UH-60A Black Hawk in a flying crane role is 3,630 kg (8,000 lb)

during a high-flare landing. General Mechatronics axle assembly and main gear shock-absorbers.

POWER PLANT: Two 1,151 kW (1,543 shp) General Electric T700-GE-700 turboshaft engines; combined transmission rating 2,109 kW (2,828 shp). Crashworthy fuel system, comprising two 594 litre (157 US gallon) Goodyear Aerospace self-sealing main fuel cells. Total internal fuel capacity 1,188 litres (314 US gallons). Exhaust infra-red suppression system available.

ACCOMMODATION: Pilot and co-pilot on armour-protected seats. Main cabin area open to cockpit to provide good communication with flight crew and forward view for squad commander. Accommodation for 11 fully-equipped troops and crew of three. Eight troop seats can be removed and replaced by four litters for medevac missions, or to make room for internal cargo. External hook, with 3,630 kg (8,000 lb) capacity, for cargo or artillery weapons. Large aft-sliding door on each side of fuselage for rapid entry and exit.

SYSTEMS: Three hydraulic systems, two driven by main gearbox and one electrically by the APU. 74.5 kW (100 shp) Solar T-62T-40-1 APU powers AiResearch engine start system and standby hydraulic system. Bendix 30/40kVA and 20/30kVA alternators, the latter driven by APU to provide ground and emergency airborne power. Eldec 5.5Ah battery. Honeywell

stability augmentation system. Hamilton Standard flight control system.

ARMAMENT: Provision for one or two M-60 machine-guns to be mounted in cabin, firing from the main side doors when open.

DIMENSIONS, EXTERNAL:

Main rotor diameter	16.36 m (53 ft 8 in)
Tail rotor diameter	3.35 m (11 ft 0 in)
Length overall, rotors turning	19.76 m (64 ft 10 in)
Height overall	5.13 m (16 ft 10 in)
Fuselage length	15.26 m (50 ft 0 3/4 in)
Fuselage width	2.36 m (7 ft 9 in)
Tailplane span	4.38 m (14 ft 4 1/2 in)
Wheel track	2.70 m (8 ft 10 3/4 in)
Wheelbase	8.83 m (28 ft 1 3/4 in)
Cabin doors (each):	
Height	1.37 m (4 ft 6 in)
Width	1.75 m (5 ft 9 in)

DIMENSION, INTERNAL:

Cabin: Volume 10.90 m³ (385 cu ft)

AREAS:

Main rotor blades (each)	4.34 m ² (46.70 sq ft)
Tail rotor blades (each)	0.41 m ² (4.45 sq ft)
Main rotor disc	210.05 m ² (2,261 sq ft)
Tail rotor disc	8.83 m ² (95 sq ft)

WEIGHTS:

Weight empty	4,944 kg (10,900 lb)
Design mission payload	1,197 kg (2,640 lb)
Max external payload	3,630 kg (8,000 lb)
Mission T-O weight	7,461 kg (16,450 lb)

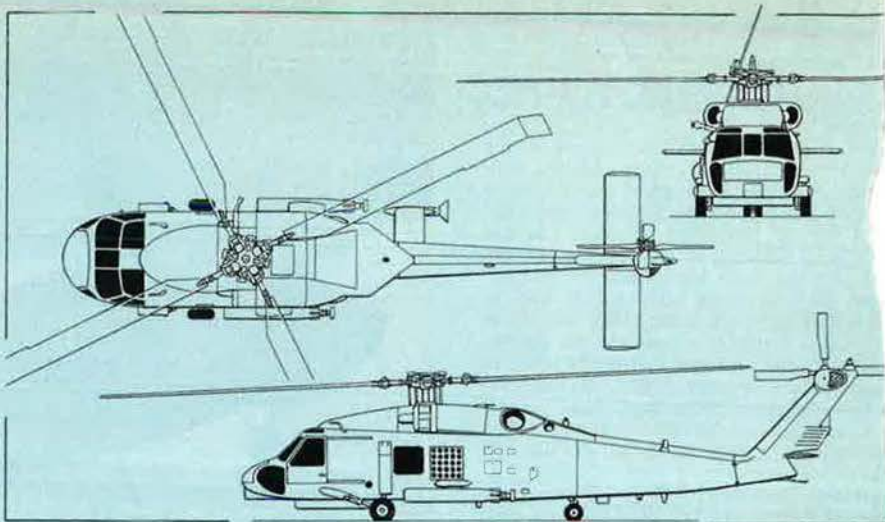
Max T-O weight 9,185 kg (20,250 lb)
PERFORMANCE (at mission T-O weight, except where indicated):
 Never-exceed speed 195 knots (361 km/h; 224 mph)
 Max level speed at S/L 160 knots (296 km/h; 184 mph)
 Max level speed at max T-O weight 158 knots (293 km/h; 182 mph)
 Max cruising speed at 1,220 m (4,000 ft), 35°C 147 knots (272 km/h; 169 mph)
 Single-engine speed 130 knots (240 km/h; 149 mph)
 Vertical rate of climb at S/L 750 m (2,460 ft)/min
 Service ceiling 5,790 m (19,000 ft)
 Hovering ceiling in ground effect (35°C) 2,895 m (9,500 ft)
 Hovering ceiling out of ground effect:
 ISA 3,170 m (10,400 ft)
 35°C 1,705 m (5,600 ft)
 Range at max T-O weight, 30 min reserves 324 nm (600 km; 373 miles)
 Endurance 3 to 3.3 hr

SIKORSKY S-70L

US Navy designation: SH-60B

The US Navy has a requirement for up to 204 LAMPS III (Light Airborne Multi-Purpose System) helicopters, to replace from 1981 its current fleet of Kaman SH-2F Seasprite interim LAMPS aircraft. The LAMPS III requirement, for which Boeing Vertel (Model 237), Sikorsky (S-70L), and Westland (Lynx) submitted proposals, is for an ASW (anti-submarine warfare) and ASST (anti-ship surveillance and targeting) helicopter, with secondary capability for search and rescue, medical evacuation, and vertical replenishment duties. These helicopters will serve on board such US Navy ships as the DDG-47 *Aegis* class cruisers, DD-963 destroyers, FFG-7 guided missile frigates, and the new Rohr Surface Effect Ship currently under development, and will be required to operate at sea for up to three months at a time.

After long consideration the Sikorsky S-70L was selected as the winner of the LAMPS III competition, and on 1 Septem-



Sikorsky SH-60B LAMPS III (Light Airborne Multi-Purpose System) (Pilot Press)

ber 1977 the USN and Sikorsky jointly announced the award by Naval Air Systems Command of cost plus fixed fee contracts to Sikorsky (\$2.7 million) and General Electric (\$547,000) for continued airframe and engine development. IBM Corporation has been selected as systems prime contractor. These contracts, which initiate the construction of five prototype helicopters, are to maintain continuity pending a decision on full-scale development, due to be taken by the Defense Systems Acquisition Review Council in early 1978. Rear Admiral Fred H. Baughman, USN, of Naval Air Systems Command, is overall Project Manager of the LAMPS programme. The first prototype is scheduled to fly in December 1978.

The S-70L is essentially a variant of the US Army's UH-60A Black Hawk tactical helicopter, retaining the same power plant, rotor and transmission assemblies, control system, and primary structure. The principal modifications are those necessary for shipboard compatibility (automatic blade and

tail rotor pylon folding, and shorter wheelbase) and the installation of US Navy mission equipment. Shipboard compatibility tests have already been carried out, at Fort Rucker, by one of the YUH-60A prototypes. **TYPE:** Shipboard anti-submarine and anti-surface-vessel helicopter.

ROTOR SYSTEM, AIRFRAME, AND POWER PLANT: Generally as for UH-60A.

LANDING GEAR: Similar to that of UH-60A, but with twin tailwheels, located further forward to provide shorter wheelbase. Main-wheel tyres of 0.35 m (13.7 in) diameter; tailwheel tyres of 0.23 m (9 in) diameter.

ELECTRONICS AND OPERATIONAL EQUIPMENT: Control Data AYK-14 airborne computer; Texas Instruments APS-124 surface search radar; magnetic anomaly detector; electronic surveillance measures (ESM); 25 sonobuoys; acoustic processors and displays; and the latest com, nav, and identification equipment for all-weather operation.

ARMAMENT: Two homing torpedoes, one mounted externally on each side of cabin.

DIMENSIONS, EXTERNAL: As UH-60A, except: Length overall, main rotor blades and tail rotor pylon folded

12.51 m (41 ft 0.6 in)

Height overall, over tail rotor

5.23 m (17 ft 2 in)

Height folded 4.00 m (13 ft 1½ in)

Width folded 3.48 m (11 ft 5 in)

Wheelbase 4.71 m (15 ft 5½ in)

DIMENSION, INTERNAL, AND AREAS:

As UH-60A

WEIGHTS:

Required mission T-O gross weight:

ASW 8,789 kg (19,377 lb)

ASST 7,985 kg (17,605 lb)

Desired mission T-O gross weight:

ASW 8,967 kg (19,769 lb)

ASST 8,148 kg (17,965 lb)

Max hovering weight out of ground effect

at S/L, ISA:

ASW, ASST 9,448 kg (20,829 lb)

PERFORMANCE (estimated):

Vertical rate of climb at T-O gross weight

both engines:

ASW 137 m (450 ft)/min

Rate of climb, one engine out:

ASW, ASST 164 m (540 ft)/min

Exceeds required mission station loiter time

by:

ASW 58 min

ASST 45 min

Exceeds desired mission station loiter time

by:

ASW 29 min

ASST 19 min

Artist's impression of the LAMPS Mk III development of the Sikorsky Black Hawk



Jimmy Doolittle

by

Paul Calle

The National Air and Space Museum has produced a limited edition of 1000 high-quality reproductions of Paul Calle's graphite pencil portrait of Lieutenant General James H. Doolittle. This unique numbered edition measures 19" X 29" and is signed by both Doolittle and Calle. It is the companion print to the Neil Armstrong edition issued earlier.

Calle portrays Jimmy Doolittle in his uniform as Commanding General of the Eighth Air Force and captures his spirit of enthusiasm for aviation in this rare portrait. Jimmy Doolittle is acknowledged to be one of the greatest pilots, the only man to win the three prestigious Schneider, Bendix, and Thompson Trophy Races. As a test pilot and engineer he was a leader in developing the instruments and techniques that enabled pilots to fly "blind," without external visual references.

Jimmy Doolittle became a war hero



19" X 29" "Lt. General James H. Doolittle"
by
Paul Calle

when he led a group of B-25's on the daring Tokyo Raid, the first U.S. bombing of Japan. He then went on to command the Twelfth, Fifteenth, and Eighth Air Forces. After leaving the military he continued to serve the country on many national committees and commissions.

All profits from the sales will be donated to the *Charles A. Lindbergh Memorial Fund*, which has been established to provide fellowships and grants to deserving individuals in the areas of science which most interested Lindbergh, such as aeronautics, conservation, exploration, and wildlife preservation.

You will receive your print in a handsome portfolio which contains biographies of the artist and the general, as well as an authenticated receipt of your purchase. Orders will be processed as they are received. The usual Smithsonian Associates discount will NOT apply to this offer.

\$50 may be taken as a charitable contribution to The Charles A. Lindbergh Memorial Fund.

'Artist Paul Calle (left) meets with Lt. General James H. Doolittle (Jimmy, right) during the preparation of his portrait.'



Doolittle Portrait
National Air and Space Museum
Smithsonian Institution,
Washington, D.C. 20560

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The Bulletin Board

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Rec Programs Threatened

An obscure law that gives blind vendors a priority right to operate vending facilities on federal property has "the potential of literally emasculating major parts of the Air Force MWR [Morale, Welfare, and Recreational] program." So declared Brig. Gen. Herbert L. Emanuel, Vice Commander of the Military Personnel Center, to a House Armed Services subcommittee recently. It was probing military clubs, rec centers, sports activities, book stores, exchanges, and other MWR projects, and their funding.

General Emanuel reiterated USAF's strong support of MWR activities. He said they "help fulfill our traditional commitment to 'take care of our own' and maintain the institutional integrity [as opposed to the 'just another job' attitude] of the Air Force family."

The blind vendor problem, which also worries the Defense Department, stems from a late 1974 law, just now being implemented. It lets blind vendors move in almost at will on military bases, and this in turn will leave "our MWR program . . . with only marginal or unprofitable facilities," General Emanuel said. "It could result in Air Force personnel bearing a disproportionate share of the cost of assisting the nation's blind," he added.

Meanwhile, the services and Defense have been struggling for months to draft a legislative proposal that would provide the military some relief. But it's a touchy matter.

On other topics in his MWR report, General Emanuel said:

- More members continue to use the 345 Air Force clubs than any other MWR leisure-time facility. Club employees are almost all en-

listed or civilians; only seventy-four officers remain assigned to operate appropriated fund positions and these slots may be eliminated. Club members paid \$23.4 million in dues during FY '76. In summary, he said, the clubs "play a valuable role in people-related programs and are . . . highly valued by the people they serve."

- There are ninety-three package stores Stateside, none with more than two outlets. However, about one-fourth of the US bases have no package store. Package profits go a long way to assure club solvency; during the first nine months of FY '77, for example, the clubs received \$9.7 million from store operations. Without this income, 218 of the clubs—instead of ninety-five—would have lost money during the period.

- Tests involving returnable beverage containers at Laughlin and Patrick AFBs show sharp income losses. At the former, package store beer sales have slumped fifty percent. If the program is laid on all Air Force bases, the service will suffer a severe loss of MWR funds.

- Recreation centers, formerly called "service clubs," are changing their traditional roles to reflect the changing recreation needs of today's airmen. There are fewer bachelors and more married couples and increased interest in adult education, arts and crafts, and ticket and tour services. Both appropriated and nonappropriated funds support the rec centers, but with operating costs soaring, fees for at least some traditionally free services are now being charged.



Briefings by key DoD and USAF officials headed the executive board meeting agenda of the Arnold Air Society and Angel Flight during September's AFA National Convention in Washington. Welcoming Society and Flight members at one Pentagon meeting was USAF Lt. Gen. Howard M. Fish, Deputy Assistant Secretary of Defense/International Security Affairs (Security Assistance), here shown greeting Cadet Terence O'Connor from the College of St. Thomas, St. Paul, Minn.

Round-Up of "People" Legislation

There was widely scattered congressional action on military personnel legislation as the lawmaker neared their late fall adjournment date. But little completed action. While the GI bill was being strengthened (see *item below*), many proposals were shelved until next year.

Extensive hearings by a House Armed Services subcommittee continued on the Senate-passed bill to ban military unions. Administrative witnesses insisted that the measure was unnecessary, that Defense new anti-union directive (see *last month's "Bulletin Board"*) is ample protection. At press time, the subcommittee was marking up the b

Another subcommittee examined several health bills which, if eventually enacted, will restore some important benefits to service people. One, for example, would return CHAMPUS reimbursement rates to the ninetieth percentile. Another would "require" the military to furnish essential medical and dental care to retirees and their families, while a third would add dental care to CHAMPUS. Chances of early approval are dim.

Also in the waning days of the 1977 congressional session:

- The Senate passed a bill pro-

hibiting federal procurement officials from working for any government contractor for two years after leaving government service. The measure would apply to GS-12s and above and their military equivalents.

- Congress dropped one of the two Deputy Secretary of Defense positions and created an Under Secretary of Defense for Policy.

- Col. Leon S. Hirsh, Jr., from Defense's manpower office, was the Pentagon's principal witness at House Armed Services subcommittee hearings on military retirement. As predicted, the sessions pro-

duced no significant developments, but they did give Rep. Les Aspin (D-Wis.) an opportunity to knock the present military retirement system. "Do you know of any system in the world that tops the military's?" Aspin asked Hirsh. He managed to get a "no" response.

- The same subcommittee put off until next year consideration of bills to give special pay to military lawyers. Mid-October hearings had been scheduled.

- Rep. Barry M. Goldwater, Jr. (R-Calif.), introduced H.R. 9548 to exempt veterans, upon reaching

AFA Believes . . .

Battle of the Marrieds vs. Singles

"Equal pay for equal work," the Air Force says. "But it doesn't practice it," one letter charged. "Bachelors are discriminated against on pay, assignment of quarters (BAQ), and on subsistence (BAS)!" declared a second. "Another man in my office—same grade, same time in, and similar duties—receives approximately \$350 more per month than I, all because he's married and I'm not!" thundered a third.

These blasts in letters to the editor are typical of charges hurled during the long-drawn-out battle of "marrieds vs. singles." It's been waged—mainly by the singles—off and on for years, but recently it appears to have intensified. More singles seemingly are squawking, not only to military-oriented publications, but also to high military officials, to Congressmen, and to the daily press. They're demanding what they call "equal treatment." Yet the services insist they are fully committed to equal treatment.

So, what's the straight story? Are USAF bachelors in uniform being done in? For the official position, AIR FORCE Magazine went to Col. Paul W. Arcari, Chief of the Entitlements Division, Hq. USAF. He's probably the top expert in all the services on benefits and entitlements. Here, paraphrased and boiled down a bit, are the highlights of his report:

Some members are under the false impression that the statute requiring "equal pay for substantially equal work" applies to military as well as civilian employees. It doesn't. Another section of the law implements the "equal pay for equal work" concept through the basic pay. There's a difference.

Historically, Colonel Arcari continued, the military pay system has been based on a "needs" philosophy, which regards basic pay as the member's salary. Other compensation elements—beyond basic pay—aim to fulfill "needs" and are provided either in cash or in kind. For example, when quarters cannot be provided members on base, they receive an allowance "tailored to their needs." (The married member may receive from about \$50 to \$80 more per month than his unmarried counterpart, depending on grade.)

Other monetary entitlements also reflect the "needs" philosophy. These include special overseas housing and cost-of-living allowances (HOLA and COLA), which both marrieds and singles may be entitled to, plus medical care, commissaries, etc.

USAF, Colonel Arcari points out, does its best to meet members' individual needs. But when such needs involve extremely high costs, like movement of a family and household goods overseas, the member may have to trim those costs by serving a longer foreign tour than a single member.

The Air Force argues too that while married members generally draw more take-home pay than bachelors, they have

more expenses. Because of these family outlays, the married member's leftover "after meeting basic needs . . . is usually less than that of a single counterpart."

On BAQ, the law requires the services to fill up quarters before authorizing the off-base allowance. "Generally, when family quarters are available, married members cannot be granted BAQ. Similarly, when bachelor quarters are available, single members cannot usually be granted BAQ."

Air Force, meanwhile, is engaged in what Arcari calls "a very dynamic program to improve existing bachelor housing." Also, under a recent legal change, single members living on base receive a partial BAQ; it is the amount of BAQ reallocated from their basic pay at the start of a pay raise (e.g., the partial rate for a single captain is \$22.20, for a master sergeant \$12). "This feature of the law will help reduce the problem of the single member who currently loses BAQ when occupying bachelor quarters," the entitlements chief says.

The perception of many airmen that the Air Force arbitrarily requires them to eat in base dining halls is wrong, he contends. Rather, the law requires feeding of enlisted members in mess halls "to the maximum extent possible." So, when such facilities are available, bachelors without BAQ are normally required to use them. Colonel Arcari calls this a logical requirement since Congress has put up a great many taxpayer dollars over the years to build and maintain these facilities.

Nevertheless, he said, Air Force recognizes that single members want a choice of when, where, and what they eat. Accordingly, its goal is for BAS across the board. However, because of the enormous cost involved, the plan is being phased in.

Step one—BAS for those supervisory positions in the top three grades—was approved last year. Step two, called "Weekend BAS," envisions two days' BAS each weekend. The plan is being tested at McChord and Elmendorf AFBs. If it proves successful, USAF will seek wider authority next year. The third and final phase, though down the road a bit, calls for BAS for all enlisted members at all times, except for basic trainees.

Meantime, the service promises to further improve dining hall meals, decor, etc.

Colonel Arcari urges all members to view the single vs. married entitlement situation in perspective, taking into consideration the statutes under which Air Force must operate and the costs involved. "Our efforts will continue to be expended with deep concern for the welfare of all Air Force members," he concluded.

That's the official USAF response to what AFA believes is a burning issue. AIR FORCE Magazine welcomes your response.

—James A. McDonnell, Jr.

The Bulletin Board

seventy, who have paid premiums on their VA term insurance for twenty-five years, from any further premium payments. Such veterans now pay outrageous premiums.

- The Senate agreed to a House-passed measure that extends for two years the exclusion from income tax for money received under the Armed Forces Health Professional Scholarship Program. Proponents hope the move will encourage more medical students to become military physicians. AFA backs this measure.

- Rep. John J. Duncan (R-Tenn.) introduced H.R. 9558, which would let the Air Force budget for and receive appropriations to beef up the Civil Air Patrol.

GI Bill Sweetened

The Senate at press time approved the 6.6 percent increase in GI Bill education benefits okayed earlier by the House, and added amendments that improve the overall package. For in-service veterans, the measure will increase the maximum monthly payment from \$292 to \$311. The Senate amendments, if the House goes along, will:

- Let veterans draw double GI benefits for nine months. That is, they could draw from their total forty-five months entitlement to complete their studies in thirty-six months.

- Extend for two years the eligibility period for vets who were full-time students when their benefits expired.

- Extend veterans benefits to the WASPs, women pilots of World War II. This is the plan long backed by Sen. Barry Goldwater (R-Ariz.), who told the Senate it would cost the government only about \$80,000 a year.

Under legislation passed last year, the number of veterans enrolled in GI study programs is dropping sharply. Eligibility extends for ten years after discharge, but during the past half year a million vets allowed their entitlement to expire. The Veterans Administration said that only 809,000 veterans were in

training this past September, although some 6,000,000 were eligible.

In a related matter, veterans groups have lined up in opposition to the Administration's drive to scuttle veterans preference in federal employment (see November "AFA Believes"). The House Post Office and Civil Service Committee conducted hearings on the issue recently.

SS Expansion Plan Dropped

The House has ditched a controversial plan to bring 6,500,000 federal, state, and local government employees under Social Security and reconstruct their existing retirement programs by January 1982.

The House Ways and Means Committee had approved the plan earlier, but it did not say how the retirement and Social Security payments would be overhauled or merged. Organizations with sizable government employee membership, including AFA, opposed the move because of its vagueness and the concern that the eventual result would be reduced benefits.

AFA President Gerald Hasler called for more study. In a letter to Ways and Means Chairman Al Ullman (D-Ore.), he said, "There is great fear, especially among our members who also are federal employees, that such action [the Committee bill] would dilute the effectiveness of their retirement program and could do serious damage to its solvency."

In rejecting the Committee plan, the House accepted an amendment by Rep. Joseph L. Fisher (D-Va.). It provides for a two-year study of the federal coverage issue.

Supporters of the Committee plan said it would bring in up to \$4 billion in added revenue to the Social Security system, which is in financial trouble. Social Security taxes, already on the rise, will go up much faster to make up for losses from the adoption of the Fisher amendment.

Relief for Bandsmen in Works

AFA President Hasler has reiterated the Association's strong support for removal of curbs on off-duty employment of military band members. With some exceptions, a 1908 statute has prevented military bandsmen from working after hours

and earning extra money at their specialty. Yet no such bar applies to other service people wishing to moonlight.

In late October, a House Armed Services subcommittee held hearings on a bill to repeal the restrictions. "It is inconceivable . . . that this discrimination continues to exist," Hasler said in a letter to subcommittee Chairman Richard C. White (D-Tex.). He added that it deters musicians from enlisting in the services. MSgt. Robert A. Navarra, a French horn player with the USAF Band, appeared before the subcommittee in support of the bill. The subcommittee approved the measure and sent it to the full committee.

Recruiters Sought Abroad

Air Force has probably spent more time searching for top-notch recruiters than on any other special assignment program. But not enough, apparently. "We still have heavy requirements to fill," Hq. USAF said recently in announcing a major recruiter policy change. The new thrust is on overseas returnees. They'll be specially screened, the most promising "will be nominated," and each one "will be given the opportunity to indicate volunteer status."

Officials said they hope to fill "all recruiting requirements" with volunteers. The new plan kicked off last month when oversea assignees scheduled to rotate Stateside next summer got the word. Against a tougher recruiting climate, Air Force is looking for 74,000 nonprior-service recruits this fiscal year compared with 72,500 last year. The new quota includes 13,120 women or nearly eighteen percent of the entire year's nonprior-service target.

Civilian Goodie Axed

Air Force and other government civilians long have enjoyed the option of using government or no government quarters on TDY. When they chose the latter they received per diem.

No longer. Now, the civilian employee who elects not to use adequate government quarters won't be reimbursed. However, there is a possible loophole. It allows an exception to the no-per-diem rule when the order-issuing authority



Eight youths from Israel and two officers of that country's Air Force found this close-up look at an F-15 at Langley AFB, Va., a high point of their recent visit to the United States. The event was part of the annual International Air Cadet Exchange Program, in which US Civil Air Patrol cadets and foreign cadets exchange three-week visits. USAF provides the major support of the program. CAP's Virginia Wing hosted the Israeli contingent, officially known as Gadna-Avir, Israel.

cides that the use of government quarters "would adversely affect the performance of the assigned mission." The exception, however, does not apply to persons attending training courses at military bases.

Energy Test Readied

All occupants of family quarters at Little Rock AFB, Ark., and Cannon AFB, N. M., will soon find utility meters recording their electricity and gas consumption. The 2,547 housing units involved—1,535 at Little Rock and 1,012 at Cannon—are USAF's share of the 11,000 family quarters Defense-wide on which utility use tests will be conducted starting about January 1. They will continue into 1979, and by January 1980 Defense must report its findings to Congress.

Air Force will keep close tabs on the meter readings—electricity at Little Rock, gas and electricity at Cannon. Energy wasters will be asked to reduce their usage, a Hq. USAF official said. The test is designed to save energy; it is not an attempt, as some members have suggested, to reduce benefits, he added.

However, the results of the Defense-wide test will probably determine whether the government will eventually install meters in all mili-

tary quarters. And whether energy-wasters will be billed.

Air Force in recent years has conducted a vigorous energy-saving program. Phase one, in which bases over the past three years have urged all personnel to curb energy use, has resulted in a USAF-wide quarters savings of 3.5% for electricity and 13.1% for natural gas. Phase two has cut the use of energy in new construction by beefing up insulation, installing water-saving devices, etc.

The official said the upcoming meter test amounts to the third phase.

New Rated Supplement Plan

The service has established a special board to frame guidelines for the distribution of the declining rated supplement inventory. Flyers currently are filling about 7,200 support positions, but by September 1980 officials believe the supplement will be down to about 2,500. The new prioritization board will identify the minimum number of rated officers needed in support jobs. The supplement drawdown in most cases will be handled through normal reassignments, officials said.

USAF's actual rated officer surplus remains at about 3,100 pilots and 1,300 navigators. But with low

new-flyer production—e.g., only 1,050 new pilots and 500 new navigators this fiscal year—authorities expect the surplus to be wiped out before the end of FY '80.

At the end of last August, USAF officer strength of 96,700 was composed of 30,500 pilots, 13,100 navigators, 40,000 line nonrated, and 13,100 nonline.

Widows Home Plans Crystallize

A permanent home for widows and dependents of Air Force enlisted members moved a step closer recently when Rep. R. F. L. Sikes (D-Fla.) reintroduced a bill to provide the property for the facility. The tract consists of forty-nine acres on the perimeter of Eglin AFB, Fla.

An earlier Sikes bill to provide the land was held up pending a determination on the financial stability of the Enlisted Men's Widows and Dependents Home Foundation. Sikes told the House recently that the Foundation has met the test, filled up its temporary home at Fort Walton Beach, Fla., and added substantial donations to its treasury.

AFA has provided funds for the project, including more than \$26,000 from a Bob Hope benefit show hosted by the Association's Eglin Chapter. Wives clubs and other military-oriented groups also have contributed. The largest donation, of \$615,000, came from the Air Force's 1977 assistance campaign.

Air Force is holding the land for the permanent home in abeyance pending congressional approval of the Sikes bill. The plan calls for a 200-unit complex of efficiencies and one- and two-bedroom apartments, a community center, recreational facilities, chapel, library, infirmary, and related treatment center.

The Fort Walton facility has 100 units, mostly two-bedroom apartments, all occupied. There is a waiting list.

States Group Seeks DoD \$

A group fighting base closures in and seeking more Defense dollars for northeast and midwest states has taken its case to the highest echelons in the military services. Working up a full head of steam on the issue is the Task Force on Military Installations for the Northeast-Midwest Economic Advancement

The Bulletin Board

Coalition, headed by Rep. Don Mitchell (R-N. Y.).

Representative Mitchell recently met behind closed doors with Air Force Secretary John C. Stetson, Assistant Secretary (Manpower, Reserve Affairs and Installations) Antonia H. Chayes, Army Secretary Clifford L. Alexander, Jr., and other high Pentagon executives. He outlined the heavy slashes in military spending in the Coalition states during recent years. For example, he reported that they have forty-five percent of the population, but only twenty percent of the military installations. He added that they receive only one of every sixteen federal dollars spent on Stateside military construction.

Mitchell also plugged for a moratorium on base closings or major mission reductions in the Northeast and Midwest. A spokesman for Mitchell said the officials attending the meeting appeared impressed with the presentation.

The Coalition strongly opposes any surgery on Loring AFB, Me., which is rumored to be on the Pentagon's long-delayed "hit list," now expected to be out in January. There was no indication whether or not the Coalition's offensive will save Loring, the spokesman said.

Short Bursts

Seventy-five active-duty airmen have been chosen for college and **eventual commissioning via the AFROTC**. They'll enter various schools in January and receive the full ROTC scholarship, including \$100 monthly subsistence allowance for from two to four years. Different from the Airman Education and Commissioning Program, persons going this AFROTC route give up their military status while in school. The

next Scholarship-Commissioning board will meet in April.

Always prepared to drive home its firm stand on behavior standards, USAF has just come out with a new AFR 30-1, simply titled "**Air Force Standards**." It's broader than its predecessor, which surfaced in 1971. New themes covered in the updated edition include "Air Force as a way of life," "the importance of the Air Force mission," and "significance of the oath each member takes" on joining the service.

Time flies. Not only were USAF's twelve **outstanding airmen** of 1977 honored at the AFA Convention just recently, but it's almost time to determine next year's twelve best. Field points have been asked to get their nominations to the USAF Military Personnel Center not later than January 31, 1978.

"... the most demanding, most rewarding, and **best job in the Air Force**" is inspecting. That's the view of the head inspector, Lt. Gen. John P. Flynn. He elaborates in the October 21, 1977, *TIG Brief*, published by his office at Hq. USAF. The same issue contains timely words about base billeting programs and how they can be improved.

Senior Staff Changes

CHANGES: B/G Donald J. Bowen, from Cmdr., Southern Comm. Area, AFCS, Oklahoma City AFS, Okla., to Dep. Dir., Plans & Programs, DCA, Washington, D. C. . . . B/G Paul E. Gardner, from Cmdr., 89th MAW, MAC, Andrews AFB, Md., to Cmdr., CAP-USAF, AU, Maxwell AFB, Ala., replacing B/G Carl S. Miller . . . M/G Philip C. Gast, from C/S, Hq. AFLC, Wright-Patterson AFB, Ohio, to Ch., MAAG, Teheran, Iran . . . M/G (L/G selectee) John R. Kelly, Jr., from Asst. DCS/S&L, Hq. USAF, Washington, D. C., to DCS/S&L, Hq. USAF, Washington, D. C. . . . B/G Carl S. Miller, from Cmdr., CAP-USAF, AU, Maxwell AFB, Ala., to Cmdr., 21st NORAD Rgn., & Cmdr., 21st Air Div., Hancock Field, N. Y., replacing M/G Richard H. Schoeneman . . . M/G Richard H. Schoeneman, from Cmdr., 21st NORAD Rgn., & Cmdr., 21st Air Div., Hancock Field, N. Y., to Comdt., AWC, AU, Maxwell AFB, Ala. . . . B/G Erskine Wigley, from Cmdr., US Forces Azores, & Cmdr., 1605th ABW, MAC, Lajes Field, Azores, to V/C, Twenty-first Air Force, MAC, McGuire AFB, N. J. ■

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THE BIG GREEN TEAM

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Compensation Inequities: How Much Longer?

Members of AFA's Enlisted Council, including some veteran noncoms, asked trenchant questions. So did Senior Enlisted Advisors from every Air Force command and separate operating agency. But some of the answers were less than rewarding.

The scene was a Joint Conference meeting of the enlisted groups with the Association's Junior Officer Advisory Council, held during the recent national convention in Washington, D. C. Pentagon officials and congressional staffers briefed the participants on various personnel, benefits, and legislative projects, all compensation-related.

"When is the Air Force and the government going to give bachelor service members full equality with married members? On such things as quarters allowances, the option of living off base and collecting the allowance, and on removing curbs on paying subsistence allowances?" several NCOs wanted to know. One reminded the meeting that all these issues have been studied for years. But nothing happens. (See related "Bulletin Board" item.)

Other Conference members brought up another sore point—the need to equalize per diem for airmen with that of officers on TDY; the former have been penalized long enough. Unfortunately, there was no indication from the official briefers that any relief was in immediate sight. They did promise to take another look.

And what, other participants asked, was the Pentagon doing to secure travel-transportation benefits for junior enlisted members and their families, as AFA has long advocated? The NCOs raised the issue, not for themselves—they all have sufficient rank and service to receive these entitlements. Rather, it was their concern for younger, low-ranking associates who, they contend, are getting a raw deal. One officer, noting that all new officers enjoy full travel benefits, asked why not new enlisteds? There was embarrassed silence from the dais.

All these injustices, of course, have been well documented time and again. The individual services, in varying degrees, have called for relief. But they haven't made much of an impression on those who call the signals on such things—the Defense Department, the Administration, and Congress. The inequities remain.

Full travel entitlements for junior enlisted families are already about five years overdue; they should have begun in January 1973, with the launching of the All-Volunteer Force. The denial of these travel items is particularly bad news for noncommand-sponsored families in Germany, where living costs are outrageous. The US Army, in accentuating that fact, calls assignments to that country "disaster tours."

To make matters worse, the Civil Service Commission has been pressing for an end to overseas employment preferences for military dependents. Who would be hurt the most? Junior EM families, of course. Uncle Sam's overall performance on the low-ranking enlisted family problem does not make pleasant reading.

Judging from the thrust of the questions and the obvious concern of those asking them, the Conference members—and probably responsible people throughout the services—are getting impatient. They're fed up with the government's foot-dragging on equal pay for single members, quarters allowance and subsistence allowance payment rules, per diem, and especially travel entitlements.

Service people may also have noticed that few high-level military or civilian leaders are speaking out for prompt correction of these deficiencies. (See "AFA Policy Paper on Defense Manpower Issues," November issue.)

Meanwhile, new delays have set in on anything that smacks of being a compensation issue. Pay-related matters are on the back burner until the Presidential Pay Commission fin-

ishes its study and the government acts—or doesn't act—on the Commission's recommendations. All that could take a couple of years, anyway.

Some wags suggest that the Commission's eventual main recommendation will be to dump all compensation studies and unresolved questions into the lap of the Fourth Quadrennial Review of Military Compensation. The Third QRM, it will be remembered, failed to come up with recommendations or a formal report following about twenty months of study. The Fourth QRM is to convene in 1979.

While various pay-benefits issues keenly affecting enlisted members go uncorrected, the Air Force hasn't been sitting on its hands. It has engineered some worthwhile personnel policy changes, ones it can launch on its own. They are hardly earth-shaking, and several affect only small numbers of people, but they are "plus" actions. Here are some of the recent ones:

- **Extended Tenure for E-9s.** Thirty years service has been the limit. Starting with a selection board convening next month, about fifty chief master sergeants annually, who volunteer, will be chosen to stay aboard for up to thirty-three years. They'll also receive preferred assignments and bases, which will add some incentive to stay on. Those chosen to remain on board will be top people and should benefit their sections, units, bases, or wherever they work. The change, however, is not seen as a first step toward extending tenure for USAF members generally (pressure is increasing on the Pentagon to end twenty-year retirement and keep people on duty longer).

- **Second-Chance Promotions to E-8, E-9.** Serious errors or omissions in personnel records have worked to deny promotion to a few worthy candidates for chief and senior master sergeant. Under a new policy, when this happens a special panel, meeting on an "as required" basis, will look into the matter. Promotion may follow.

- **NCO Professional Education Goals.** The service has settled on new goals designed to improve the NCO Professional Military Education program. One calls for establishing annual USAF needs for in-residence attendance at NCO leadership schools, NCO academies, and the Senior NCO Academy. Another envisions a central selection system for the latter school.

- **Do-It-Yourself Haul.** Though a Defense-wide project, USAF is far ahead of the other services in embracing it, and more airmen are benefiting than soldiers, sailors, and Marines. By letting members move their own goods at PCS time, the government saves money—which it shares with the participants. USAF reports that through last June, Air Force people (mostly airmen) collected \$2 million, while all the other military do-it-yourselfers together received only \$1.6 million.

- **Overseas Selection Rules for Airmen.** Under a recent change in procedures, airmen have a better chance of receiving their preferred overseas area or their preferred country of assignment.

- **First Sergeant Careers.** This continuing program aims to increase the authority and prestige of USAF first sergeants.

There are other new, improved enlisted people projects Air Force comes up with from time to time. Like those noted here, they all have a common goal: Make the service a better place in which to live and work.

But they're not the "heartburn" issues that stir up the troops—and at times get them fuming.

It's the compensation-related issues, particularly those cited earlier, that are the attention-getters. They get the big play, draw the tall headlines, and generate the conversation. At the exasperatingly slow pace Uncle Sam is addressing them, they are likely to be around, as unresolved as ever, for a long time. ■

AFA News

By Don Steele, AFA AFFAIRS EDITOR



Lt. Gen. John P. Flynn, USAF Inspector General, was guest speaker at the Gen. Robert F. Travis Chapter's recent awards banquet. Twenty-two awards were presented to AFA and USAF people and units. CMSgt. Walter E. Scott, Enlisted Air Crew Advisor to the Deputy Commander, 60th MAW at Travis AFB, Calif., and the keynote speaker at AFA's 31st National Convention, received the Chapter's Certificate of Merit for his work in promoting the objectives of the Aerospace Education Foundation, AFA's education affiliate. Shown during the presentation are, from left, Chief Scott; Travis Chapter President Art Littman; and California State AFA President Dwight Ewing.



George Rose, left, recipient of the Air Force Association award for the Best Military Scale Model at the 51st National Model Airplane Championships, recently held at March AFB, Calif., and Gene Sidwell, right, the California State AFA's Director of Model Aviation and a judge at the competitions, are shown with Mr. Rose's winning model, a Curtiss Hawk P-6E. AFA's Riverside County and San Bernardino Area Chapters joined the Academy of Model Aeronautics in cosponsoring the event.

The Washington State AFA's Spokane Chapter recently conducted its fifth annual flight instruction and indoctrination program for the new cadets in the AFJROTC unit at Medical Lake High School. Under the direction of Project Chairman Jack Berg, fourteen pilots, using their own airplanes, made nineteen orientation flights with fifty-eight cadets participating. In the photo, Washington State AFA Vice President Dick Bond, left, who is also a member of the state legislature, shows his amphibian to Cadets Ken Schreffler, Ken Bare, and Keith Bare.



Participants in the Central Indiana Chapter's Charter Night included, from left, Jack Withers, then Vice President for AFA's Great Lakes Region, now an AFA National Director, who presented the charter; Chapter President Thomas E. Correll; and Maj. Gen. Robert A. Rushworth, Vice Commander, Aeronautical Systems Division, AFLC, who was the guest speaker.



Speakers at the Greater Peoria Chapter's recent Charter Night Banquet were Brig. Gen. Robert F. Coverdale, DCS/Plans, Military Airlift Command, Scott AFB, Ill.; Maj. John Gura, Chief, Midwest Office of Air Force Information, Chicago; and Al Field, Illinois State AFA President. Hugh Enyart, Vice President for AFA's Great Lakes Region, presented the AFA charter. Shown are, from left, Mr. Enyart; General Coverdale; Chapter President Mark D. Demmin, who, at twenty-three, is the youngest Chapter president in AFA; and Mr. Field.

chapter and state photo gallery

LEFT: Maj. Gen. John Hepfer, Deputy for ICBMs at the Air Force's Space and Missile Systems Organization (SAMSO) at Norton AFB, Calif., was presented the AFA's General Bernard Schriever Award by then AFA National President George M. Douglas during the annual reunion of ICBM Pioneers, a group of people who worked on the missile program prior to April 1959. From left, Mr. Douglas; retired Gen. Bernard Schriever, for whom the award is named; and General Hepfer. **FAR RIGHT:** Gen. F. Michael Rogers, Commander, Air Force Logistics Command, was the guest speaker and recipient of the coveted Wright Memorial Chapter Award at a dinner dance sponsored by AFA's Wright Memorial Chapter to observe the thirtieth anniversary of the Air Force and the sixtieth of the founding of McCook Field, forerunner of Wright-Patterson AFB, Ohio. Other award recipients included Lt. Gen. Bryce Poe II; Dr. Jerome Meyer, who received a Jimmy Doolittle Fellow plaque; and Jack Withers, then Vice President for AFA's Great Lakes Region. In the photo, General Rogers, left, and Chapter President N. C. "Dutch" Heilman are shown cutting the traditional birthday cake.



—OFFICIAL USAF PHOTO

—PHOTO BY W. DONALD DODD



More than 500 members and guests attended the San Bernardino Area Chapter's "Salute to Jimmy Doolittle" luncheon held during the National Orange Show in San Bernardino, Calif. Shown are, from left, Maj. Gen. George J. Keegan, USAF (Ret.), the featured speaker; Lt. Gen. James H. Doolittle, USAF (Ret.), one of AFA's founders and its first National President; and Chapter President S. Wayne Lynch.

IN SYMPATHY . . . AFA extends its deepest sympathy to the family and friends of Frederick J. Gavin, Massachusetts State AFA President. Fred died November 8 in the Jamaica Plains VA Hospital. He was serving his second term as State President and his fifth term as President of AFA's Boston Chapter.



Gen. George S. Brown, USAF, Chairman of the Joint Chiefs of Staff, was the guest of honor and speaker at a luncheon recently cosponsored by AFA's Albuquerque, N. M., Chapter and the Kirtland AFB Retiree Council. General Brown, left, is shown accepting an Albuquerque Chapter Citation from Chapter President John N. Donnellan, right, a lieutenant colonel in the Air Force Reserve. The General was cited for his outstanding support of the Air Force Association and the Chapter.



A check from AFA's Pease Chapter, N. H., is presented to A1C Donna W. Allen in appreciation of her efforts in the Chapter's behalf and, to make it possible for her to attend the AFA National Convention. In addition, a Chapter check was presented to the 509th BW Commander, Col. James M. Greer, Pease AFB, to be used toward the wing's participation in SAC's annual Bombing, Navigation, and Loading Competitions. From left, Chapter President Charles Sattan, A1C Allen, and Chapter Treasurer Stephen Coffey.

AFA News



The Alamo Chapter of San Antonio, Tex., recently sponsored a "get-acquainted" reception for Air Force commanders in their area and officers of the Chapter. Shown discussing support for Air Force commands and their activities are, from left, Brig. Gen. Kenneth D. Burns, USAF Security Service Commander; Chapter President Jim Williams; and Maj. Gen. Paul W. Myers, Commander, Willford Hall USAF Medical Center at Lackland AFB.



AFA's Ak-Sar-Ben Chapter and the Omaha Chamber of Commerce recently cosponsored a luncheon to honor Gen. Russell E. Dougherty, Commander in Chief, Strategic Air Command, and Lt. Gen. James M. Keck, Vice Commander, SAC, for their community service. During the program, Chapter President Robert E. Runice, right, presented General Dougherty, left, a hand-made Kentucky long rifle.



AFA National Director Alexander E. Harris, right, recently presented an AFA Medal of Merit to Eddie Holland, left, a member of the Arkansas State AFA's Executive Committee and a member of the Executive Council of the David D. Terry, Jr., Chapter of Little Rock, Ark.



Rep. E. H. "Bud" Hillis, right, from Indiana's Fifth District, a member of the House Armed Services Committee, was the guest speaker at a recent meeting of AFA's Grissom Memorial Chapter. Shown visiting with the congressman before the meeting are, from left, Chapter President Robert H. Wilkie and Col. Donald K. Winston, Commander, 305th ARW at Grissom AFB, Ind.



Mr. Spann Watson, former National President of the Tuskegee Airmen, an organization composed of the black World War II airmen who trained at Tuskegee Institute, Ala., was the guest speaker at the Andrews AFB, Md., Chapter's recent dinner. Head-table guests included, from left, Brig. Gen. William E. Brown, Jr., Chief, Security Police, Bolling AFB, D. C.; Mr. Watson; Chapter President Tony Anthony; Northern Virginia Chapter President Larry Dyer; and Dan Strickland, Superintendent, D. C. Department of Corrections.

chapter and state photo gallery



AFA's Middle Georgia Chapter recently presented a painting to Maj. Gen. William R. Hayes as he retired from his duties as Commander of the Warner Robins Air Logistics Center at Robins AFB, Ga. Shown presenting the gift are, from left, Chapter President-elect L. A. "Buster" McConnell, Jr.; Chapter President Betty Clark; General Hayes; Chapter Secretary Virginia Mullendore; and Chapter Treasurer Roy Ditterline.



"AFA Night at the Ball Game," an event organized annually by AFA's Long Beach Chapter for members of all Chapters in Southern California, this year drew more than 1,000 AFAers among the some 31,000 fans to watch the Los Angeles Dodgers battle the Atlanta Braves in Dodger Stadium. The AFA lineup for the traditional opening ceremonies consisted of, from left, California State Vice President (South) Jay Golding as the umpire; Long Beach Chapter President Doug Gibson as the batter; California State AFA President Dwight Ewing, the pitcher; and Long Beach Chapter Vice President Floyd Damman, the catcher.



Greater Los Angeles Airpower Chapter President Dick Doom, right, recently presented an AFA "Community Partner" certificate to Frank A. Godoy, Jr., left, General Manager of Hacienda Hotel at Los Angeles International Airport.



George M. Douglas, then AFA National President, and now Board Chairman, tees off during the Eglin Chapter's annual golf tournament. The proceeds of the tournament go to the Chapter's scholarship fund for local AFJROTC cadets. Mr. Douglas was the featured speaker at the Chapter's banquet following the tournament and, in addition, visited Teresa Village, the Air Force Enlisted Men's Widows and Dependents Home, Fort Walton Beach, Fla.



AFA's Alamo Chapter, Tex., recently sponsored a luncheon to honor CMSAF Robert D. Gaylor. Guests included chief master sergeants from ten separate commands in the San Antonio area. Shown are, from left, CMSgt. William D. Walton, San Antonio ALC; CMSAF Gaylor; Alamo Chapter President Jim Williams; Chapter Treasurer James Shutt; and Col. Jerry Waltman, senior advisor to the Chapter.

—OFFICIAL USAF PHOTO

AFA State Contacts

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Donal B. Cunningham**, 1 Keithway Dr., Selma, Ala. 36701 (phone 205-875-2450).

ALASKA (Anchorage, Fairbanks): **Daniel C. Crevensten**, Box 60184, Fairbanks, Alaska 99706 (phone 907-452-5414).

ARIZONA (Phoenix, Tucson): **E. D. Jewett, Jr.**, 7861 N. Tuscany Dr., Tucson, Ariz. 85704 (phone 602-297-1107).

ARKANSAS (Blytheville, Fort Smith, Little Rock): **Gordon W. Smethurst**, RR #2, Box 43D, Cabot, Ark. 72023 (phone 501-374-2245).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hawthorne, Hermosa Beach, Long Beach, Los Angeles, Marysville, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Monica, Tahoe City, Vandenberg AFB, Van Nuys, Ventura): **Dwight M. Ewing**, P. O. Box 737, Merced, Calif. 95340 (phone 209-722-6283).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Ft. Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **Edward C. Marriott**, 11934 E. Hawaii Cir., Aurora, Colo. 80012 (phone 303-934-5751).

CONNECTICUT (East Hartford, North Haven, Stratford): **Joseph R. Falcone**, 14 High Ridge Rd., Rockville, Conn. 06066 (phone 203-565-3543).

DELAWARE (Dover, Wilmington): **George H. Chabbott**, 33 Mikell Dr., Dover, Del. 19901 (phone 302-697-6943).

DISTRICT OF COLUMBIA (Washington, D. C.): **Ricardo R. Alvarado**, 900 17th St., N. W., Washington, D. C. 20006 (phone 202-872-5918).

FLORIDA (Bartow, Broward, Cape Coral, Ft. Walton Beach, Gainesville, Jacksonville, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tampa): **Eugene D. Miniotta**, Box 286A, Route 1, Oviedo, Fla. 32765 (phone 305-420-3868).

GEORGIA (Athens, Atlanta, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **William L. Copeland**, 1885 Walthall Dr., NW, Atlanta, Ga. 30318 (phone 404-355-5019).

HAWAII (Honolulu): **James Dowling**, 2222 Kalakaua Ave., Honolulu, Hawaii 96815 (phone 808-923-0492).

IDAHO (Boise, Pocatello, Twin Falls): **Ronald R. Galloway**, Box 45, Boise, Idaho 83707 (phone 208-385-5247).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, O'Hare Field, Peoria): **Alexander C. Field**, 2501 Bradley Pl., Chicago, Ill. 60618 (phone 312-528-2311).

INDIANA (Logansport, Marion, Mentone): **Donald Thomas**, 215 S. Illinois St., Delphi, Ind. 46923 (phone 317-564-4324).

IOWA (Des Moines): **Ric Jorgensen**, 4005 Kingman, Des Moines, Iowa 50311 (phone 515-255-7656).

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum**, 6503 E. Burdock, Wichita, Kan. 67206 (phone 316-681-5445).

KENTUCKY (Louisville): **Stanley P. McGee**, 5405 Wending Ct., Louisville, Ky. 40207 (phone 502-368-6524).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **Bessie Hazel**, 155 E. Herndon Ave., Shreveport, La. 71101 (phone 318-221-7005).

MAINE (Limestone): **Alban E. Cyr**, P. O. Box 160, Caribou, Me. 04736 (phone 207-492-4171).

MARYLAND (Andrews AFB, Baltimore): **Stanley E. Stepnitz**, 11304 Maryvale Rd., Upper Marlboro, Md. 20870 (phone 301-981-4765).

MASSACHUSETTS (Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Albert A. Kashdan**, 910 Watertown St., West Newton, Mass. 02165 (phone 617-271-2198).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Lansing, Marquette, Mount Clemens, Oscoda, Petoskey, Sault Ste. Marie, Southfield): **James N. Holcomb**, 6242 Broadbridge, Marine City, Mich. 48039 (phone 313-466-4154).

MINNESOTA (Duluth, Minneapolis, St. Paul): **David J. Little**, 1888 Princeton Ave., St. Paul, Minn. 55105 (phone 612-699-3600).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Billy A. McLeod**, P. O. Box 1274, Columbus, Miss. 39701 (phone 601-328-0943).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **Donald K. Kuhn**, 3238 Southern Aire Dr., St. Louis, Mo. 63125 (phone 314-892-0121).

MONTANA (Great Falls): **Jack R. Thibaudeau**, P. O. Box 2247, Great

Falls, Mont. 59403 (phone 406-727-3807).

NEBRASKA (Lincoln, Omaha): **Lyle O. Remde**, 4911 S. 25th St., Omaha, Neb. 68107 (phone 402-731-4747).

NEVADA (Las Vegas, Reno): **William S. Chairsell**, 2204 Westlund Dr., Las Vegas, Nev. 89102 (phone 702-878-6679).

NEW HAMPSHIRE (Manchester, Pease AFB): **William W. McKenna**, RFD #5, Strawberry Hill Rd., Bedford, N. H. 03102 (phone 603-472-5504).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Newark, Trenton, Wallington, West Orange): **Leonard Schiff**, 246 Franklin Ave., Cliffside Park, N. J. 07010 (phone 201-861-2950).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **William J. Denison**, 2615 Vista Larga Ave., N. E., Albuquerque, N. M. 87110 (phone 505-264-1733).

NEW YORK (Albany, Bethpage, Binghamton, Buffalo, Catskill, Chautauqua, Griffiss AFB, Hartsdale, Ithaca, Long Island, New York City, Niagara Falls, Patchogue, Plattsburgh, Riverdale, Rochester, Staten Island, Syracuse): **Kenneth C. Thayer**, R. D. #1, Ava, N. Y. 13303 (phone 315-827-4241).

NORTH CAROLINA (Charlotte, Fayetteville, Goldsboro, Greensboro, Raleigh): **William M. Bowden**, P. O. Box 1255, Goldsboro, N. C. 27530 (phone 919-735-4716).

NORTH DAKOTA (Grand Forks, Minot): **Ernest J. Collette, Jr.**, Box 345, Grand Forks, N. D. 58201 (phone 701-775-3944).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Toledo, Youngstown): **Edward H. Nett**, 1449 Ambridge Rd., Centerville, Ohio 45459 (phone 513-461-4823).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **David L. Blankenship**, P. O. Box 51308, Tulsa, Okla. 74151 (phone 918-835-3111, ext. 2207).

OREGON (Corvallis, Eugene, Portland): **Robert G. Ringo**, 2835 SW DeArmond, Corvallis, Ore. 97330 (phone 503-757-1213).

PENNSYLVANIA (Allentown, Beaver Falls, Chester, Dormont,

Erie, Harrisburg, Homestead, Horsham, King of Prussia, Lewistown, Philadelphia, Pittsburgh, State College, Washington, Willow Grove, York): **Lamar R. Schwartz**, 390 Broad St., Emmaus, Pa. 18049 (phone 215-967-3387).

RHODE ISLAND (Warwick): **Charles H. Collins**, 143d TAG (RIANG), Warwick, R. I. 02886 (phone 401-737-2100).

SOUTH CAROLINA (Charleston, Columbia, Greenville, Myrtle Beach, Sumter): **Edith E. Calliham**, P. O. Box 959, Charleston, S. C. 29402 (phone 803-577-4400).

SOUTH DAKOTA (Rapid City): **Ken Guenther**, P. O. Box 9045, Rapid City, S. D. 57701 (phone 605-348-0579).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Thomas O. Bigger**, Sverdrup/ARO, Inc., AEDC Div., Arnold AFS, Tenn. 37389 (phone 615-455-2611, ext. 243).

TEXAS (Abilene, Austin, Big Spring, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **T. A. Glasgow**, 502 Tammy Dr., San Antonio, Tex. 78216 (phone 512-536-3656).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Leigh H. Hunt**, 1107 S. 1900 E., Salt Lake City, Utah 84108 (phone 801-582-0935).

VERMONT (Burlington): **James W. McCabe**, RFD, Monroe, N. H. 03771 (phone 603-638-4932).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Jon R. Donnelly**, 8539 Sutherland Rd., Richmond, Va. 23235 (phone 804-649-6424).

WASHINGTON (Port Angeles, Seattle, Spokane, Tacoma): **Mario F. Iafate**, 10613 Douglas Dr., S. W., Tacoma, Wash. 98499 (phone 206-584-6191).

WEST VIRGINIA (Huntington): **Ralph D. Albertazzie**, 1550 Kanawha Blvd., E., Charleston, W. Va. 25311 (phone 304-345-1776).

WISCONSIN (Madison, Milwaukee): **Charles W. Marotske**, 7945 S. Verdev Dr., Oak Creek, Wis. 53154 (phone 414-762-4388).

WYOMING (Cheyenne): **Tom Watson**, 908 Arapahoe, Cheyenne, Wyo. 82001 (phone 307-638-3348).

AFA News photo gallery



The Tacoma Chapter's Tenth Annual Golf Tournament and Cookout was held recently at the Whispering Firs Golf Course, McChord AFB, Wash. Among the eighty-seven participants were, from left, Tacoma Mayor Gordon N. Johnston; Col. Don Brown, 62d MAW Commander; Chapter President Dick Turbak; Immediate Past Chapter President Ed Hudson; Col. Robert H. Campbell, Base Commander; Col. Rick Evans; and David A. Tate, Chapter Communications Director.



Among the more than seventy-five AFA officers and members who attended the recent Far West Region Conference in Tucson, Ariz., were, from left, California State AFA Vice President Jay Golding; William P. Chandler, Vice President for AFA's Far West Region; Gerald V. Hasler, then AFA Board Chairman, now AFA National President, who was the guest speaker; Nevada State AFA President William Chairsell; Hugh W. Stewart, then an AFA National Director; AFA National Directors Edward A. Stearn and Zack Taylor; and Arizona State AFA President E. D. Jewett, Jr.



When the replica of Charles Lindbergh's Spirit of St. Louis arrived in Salt Lake City, Utah, during its tour of the country commemorating Lindbergh's historic transatlantic flight, AFA leaders and members were among those who participated in the welcoming ceremonies. Shown are, from left, Capt. Verne Jost, the pilot; Bev Turner, "Mrs. Environmental Aircraft Association"; Utah State AFA President Leigh Hunt; and Col. Ray P. Greenwood, Jr., Commander, 51st Air Refueling Group (ANG).

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DISABILITY WAIVER OF PREMIUM. If you become totally disabled at any time prior to age 60 for at least a 9-month period, your coverage will be continued in force without further payment of premiums as long as you remain disabled.

FULL CHOICE OF SETTLEMENT OPTIONS. All standard forms of settlement options, as well as special options agreed to by the insured and United of Omaha, are available to insured members.

CONVENIENT PAYMENT PLANS. Premium payments may be made by monthly government allotment (payable to Air Force Association), or direct to AFA in quarterly, annual or semi-annual installments.

DIVIDEND POLICY. AFA's primary policy is to provide maximum coverage at the lowest possible cost. Consistent with this policy, AFA has provided year end dividends (20% for 1976) to insured members in twelve of the past fifteen years, and has increased the basic amount of coverage on four separate occasions.

Additional Information

Effective Date of Your Coverage. All certificates are dated and take effect on the last day of the month in which your application for coverage is approved, and coverage runs concurrently with AFA membership. AFA Military Group Life Insurance is written in conformity with the insurance regulations of the State of Minnesota. The insurance will be provided under the group insurance policy issued by United of Omaha to the First National Bank of Minnesota as trustees of the Air Force Association Group Insurance Trust.

EXCEPTIONS: There are a few logical exceptions to this coverage. They are: **Group Life Insurance:** Benefits for suicide or death from injuries intentionally self-inflicted while sane or insane will not be effective until your coverage has been in force for 12 months.

The Accidental Death Benefit and Aviation Death Benefit shall not be effective if death results: (1) From injuries intentionally self-inflicted while sane or insane, or (2) From injuries sustained while committing a felony, or (3) Either directly or indirectly from bodily or mental infirmity, poisoning or asphyxiation from carbon monoxide, or (4) During any period a member's coverage is being continued under the waiver of premium provision, or (5) From an aviation accident, either military or civilian, in which the insured was acting as pilot or crew member of the aircraft involved, except as provided under AVIATION DEATH BENEFIT.

Eligibility

All active duty personnel of the Armed Forces of the United States and members of the Ready Reserve* and National Guard* (under age 60), Armed Forces Academy cadets*, and college or university ROTC cadets* are eligible to apply for this coverage provided they are now, or become, members of the Air Force Association.

*Because of restrictions on the issuance of group insurance coverage, applications for coverage under the group program cannot be accepted from cadets or Reserve or Guard personnel residing in Florida, New York, Ohio or Texas. Members in these states may request special application forms from AFA for individual policies which provide coverage quite similar to the group program.

Please Retain This Medical Bureau Prenotification For Your Records

Information regarding your insurability will be treated as confidential. United Benefit Life Insurance Company may, however, make a brief report thereon to the Medical Information Bureau, a nonprofit membership organization of life insurance companies, which operates an information exchange on behalf of its members. If you apply to another bureau member company for life or health insurance coverage, or a claim for benefits is submitted to such a company, the Bureau, upon request, will supply such company with the information in its file.

Upon receipt of a request from you, the Bureau will arrange disclosure of any information it may have in your file. (Medical information will be disclosed only to your attending physician.) If you question the accuracy of information in the Bureau's file, you may contact the Bureau and seek a correction in accordance with the procedures set forth in the federal Fair Credit Reporting Act. The address of the Bureau's information office is P.O. Box 105, Essex Station, Boston, Mass. 02112. Phone (617) 426-3660.

United Benefit Life Insurance Company may also release information in its file to other life insurance companies to whom you may apply for life or health insurance, or to whom a claim for benefits may be submitted.

CURRENT BENEFIT TABLES

AFA STANDARD PLAN

PREMIUM: \$10 per month

Insured's Attained Age	Basic Benefit*	Extra	
		Accidental Death Benefit*	Total Benefit
20-24	\$75,000	\$12,500	\$87,500
25-29	70,000	12,500	82,500
30-34	65,000	12,500	77,500
35-39	50,000	12,500	62,500
40-44	35,000	12,500	47,500
45-49	20,000	12,500	32,500
50-54	12,500	12,500	25,000
55-59	10,000	12,500	22,500
60-64	7,500	12,500	20,000
65-69	4,000	12,500	16,500
70-74	2,500	12,500	15,000

Aviation Death Benefit:*
Non-war related \$25,000
War related \$15,000

AFA HIGH OPTION PLAN

PREMIUM: \$15 per month

Insured's Attained Age	Basic Benefit*	Extra	
		Accidental Death Benefit*	Total Benefit
20-24	\$112,500	\$12,500	\$125,000
25-29	105,000	12,500	112,500
30-34	97,500	12,500	110,000
35-39	75,000	12,500	87,500
40-44	52,500	12,500	65,000
45-49	30,000	12,500	42,500
50-54	18,750	12,500	31,250
55-59	15,000	12,500	27,500
60-64	11,250	12,500	23,750
65-69	6,000	12,500	18,500
70-74	3,750	12,500	16,250

Aviation Death Benefit:*
Non-war related \$37,500
War related \$22,500

*The Extra Accidental Death Benefit is payable in the event an accidental death occurs within 13 weeks of the accident, except as noted under **Aviation Death Benefit** (below).

***AVIATION DEATH BENEFIT:** The coverage provided under the Aviation Death Benefit is paid for death which is caused by an aviation accident in which the insured is serving as pilot or crew member of the aircraft involved. Under this condition, the Aviation Death Benefit is paid in lieu of all other benefits of this coverage. Furthermore the non-war related benefit will be paid in all cases where the death does not result from war or an act of war, whether declared or undeclared.

OPTIONAL FAMILY COVERAGE

(may be added to either Standard or High Option Plan)

PREMIUM: \$2.50 per month

Insured's Attained Age	Life Insurance Coverage for Spouse	Life Insurance Coverage for each Child*
20-39	\$10,000	\$2,000
40-44	7,500	2,000
45-49	5,000	2,000
50-54	4,000	2,000
55-59	3,000	2,000
60-64	2,500	2,000
65-69	1,500	2,000
70-74	750	2,000

*Between the ages of six months and 21 years, each child is provided \$2,000 coverage. Children under 6 months are provided with \$250 coverage once they are 15 days old and discharged from hospital.

Professional Association! Apply Now!

Military Group Life Insurance



**APPLICATION FOR
AFA MILITARY GROUP LIFE INSURANCE**



Group Policy GLG-2625
United Benefit Life Insurance Company
Home Office Omaha Nebraska

Full name of member _____
 Rank _____ Last _____ First _____ Middle _____
 Address _____
 Number and Street _____ City _____ State _____ ZIP Code _____

Date of birth Mo. Day Yr.	Height	Weight	Social Security Number
------------------------------	--------	--------	------------------------

Please indicate category of eligibility and branch of service.

Extended Active Duty Air Force
 Ready Reserve or National Guard Other _____
 (Branch of service)
 Air Force Academy _____ Academy
 ROTC Cadet _____
 Name of college or university _____

Name and relationship of primary beneficiary _____

Name and relationship of contingent beneficiary _____

This insurance is available only to AFA members

I enclose \$10 for annual AFA membership dues (includes subscription (\$9) to AIR FORCE Magazine).
 I am an AFA member.

Please indicate below the Mode of Payment and the Plan you elect.

HIGH OPTION PLAN

STANDARD PLAN

Members Only		Members and Dependents	Mode of Payment	Members Only		Members and Dependents
<input type="checkbox"/> \$ 15.00	<input type="checkbox"/> \$ 17.50	<input type="checkbox"/> \$ 17.50		Monthly government allotment. I enclose 2 months' premium to cover the period necessary for my allotment (payable to Air Force Association) to be established. Quarterly. I enclose amount checked. Semiannually. I enclose amount checked. Annually. I enclose amount checked.	<input type="checkbox"/> \$ 10.00	<input type="checkbox"/> \$ 12.50
<input type="checkbox"/> \$ 45.00	<input type="checkbox"/> \$ 52.50	<input type="checkbox"/> \$ 52.50	<input type="checkbox"/> \$ 30.00		<input type="checkbox"/> \$ 37.50	<input type="checkbox"/> \$ 37.50
<input type="checkbox"/> \$ 90.00	<input type="checkbox"/> \$105.00	<input type="checkbox"/> \$105.00	<input type="checkbox"/> \$ 60.00		<input type="checkbox"/> \$ 75.00	<input type="checkbox"/> \$ 75.00
<input type="checkbox"/> \$180.00	<input type="checkbox"/> \$210.00	<input type="checkbox"/> \$210.00		<input type="checkbox"/> \$120.00	<input type="checkbox"/> \$150.00	<input type="checkbox"/> \$150.00

Names of Dependents To Be Insured	Relationship to Member	Dates of Birth			Height	Weight
		Mo.	Day	Yr.		

Have you or any dependents for whom you are requesting insurance ever had or received advice or treatment for: kidney disease, cancer, diabetes, respiratory disease, epilepsy, arteriosclerosis, high blood pressure, heart disease or disorder, stroke, venereal disease or tuberculosis? Yes No

Have you or any dependents for whom you are requesting insurance been confined to any hospital, sanitarium, asylum or similar institution in the past 5 years? Yes No

Have you or any dependents for whom you are requesting insurance received medical attention or surgical advice or treatment in the past 5 years or are now under treatment or using medications for any disease or disorder? Yes No

IF YOU ANSWERED "YES" TO ANY OF THE ABOVE QUESTIONS, EXPLAIN FULLY including date, name, degree of recovery and name and address of doctor. (Use additional sheet of paper if necessary.)

I apply to United Benefit Life Insurance Company for insurance under the group plan issued to the First National Bank of Minneapolis as Trustee of the Air Force Association Group Insurance Trust. Information in this application, a copy of which shall be attached to and made a part of my certificate when issued, is given to obtain the plan requested and is true and complete to the best of my knowledge and belief. I agree that no insurance will be effective until a certificate has been issued and the initial premium paid.

I hereby authorize any licensed physician, medical practitioner, hospital, clinic or other medical or medically related facility, insurance company, the Medical Information Bureau or other organization, institution or person, that has any records or knowledge of me or my health, to give to the United Benefit Life Insurance Company any such information. A photographic copy of this authorization shall be as valid as the original. I hereby acknowledge that I have a copy of the Medical Information Bureau's prenotification information.

Date _____, 19 _____ Member's Signature _____

Bob Stevens'

"There I Was..."

FLY, DICK, FLY. SEE DICK FLY. SEE DICK MAKING LANDINGS AT AN AUX. FIELD. SEE DICK LAND GEAR UP!



THIS IS REPORTEDLY A TRUE STORY. CADET DICK WEST—WHO WAS TO LATER BECOME AN AMERICAN FIGHTER ACE—WAS MAKING TOUCH-AND-GO LANDINGS AWAY FROM THE MAIN BASE. RETRACTABLE LANDING GEAR, BEING NEW TO AT'S AT THE TIME, WERE GIVING NEOPHYTE BIRDMEN A WHOLE BUNCH OF TROUBLE...

SEE DICK LOOK AROUND. LOOK, DICK, LOOK. HEAR DICK'S THOUGHT WHEELS TURNING. THINK, DICK, THINK!...AHA!



HEAR DICK MAKING A RADIO CALL. CALL, DICK, CALL. HEAR MAIN BASE PANIC. PANIC, MAIN BASE, PANIC!

TOWER, THIS IS CADET WEST. I'VE LOST MY ENGINE ABOUT 20 MILES SOUTH OF THE MAIN BASE. INSTRUCTIONS, **PLEASE**

DON'T PANIC WEST! ESTABLISH NORMAL GLIDE! TRY TO MAKE **ANY** FIELD! KEEP COOL! CRASH CREW'S READY, ETC., ETC., ETC.



WATCH THE LARGE HAND MOVE 5 MARKS ON THE WATCH, ER, CLOCK

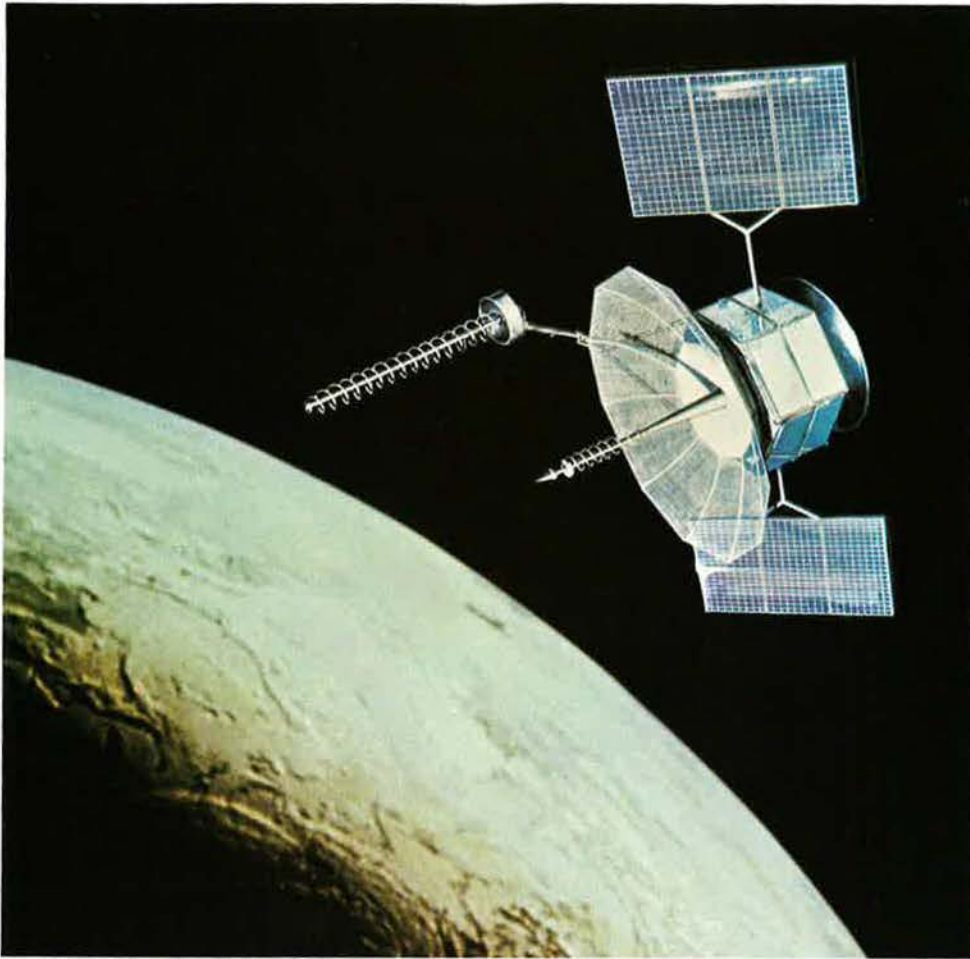


THANKS TO WM K (KENNY) GIRoux, KANKAKEE, ILL.

HEAR DICK SAVE HIS GLUTEUS MAXIMUS. GOOD SHOW, DICK, GOOD SHOW!

TOWER, THIS IS CADET WEST. I COULDN'T MAKE THE MAIN BASE, BUT MANAGED A BELLY LANDING AT AUX #2!





Who brings satellite communications down to earth?

Essential national defense messages come through loud and clear, even when sent to individual Naval and Air Force units operating on one side of the earth from National Command Networks based on the other. The U.S. Fleet Satellite Communications system makes the feat possible.

The satellite's receiving subsystem, designed and built by E-Systems, handles over 30 high priority messages simultaneously. To assure the exceptional reliability required for this vital equipment, E-Systems people overcame critical size, weight, and operating power to provide redundancy in each receiver circuit.



The FltSatCom receiver is just one example of E-Systems' communications expertise. The company is heavily involved in earth-bound satellite communications terminals, as well as the design and construction of earth station antennas. E-Systems also holds leadership positions in command and control systems, aircraft maintenance and modification, guidance and navigation aids, and electronic warfare.

As a result, E-Systems has more than doubled annual sales in just five years as an independent business organization. For a copy of the brochure that fully describes E-Systems capabilities, write: E-Systems, Inc., P. O. Box 6030, Dallas, Texas 75222.

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E-SYSTEMS



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The integral rocket ramjet system is lighter. It extends performance to higher altitudes and speeds. So it's capable of great range and powered maneuverability all the way to the target.

That's the kind of advanced technology you'd expect from a company that's built more than 100,000 missiles in the last 25 years.

And that will make our missile better in the long run.

MCDONNELL DOUGLAS

