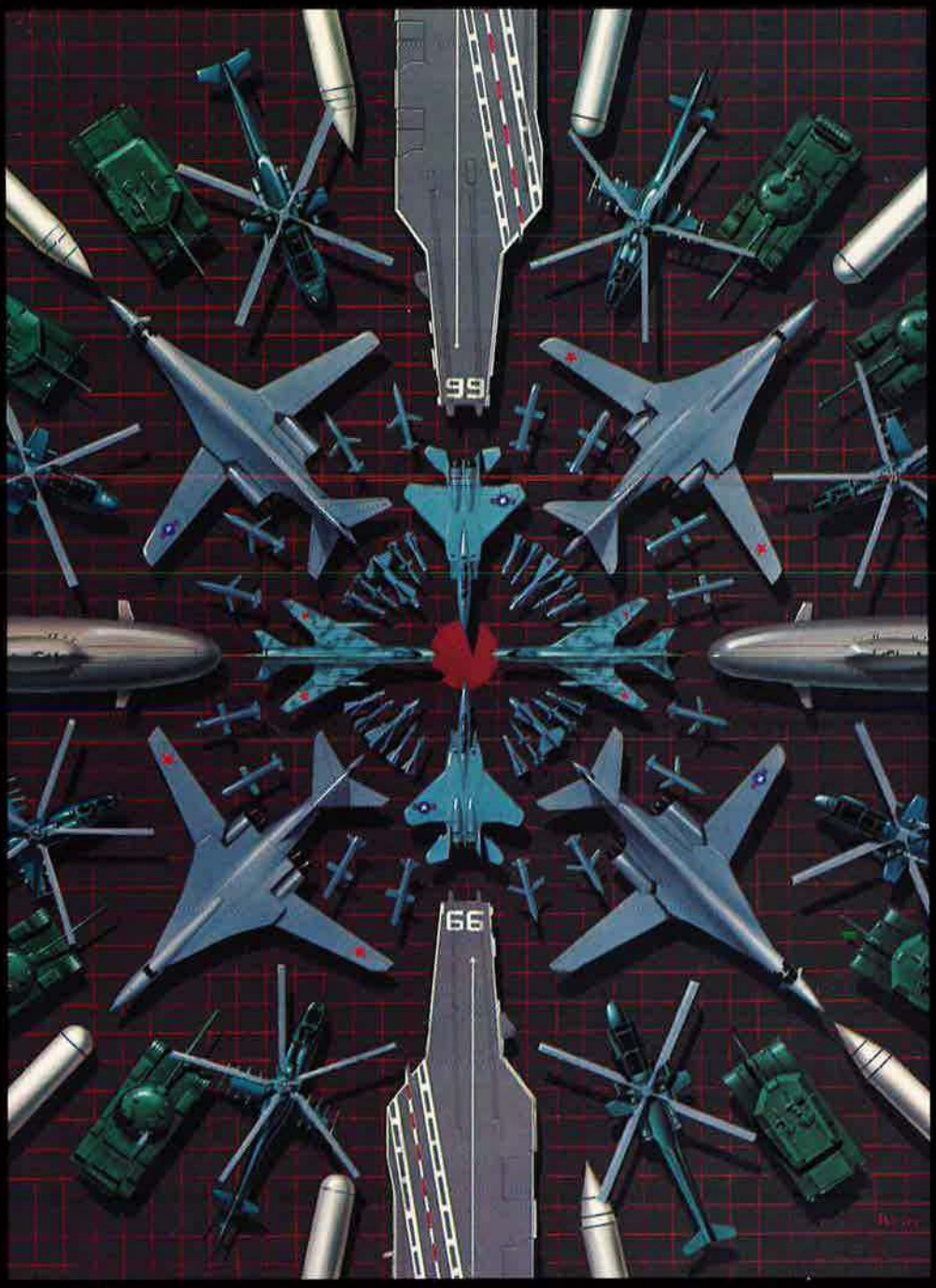
AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

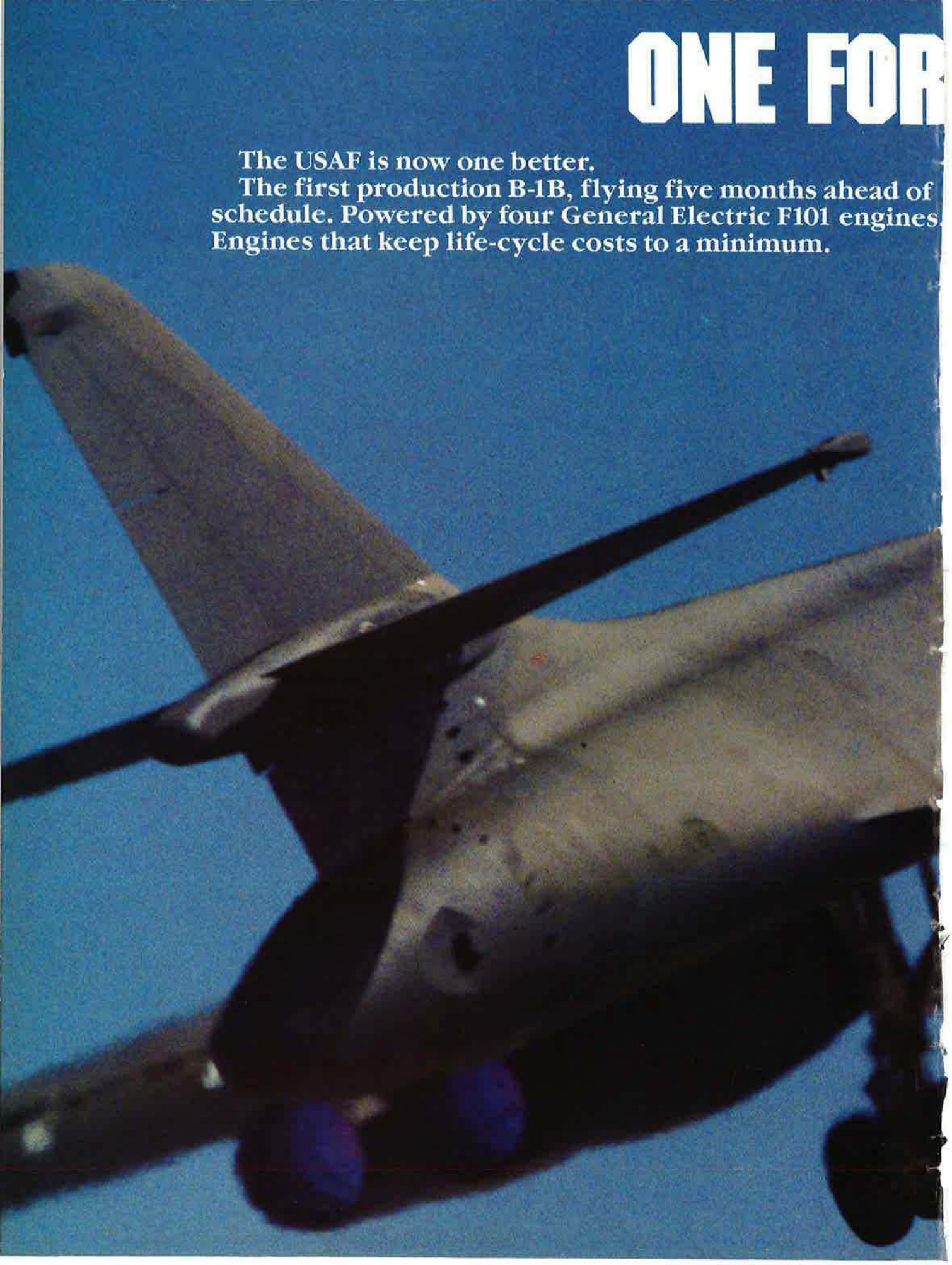


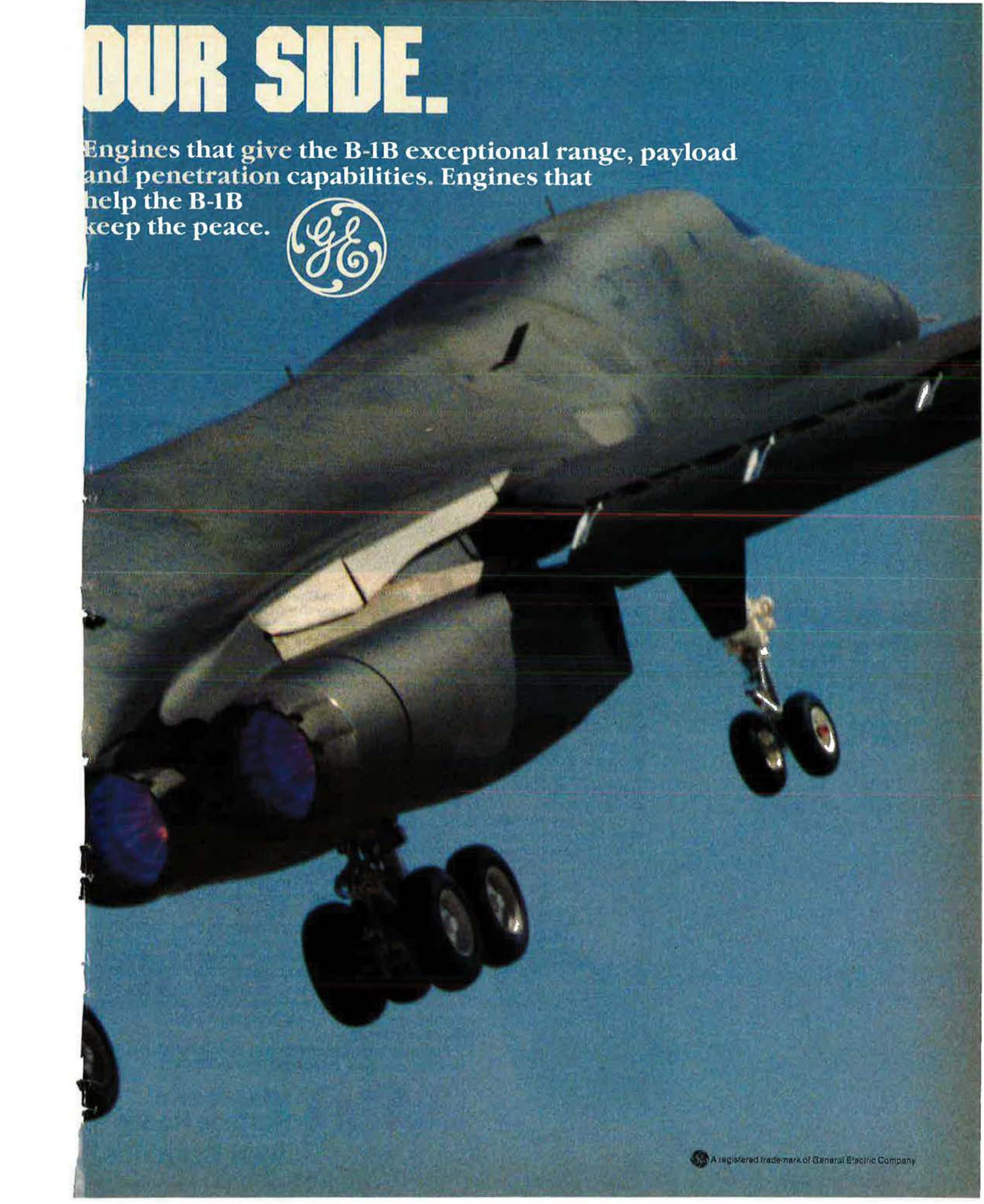
THE MILITARY BALANCE 1984/85

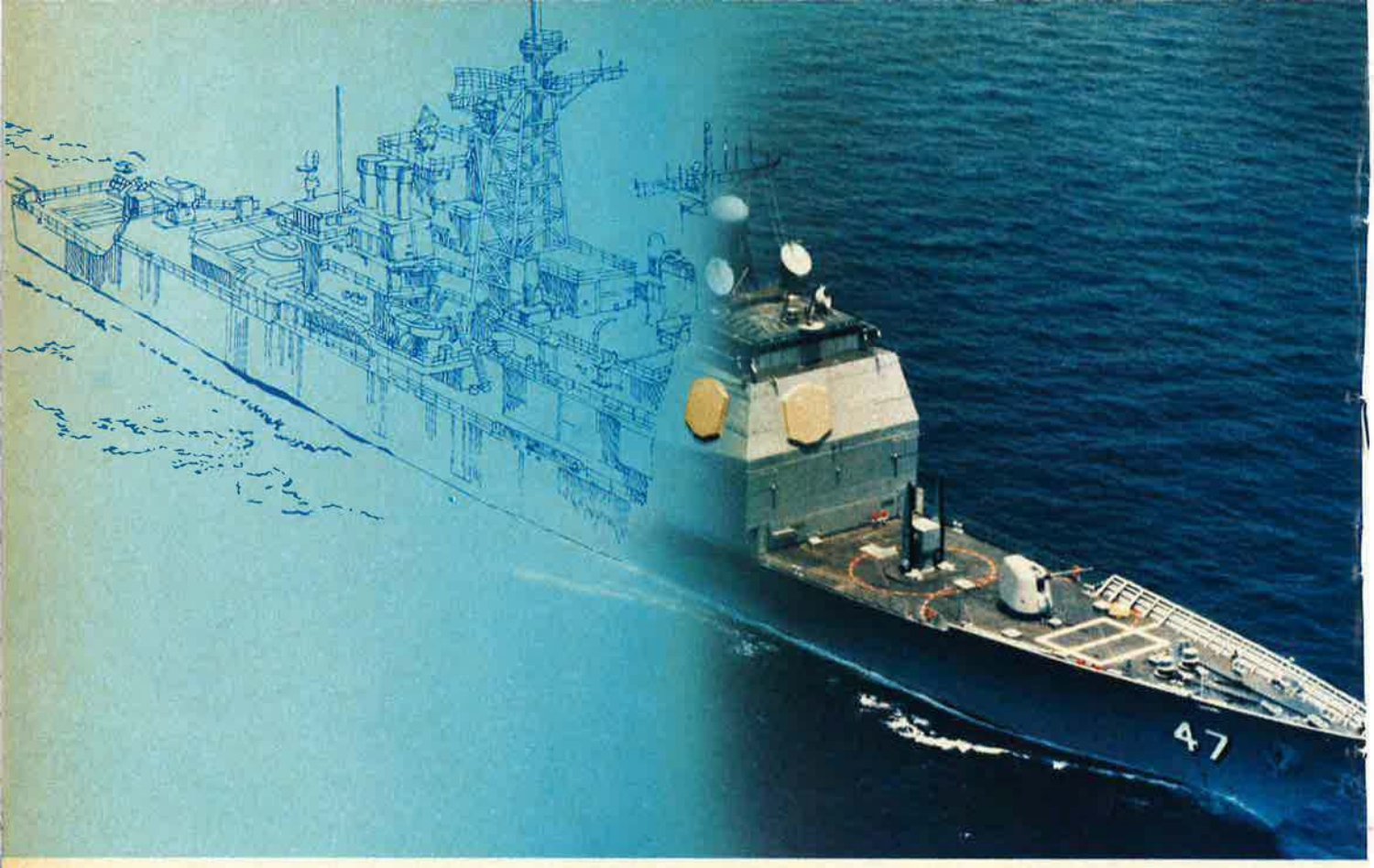
ONE FOR

The USAF is now one better.

The first production B-1B, flying five months ahead of schedule. Powered by four General Electric F101 engines. Engines that keep life-cycle costs to a minimum.




OUR SIDE.
Engines that give the B-1B exceptional range, payload and penetration capabilities. Engines that help the B-1B keep the peace.
A registered trademark of General Electric Company



The AEGIS Team built a tight ship by running a tight ship

RCA as Prime Contractor to the Navy Met the Challenge of Managing a Total Ship Combat System Design Process to Produce the TICONDEROGA Class Cruisers. To meet the battle group needs of the future, the AEGIS program confronted a formidable challenge . . . create a total shipboard combat system capable of countering a potential enemy's most sophisticated threats of the 1990's. As prime contractor to the Navy, RCA met this challenge with new technologies and innovative management techniques. From blueprint through production, the system combat design methodology consisted of a step-by-step incremental design-build-test-integrate approach that has led to the successful at-sea performance of the first AEGIS guided missile cruiser USS TICONDEROGA.

AEGIS was developed as a total ship combat system, rather than the traditional approach to integrate a series of weapon and electronic subsystems into a ship. Each function of the combat system — detection, control, engagement, as well as support equipment — was developed under an integrated design review and testing process.

On January 22, 1983 TICONDEROGA was commissioned on time and on budget. Time from commissioning to first deployment was cut from 2 years to just 9 months . . . a savings of time and millions of dollars.



On July 4, 1984 USS YORKTOWN joined the fleet with an even better on time, on budget performance record. Plans for completion of 11 more AEGIS class cruisers by 1988 are on schedule.

RCA's unique combat system engineering capabilities are being applied to future ship classes. Against intense competition, RCA was selected to develop the combat system for the Arleigh Burke class, DDG 51 destroyers.

A system for the 90's became a reality in the 80's by running a tight ship. To meet your challenge for the next century, we welcome you to learn more about RCA's technology.

For more information contact: Director of Marketing, Moorestown, New Jersey 08057, (609) 778-7431.

RCA Missile and Surface Radar

Total Solutions.

DECEMBER 1984
VOLUME 67, NUMBER 12

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION



Page 96



Page 62



About the cover: This issue features the exclusive US presentation of "The Military Balance 1984/85." Compiled by the London-based International Institute for Strategic Studies, it is an authoritative reference guide to the world's military forces. The cover is an airbrush rendering by artist John Porter.

Special Section: The Military Balance 1984/85

Foreword 83
The United States and the Soviet Union 85
The Warsaw Pact 96
The North Atlantic Treaty 103
Other European Countries 117
The Middle East and North Africa 120
Sub-Saharan Africa 127
China 137
Other Asian Countries and Australasia 139
Latin America 147
Economic Trends and Defence Expenditure 154
The East-West Conventional Balance in Europe 156
Deployment of Strategic Systems in the US and USSR 160
Tables of Comparative Strengths 162

Features

The Little Big Deal / Editorial by John T. Correll 4
The horror story groupies are marketing melodrama.

Teeth for the Dual Track / By John T. Correll 42
The ground-launched cruise missile adapts quickly to life in Europe.

How the Burden Is Borne / By Peter Petersen 50
A member of the Bundestag puts European defense efforts in context.

Moscow's Technology Parasites / By Edgar Ulsamer 52
Leaking Western technology is buoying Soviet defense efforts.

Navigation: From Dead Reckoning to Navstar GPS 62
By Lt. Col. Ralph R. Williams, USAF
The history of aerial navigation recapitulates the history of aviation.

A Glossary of Navaids 70

From Valley Forge to Gabriel / By Capt. Napoleon B. Byars, USAF 74
The passing of the baton marks another milestone in the USAF Band's long march.

Viewpoint: Vas You Dere, Salisbury? / By Gen. T. R. Milton, USAF (Ret.) 79
Heedless of the facts, Harrison Salisbury finds strategic bombing a failure.

Jane's All the World's Aircraft Supplement / Compiled by John W. R. Taylor 169

Gains for the Troops / By Benjamin S. Catlin 178
Uncle Sam looked with an avuncular eye in providing for the needs of servicemen.

Valor: Valley of the Shadow / By John L. Frisbee 183
Two determined airmen gave their lives in an attempt to aid the Lost Battalion.

Departments

Airmail	9	**Index to Advertisers**	40	**Intercom**	188
In Focus . . .	20	**Airman's Bookshelf**	180	**AFA State Contacts**	196
Capitol Hill	28	**The Bulletin Board**	184	**Unit Reunions**	197
Aerospace World	30	**Senior Staff Changes**	187	**There I Was . . .**	200

AIR FORCE Magazine (ISSN 0730-6784) December 1984 issue (Vol. 67, No. 12) is published monthly by the Air Force Association, 1501 Lee Highway, Arlington, Va. 22209-1198. **Phone** (703) 247-5800. Second-class postage paid at Arlington, Va., and additional mailing offices. **Membership Rate:** $15 per year; $42 for three-year membership. **Life Membership:** $250. **Subscription rate:** $15 per year; $25 per year additional for postage to foreign addresses (except Canada and Mexico, which are $8 per year additional). Regular issues $1 each. Special issues (Soviet Aerospace Almanac, USAF Almanac Issue, Anniversary issue, and "Military Balance" issue) $3 each. **Change of address** requires four weeks' notice. Please include mailing label. **POSTMASTER:** Send change of address to Air Force Association, 1501 Lee Highway, Arlington, Va. 22209-1198. Publisher assumes no responsibility for unsolicited material. Trademark registered by Air Force Association. Copyright 1984 by Air Force Association. All rights reserved. Pan-American Copyright Convention.

AN EDITORIAL

The Little Big Deal

By John T. Correll, EDITOR IN CHIEF

THE FLAP about overpriced spare parts and accessories for military systems is well into its second year, the controversy replenished periodically by fresh revelations. Among the more recent of the "horror stories," as they have come to be called, is the one about the $7,622 hot-beverage unit bought by the Air Force for the C-5A aircraft.

A great deal has been said already, much of it in this magazine, to place this matter in perspective. The Pentagon points out that nearly all of the horror stories have been discovered by the services themselves as part of their aggressive programs to find and correct overpricing. The Air Force, for example, was alerted to the pending procurement of the now-famous $916 navigator stool cap by its own Zero Overprice program, and the purchase was stopped.

Examined closely, many of the horror stories are not what they seemed to be at first gasp. Consider the "$170 flashlight" that the New York *Times* compared scornfully with a $25 model from Montgomery Ward. In fact, this is an emergency exit light for aircraft, designed to withstand high impact and to switch on automatically if primary power is lost. In the event of a crash, crews remove it from its mountings and use it to get themselves and passengers out of the wreckage. As for the $7,622 hot-beverage unit, the Air Force agrees that it is a clear case of overpricing, but even this horror story is slightly less horrible than the first reports depicted it. It is not a kitchen-quality coffee pot. It must have features that make it suitable and safe for use in flight. The airlines pay $3,046 for comparable in-flight beverage units; from now on, so will the Air Force.

The causes of overpricing have been explained again and again. The principal one is too few people, having too little data, taking shortcuts to get the job done. They place orders for small quantities with firms not equipped to produce the items economically. Formula pricing techniques have been used to cost out parts statistically, estimating some high and others low and seeking to set a fair price on a big lot of spares without working each item independently.

One point, however, has not been addressed sufficiently: Just how big a deal is all this, anyway?

USAF's Management Analysis Group estimates that the Air Force is *vulnerable* to overpricing on about six percent of the spare parts it buys. That amounts to a danger zone of $300 million a year, some subset of which is actual overpricing. Since 1979, USAF's Zero Overprice program has investigated 27,000 cases and found overpricing in eight percent of them. A Defense Department audit of 2,300 parts selected at random found that thirty-six percent of them were overpriced but that the overpriced parts represented only six percent of the dollar value of the sample. Overpricing is concentrated among low-value parts.

The services are correct in treating the problem as a reasonably big deal. While dollars lost to overpricing are barely a blip in the context of the overall defense budget, the sums are still significant. Furthermore, public confidence in the armed forces has been damaged by the horror stories. The fact that USAF's Zero Overprice program has been triggered 27,000 times indicates that a great many people are alert and concerned. At least a few members of the choir seem to have slept through the sermons, though. Earlier this year, an airman got the idiot treatment from the bureaucracy when he attempted to report a case of overpricing. The Air Force looked very bad when the story surfaced.

On the other hand, the horror story groupies might ask how well they serve the nation when they force a reaction that's so out of proportion to the problem. Perceptions become more important than realities. Thousands of people and nobody knows how many man-hours are diverted to the spare-parts problem. Attention is distracted from defense affairs of greater consequence. If and when this distraction leads to trouble, don't look for the horror story groupies to step forward for any of the blame. One wonders about the sincerity of their interest in efficient defense procurement and if their real objective is to sabotage defense spending, regardless of efficiency.

Eliminating horror stories altogether may be impossible. The Air Force alone manages 834,000 different kinds of spare parts. How much effort and what sort of data system would be required to micromanage them all? When does the cost of the solution exceed the cost of the problem? What camels do we swallow, unnoticed, while we are busy straining at gnats?

Stretchout from six years to nine on procurement of the original increment of F-15 aircraft added $2 billion to the cost of that acquisition. That's a real horror story, but it never caught on.

The standard explanation is that while the citizen is confused by big system procurements, he understands an overpriced claw hammer instantly. An alternate explanation may be that the citizen has had a steady diet of horror-story melodrama from those upon whom he relies for information. More responsibly informed, the public might recognize a little big deal when it sees one. ■

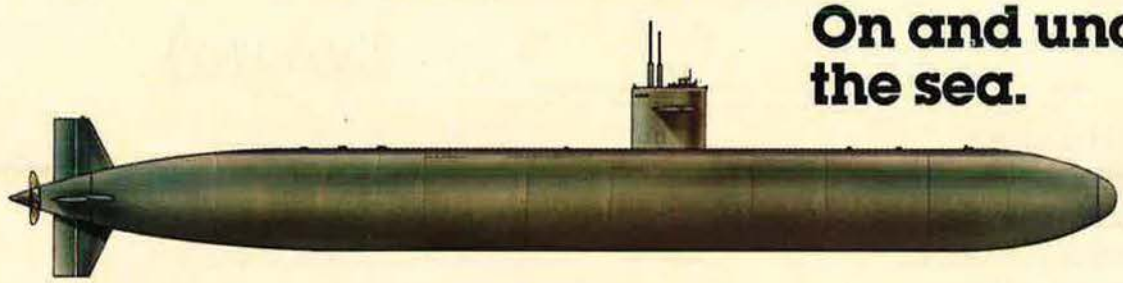
COLLINS GPS:



In the air.



On land.



On and under the sea.



And 1st off the production line.

The Collins Global Positioning System Navigation Receivers are being tested on everything from an Army manpack to a tank and a helicopter, from an aircraft carrier to a submarine, and from an A-6 to a B-52 and the front-line F-16 fighter.

That's the kind of performance you'd expect from Collins Government Avionics Division. But what makes our precise, 3-dimensional position/velocity/time system even more special is that our developmental GPS units were produced under actual production line conditions to prove manufacturing feasibility.

In addition, designed-in commonality assures maximum cost-effectiveness through lower unit cost and vastly reduced maintenance and spares requirements.

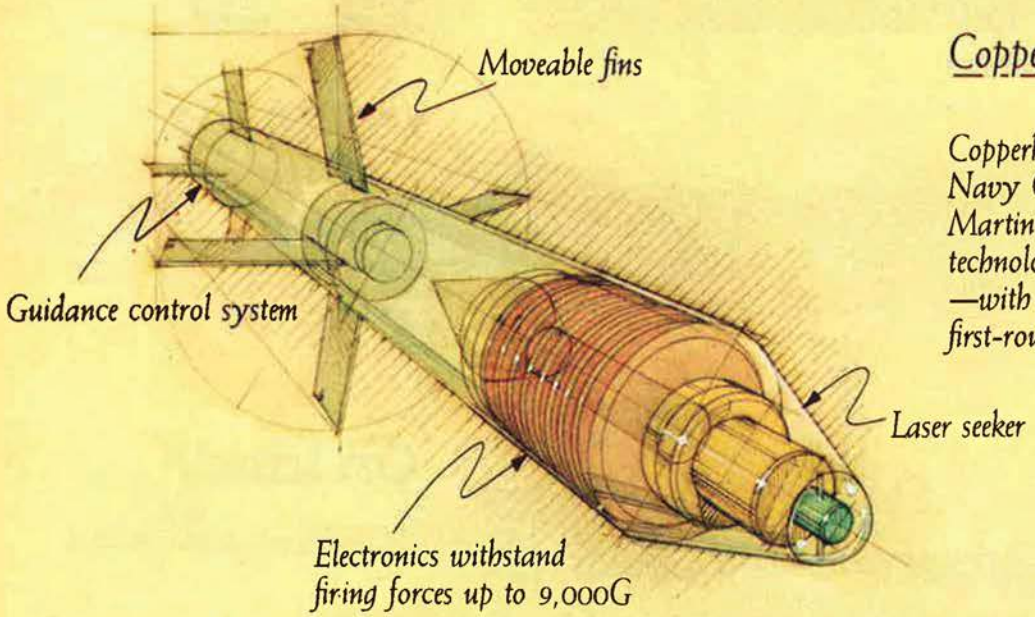
Collins GPS. It's the production-ready solution. For a current status report on the Collins GPS, contact Collins Government Avionics Division, Rockwell International, Cedar Rapids, Iowa 52498. (319) 395-2208.

COLLINS AVIONICS

Rockwell International

...where science gets down to business

Systems that search, sense, seek...and succeed.

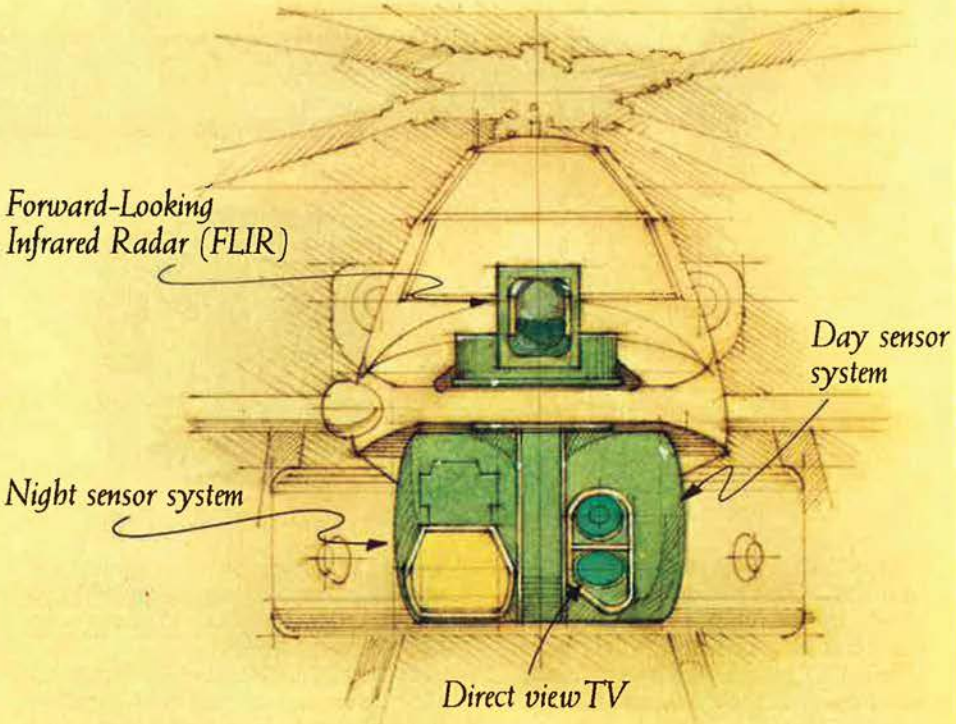


Copperhead

Copperhead, Hellfire, the Navy Guided Projectile—Martin Marietta laser technology guides them all —with adverse-weather, first-round accuracy.

TADS/PNVS

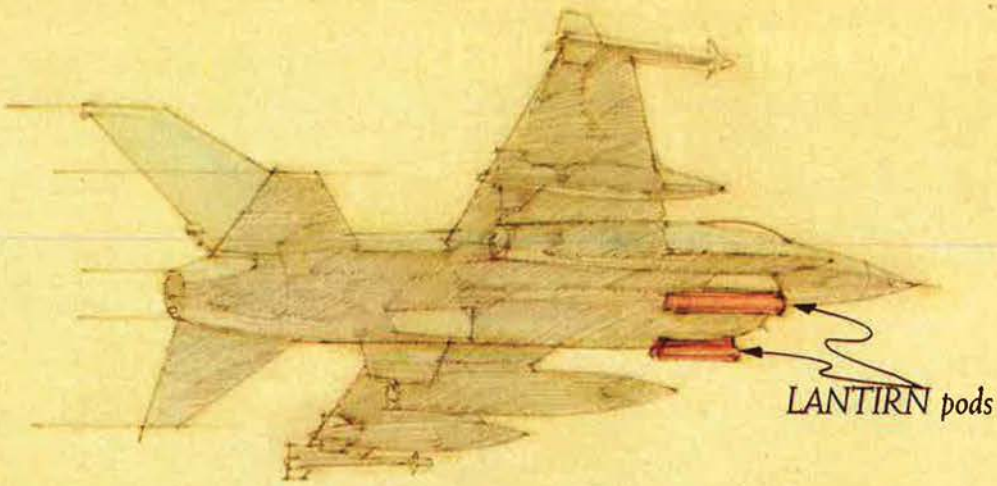
Martin Marietta has pioneered the application of laser, infrared and other electro-optical technologies for navigation and fire control systems like TADS/PNVS. It guides pilots of advanced attack helicopters to targets, day or night, and in adverse weather.

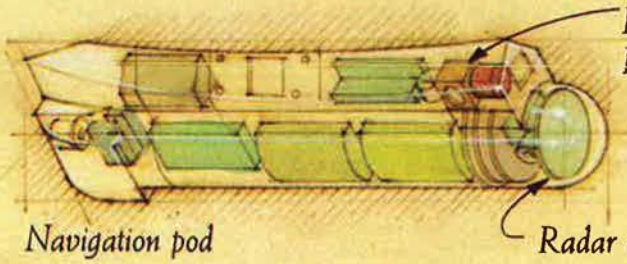


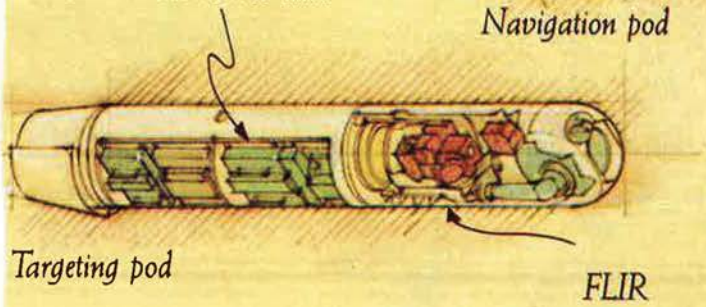
OUR COMMITMENT IS TOTAL. OUR CAPABILITIES

LANTIRN

LANTIRN is a system which incorporates Martin Marietta's advanced sensor technology to increase the mission effectiveness and strike capability of attack aircraft. It allows pilots to operate at night and under the weather to find and destroy ground targets.







Sensors and seekers aimed at tomorrow

Today, Martin Marietta is developing new generations of all-weather guidance and control systems employing state-of-the-future advances in electro-optics, millimeter-wave and infrared technologies. Whatever the mission, whatever the threat, Martin Marietta systems know how to search, sense, seek...and succeed.

MARTIN MARIETTA

6801 Rockledge Drive
Bethesda, Maryland 20817

ARE PROVEN. OUR MISSION IS SUCCESS.

How to make a C-5B tell you where it hurts.



Transient faults from interfacing avionics or weapons systems are not always evident on the ground. That's why you should specify the Garrett Standard Central Air Data Computer



(SCADC) in your retrofit program. Or in new designs.

SCADC is already in production for the Grumman C-2A and the Lockheed C-5B. Where it will permanently record its own intermittent faults, or input faults from interface systems. Before they become catastrophic.

Even in the event of a complete power shutdown, the SCADC memory remains completely intact. So input data will be there for output. And analysis.

What's more, the Garrett SCADC is designed for growth, easily adding new systems inputs.

SCADC can be retrofitted to over 25 types of fighter, attack and transport aircraft. Extending their life. Or adding capability to new aircraft designs.

So when the time comes to specify a SCADC, remember the only one that can't forget.

For information, contact: SCADC Sales Manager, AiResearch Manufacturing Company, 2525 West 190th Street, Torrance, CA 90509. (213) 512-1025.

GARRETT

AIRMAIL

The IFF Problem

Regarding your article "Resurgence and Reservations" in the October 1984 issue *(p. 80)*:

I share General Minter's frustration about the lack of an effective, interoperable NATO IFF system. However, having worked in the field of military identification for the past fifteen years, I feel compelled to expand upon the General's comment that, "in this day and age, we ought to be able to come up with a technical solution."

Certainly, the technical problems are challenging. However, the most prominent roadblock to realizing an effective system has been a historical lack of IFF priority at the proper echelons. As a result, a common IFF system was never envisioned by military planners, nor has its use been systematically incorporated into our tactics. Hence, operational requirements, which would permit the IFF system to be meaningfully employed, remain undefined. . . .

To assess the value of an identification system, we must define its purpose. I suggest the purpose should be to minimize our overall battlefield losses, which include losses to fratricide and enemy action. In a war with the Soviets, we will not enjoy air supremacy. Therefore, we will suffer fratricide in mixed airspace, unless we use our weapons only for revenge. This would cause our overall battlefield losses to soar, with catastrophic results. Therefore, our hellish task is to implement an identification system and to devise tactics that allow us to use our weapons with near-maximum effectiveness while limiting fratricide.

There is little doubt that our present Q&A system (Mk XII) needs improving. In this regard, we have begun development of the Mk XV system, which is intended to provide NATO a common IFF system. Its main technical thrusts are to improve performance in the face of jamming, to increase cryptographic security, to reduce susceptibility to enemy exploitation, and to separate out friendly aircraft better. However, under normal conditions, the friend identification probability of the Mk XV and Mk XII systems is approximately equal. Thus, when Mk XV becomes operational within NATO—in perhaps ten years—it will not be a panacea. We will still face, and must resolve, the hard issues confronting us today.

The question we must answer today is how best to utilize the Mk XII system. This system has been allowed to wither through lack of coordinated planning and disuse, even though the electronic equipment is installed in more than 30,000 airborne, ground-based, and sea-going weapon systems.

No Q&A system will work effectively unless we use it daily, burdensome as that might be. In all the services, we must train our technicians to program and preflight the airborne systems daily. We must also train the pilots on when and how to use the system, regardless of their misconceptions and mindsets. We must insist that our ground systems be properly equipped and operable. Finally, we must routinely use the Mk XII system in field exercises to evaluate its performance and to shape its tactical use. We have the wherewithal to do these things. We must resolve to do them.

Recently, under the leadership of such officers as General Minter and Admiral Tuttle, Mk XII readiness and weapon-system reaction times have been dramatically improved in USAFE and aircraft carrier operations. If equal triservice emphasis is placed on Mk XII readiness, identification probabilities exceeding ninety percent appear possible. In conjunction with proper tactics and training, this would allow us to achieve our goal of minimizing battlefield losses.

Robert A. Gerlock
Vice President for Programs
and Advanced Planning
Teledyne Electronics
Newbury Park, Calif.

Submissions to "Airmail" should be sent to the attention of the "Airmail" Editor, Air Force Magazine, 1501 Lee Highway, Arlington, Va. 22209-1198. Letters should not exceed 500 words and should preferably be typewritten. We reserve the right to condense letters as may be needed. Unsigned letters are not acceptable. Because of the volume of letters received, it is not possible to print all submissions, and none can be returned. Photographs cannot be used or returned. Please allow lead time of *at least* two months for time-sensitive announcements.

A Great Injustice?

As a former avionics technician and expediter of the 86th Tactical Fighter Wing at Ramstein AB, Germany, I feel that your October 1984 article "Resurgence and Reservations" was a great injustice to those of us who maintained USAFE's aircraft and missiles during the early 1980s. Such comments as "how good its maintenance personnel were . . . terrible" and "an appalling number of maintenance men simply did not know how to fix aircraft" lead one to conclude that our aircrews were dependent on a group of incompetent enlisted folks doing the headless-chicken routine out on the flight line.

Nothing could be farther from the truth. While not the most efficient organization ever to maintain aircraft, we gave 100 percent and were paid the highest compliment possible: The Warsaw Pact declined to test our abilities and capabilities.

When talking about our performance during those years, several factors must be considered, as they played a major role in our effectiveness. At the top of the list was that wonderful maintenance concept—at least on paper—called POMO. It's sort of hard to specialize when one spends more time washing aircraft and assisting crew chiefs than learning one's assigned specialty. If all of our personnel, management and workers, had come to us qualified on the F-4, POMO would have worked extremely well—which was demonstrated on TDYs, when only qualified personnel went. Since they didn't, and since our manning levels assumed they did, some things had to

AIR FORCE MAGAZINE
PUBLISHED BY THE AIR FORCE ASSOCIATION

Publisher
Russell E. Dougherty

Deputy Publisher
Andrew B. Anderson

Associate Publishers
Charles E. Cruze, Richard M. Skinner

Editor in Chief
John T. Correll

Senior Editor (Policy & Technology)
Edgar Ulsamer

Senior Editors
James W. Canan, James P. Coyne

Staff Editor
Edward J. McBride, Jr.

Military Relations Editor
James A. McDonnell, Jr.

Contributing Editors
Kathleen McAuliffe, Gen. T. R. Milton, USAF (Ret.), John W. R. Taylor ("Jane's Supplement"), Robin L. Whittle, Capt. Napoleon B. Byars, USAF

Managing Editor
Richard M. Skinner

Assistant Managing Editor
Hugh Winkler

Director of Production
Robert T. Shaughness

Art Director
Guy Aceto

Research Librarian
Pearlie M. Draughn

Editorial Assistants
Grace Lizzio, Philip E. Musi

Secretary to the Editor in Chief
Gail L. Knighten

Advertising Director
Charles E. Cruze
1501 Lee Highway
Arlington, Va. 22209-1198
Tel: 703/247-5800

Director of Marketing Services
Patricia Teevan—703/247-5800

AREA ADVERTISING MANAGERS
East Coast and Canada
By Nicholas—203/357-7781

Midwest, Northern California, Oregon, and Washington
William Farrell—312/446-4304

Southern California and Arizona
Gary Gelt—213/641-7970

UK, Benelux, France, and Scandinavia
Richard A. Ewin
Overseas Publicity Ltd.
91-101 Oxford Street
London W1R 1RA, England
Tel: 1-439-9263

Italy and Switzerland
Dr. Vittorio F. Negrone, Ediconsult Internationale S.A.S. Piazzo Fontane Marose 3
16123 Genova, Italy
Tel: (010) 543659

Germany and Austria
Fritz Thimm
645 Hanau am Main, Friedrichstrasse 15
W. Germany
Tel: (06181) 32118

BPA Circulation audited by Business Publication Audit

AIRMAIL

suffer. Specialist training was one. . . . We also received a large number of three-levels, who didn't even have the benefit of past aircraft experience or realistic tech school training.

Another factor was the aircraft we had. The F-4 is an aircraft that requires a specialist. It can't tell you where its faults are. Once you've determined what the problem is, getting to it is another battle. The F-15 and F-16 were just coming on line, so there were the initial teething and growing pains incurred by both maintenance and operations.

Doing the job we did, dealing with handicaps like these, should result in "attaboys," not criticism, like in your article. An apology is due those of us who worked in fair and foul weather twelve to fifteen hours a day and upwards of twenty-seven days a month.

Without our efforts, the fighter jock would have been just another officer.

TSgt. Ray Albright, USAF
Midwest City, Okla.

• *Sergeant Albright is quick to shoot the messenger. The "comments" that he quotes (without regard to their proper context) were clearly attributed to USAFE command officials who—on the basis of field tests—drew the negative assessments he finds so unjust. Further along, the article relates that those same officials faulted personnel attrition and insufficient funding for the maintenance problems. In no way did they or author James Canan disparage the critical, valiant efforts of maintenance personnel or blame the maintenance shortcomings in USAFE on the people on the flight line and in the shops. It is sophistry to argue otherwise and misstates what the article actually said.*—THE EDITORS

Breaking Out Spares

I have just read your article "Horrors and Heroes" *(October '84 issue, p. 56).* I commend AFLC for their interest in increasing competition in spare parts procurement. Theoretically, small business should now be able to participate in the spare parts breakout program. The "real world" indicates a different story, however.

Most if not all spare parts procurement intentions are first listed in the *Commerce Business Daily.* The part is listed normally first by name, then the national stock number, quantity required, bid request number, point of contact, and, finally, any CBD notes.

There are 100 individual CBD notes, however, and CBD note 73 seems to be the main monkey wrench in the works through its frequent appearance. It states that no specification plans or drawings are available for this procurement. That leaves everyone except the "original producer" unable to bid on the procurement. It is quite fair to state that the original producer is not about to give up proprietary information to his competitors. That will assure sole-source procurement by keeping others in the dark, regardless of capabilities and price competitiveness.

Another note seen frequently is note 33. In short, it states that a business that is capable of producing the part must submit for evaluation purposes complete and current engineering data to the government so that the government can determine the acceptability of the part as supplied by that firm.

The only problem I have with this condition is that it takes several weeks before the ALC Source Development Office completes its analysis of the firm's abilities to satisfy this procurement. By that time, the bid is closed. You can only hope for better luck on the next bid opportunity, provided that drawings are available.

All in all, though, the competition advocacy organization is a benefit to the military, small business, and the taxpayers. It is a pleasant departure from the old-line thinking of "we have to do what the prime contractor tells us" or "don't rock the boat."

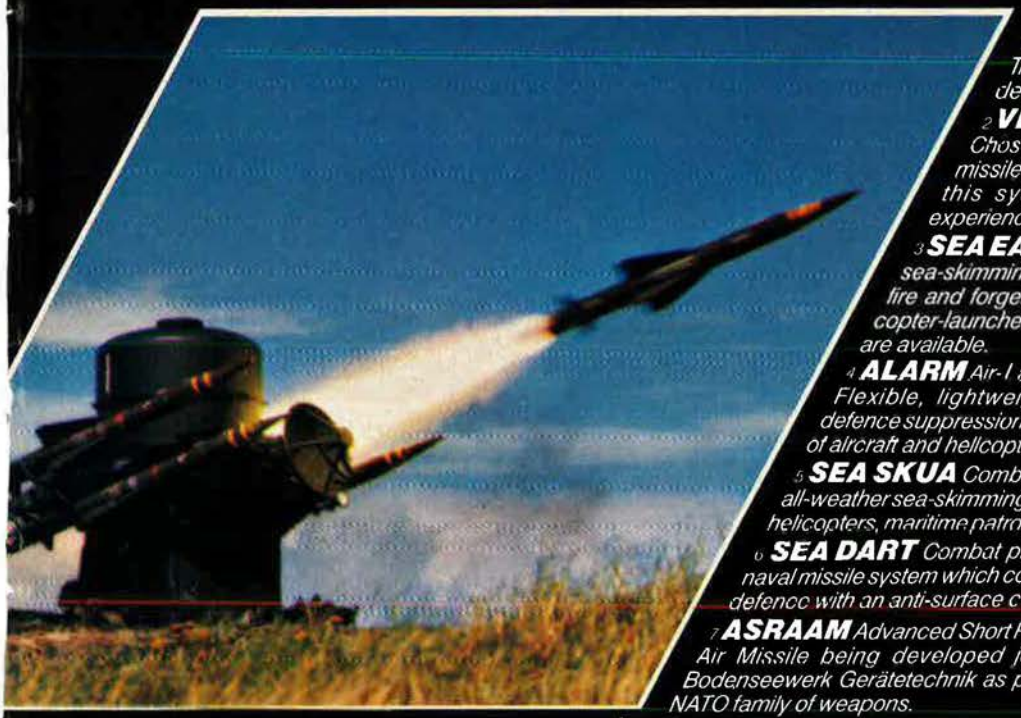
A complementary organization that is also a benefit to everyone concerned is PRAM (Productivity, Reliability, and Maintainability). Their basic function, as I understand it, is to save money on the upgrade or retrofit of existing weapon systems by promoting decreased maintenance costs. The PRAM office seems to be separately funded and is staffed with aggressive, conscientious people. Perhaps an examination of their function would be a good subject for a future article.

Keith McKinney
Santa Fe Springs, Calif.

Treasonous Contractors?

I agree that the spare parts procurement debacle is a national disgrace *(see also "The Little Big Deal" on p. 4 of this issue).* Everyone seems to point the finger at the contracting and procurement people. I don't believe they are that stupid or inept or are know-

World leader in missile defence systems



1 **RAPIER** Combat-proven low-level air defence missile sold to 12 countries. Tracked and Laserfire versions have been developed.

2 **VERTICAL LAUNCH SEAWOLF** Chosen by the Royal Navy to provide anti-missile defence for the new Type 23 Frigate, this system builds on battle-proven experience.

3 **SEA EAGLE** New generation long range sea-skimming anti-ship missile. All-weather, fire and forget capability. Air-launched, helicopter-launched and ship-launched versions are available.

4 **ALARM** Air-Launched Anti-Radar Missile. Flexible, lightweight and cost-effective defence suppression system for a wide range of aircraft and helicopters.

5 **SEA SKUA** Combat-proven lightweight all-weather sea-skimming anti-ship missile for helicopters, maritime patrol aircraft and ships.

6 **SEA DART** Combat provon long-range naval missile system which combines area air defence with an anti-surface capability

7 **ASRAAM** Advanced Short Range Air-to-Air Missile being developed jointly with Bodenseewerk Gerätetechnik as part of the NATO family of weapons.



1

2



3



4



5



6

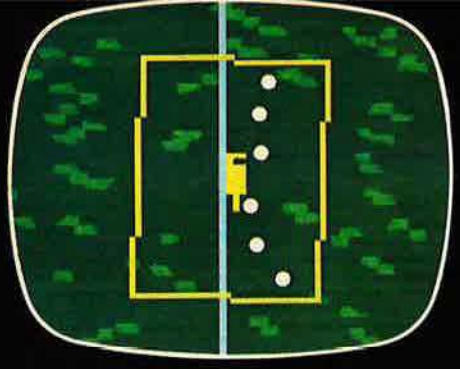


7

BRITISH AEROSPACE

unequalled in hypertechnology

Six Hills Way, Stevenage, Hertfordshire, Great Britain SG1 2DA. Telephone (0438) 312422



JOINT STARS

ON SEPTEMBER 2, 1982, WE GAVE YOU THE BEST REASON TO GIVE THE GRUMMAN TEAM THE GO-AHEAD.

In combat, time is of the essence. Winning or losing can hinge on the real-time detection and attack of advancing armor.

Battle action like this demands Joint STARS—the Air Force/Army Surveillance and Target Attack Radar System. It's a technology developed and successfully tested by the Grumman team.

That September, Grumman's Pave Mover radar successfully tracked moving tanks and guided a missile to the targets, using a technology required by Joint STARS.

We're ready to do it again. The Grumman team brings to the Joint STARS project outstanding credentials. Norden is one of the nation's foremost radar systems designers. And Grumman is a leading integrator of avionic systems.

But the biggest advantage: demonstrated technology and "off-the-shelf" software that will save the Air Force and Army a lot of time. And money.

Grumman-Norden. The proven team with the already-tested system.



GRUMMAN-NORDEN

GRUMMAN

ingly squandering our dollars. They should not take all the blame.

A major portion of the responsibility for this "rip-off" of the government must be laid on the doorstep of the contractor. Remember, he negotiates and signs the contract, too. Are they all so money-hungry that they put profit, no matter how it is gained, before their patriotism? Have they distorted their moral values to the point that dollars mean more than freedom?

Conduct of this type is synonymous with "aiding and abetting" the enemy. In wartime, that is *treason*. Anyone who doesn't think we are in a war for survival has to be naïve and unthinking.

Premeditated overcharging and cheating on a contract is a criminal offense. Where are the government watchdogs?

Come on, Congress, get tough with the ones who bleed away our survival with their greed. I'd like to see some of them paying for their years of unconscionable rape of our deterrent forces by being denied the freedom we all cherish.

Lt. Col. John H. Meierdierck, USAF (Ret.)
Las Vegas, Nev.

Readiness or Not

As are all of his observations, Gen. T. R. Milton's views of the current critical madness over readiness are very appropriate *(see "Readiness and the Critics," October '84 issue, p. 101).* Though not so stated, his views are very much Total Force in nature. All three components of the Air Force have gone through the same traumatic convulsions since the days the General recalls when tactical fighters were a "bush-league Strategic Air Command." I remember, too.

In 1961–62, we in the Guard were standing alert in France and Germany with all of *two* 750-pound GP bombs on each of our F-84Fs. Even with that pitiful load, we were so "grossed out" that our alert birds had to be equipped with RATO bottles just to ensure a safe takeoff. The active-force F-100Ds nearby, with their huge 450-gallon "tubs," couldn't even outdo us in silly mock combat. Against a MiG? Forget it!

Those were also the days of the generalist fighter pilot. We maintained "combat-ready" status in tactical nuclear weapons delivery, air-to-ground conventional munitions delivery, *and* air-to-air combat. I don't think we performed any of those tasks well. But we were mighty expert under severe clear conditions. I guess "readiness" is a relative thing.

AIRMAIL

If some of those defense "experts" would get out to Nellis AFB, Nev., and really watch today's "weapon system managers" and the machines they manipulate, perhaps the noise being made about our perceived lack of readiness would fade into the background.

Finally, at what point in each five-year defense plan should we insert the monstrous wedge of dollars for sustainability to fight the next war? And where would we store it?

Col. C. L. Weidinger, USAF
Alexandria, Va.

Required Reading

Your editorial, "It Ain't Broke—But It Needs Some Fixing," ought to be required reading for every officer and legislator serving in government *(October '84 issue, p. 8).* If the Senate is looking for a logical argument to follow, your article should make the difference.

Given an appropriate balance of authority and responsibility, the Chairman of the JCS should be able to do his job effectively without a fifth star. Without clear authority, another star would only make the Chairman's job even more difficult and frustrating than it is today.

While Congress debates the authority of the JCS, perhaps the service Chiefs should take a hard look at "anomalies" within their own organizations, which tend to retain authority and delegate responsibility. I suspect that many subordinate commanders and managers suffer the same frustration that vexes the Chairman—accountability without genuine authority.

In the meantime, we can hope and pray that individual skill and dedication will continue to prevail in spite of some built-in headwinds.

Brig. Gen. Kenneth H. Bell, USAF (Ret.)
Fairborn, Ohio

Manning the New Aircraft

There can be no doubt that, as an airlifter, I was pleased to see airlift make the lead article in your October issue *(see "Airlift for Near and Far," p. 44).* However, the article has the same serious flaw as the approach our defense decision-makers are taking toward airlift.

Unglamorous in comparison to the development of new aircraft and capabilities is the subject of manpower. The article made absolutely no mention of who will man these new additional aircraft or from what source they will come. A similar approach seems to guide our defense decision-makers.

Military Airlift Command is already having problems putting an adequate crew force in its present fleet. From where will a cadre of experienced airlifters come without jeopardizing the capabilities of the existing airlift forces? Unfortunately, a solution to that problem needed to be found yesterday.

Additionally, your front cover picture of a C-17 delivering a single battle tank to what is most probably a forward area close to hostilities is fantasy, far beyond reality. No combat commander would risk an aircraft with the proposed capabilities of the C-17 to deliver a single battle tank. The tradeoff is obvious.

Capt. Chris J. Krisinger, USAF
Pope AFB, N. C.

Call for Credit

In the October 1984 issue "Intercom" story on the TV movie *Call to Glory,* credit for the premiere show footage is somewhat misplaced. It was implied that all scenes were filmed in Hollywood or at Edwards AFB, Calif., for the premiere show. In fact, most outdoors base housing scenes, hangar scenes, and all T-38 flying scenes were filmed at Laughlin AFB, Tex.

We here at Laughlin AFB are proud to boast of our participation in the series premiere. The entire base was involved in the filming, both flying and on location, including pilots and extras for many of the scenes.

The community of Del Rio, too, was involved, as scenes were filmed on location at local schools and restaurants. Local merchants also provided services to the Hollywood team. A consolidated effort was shown by the Laughlin AFB and Del Rio communities.

Please give credit where credit is due.

1st Lt. Dik A. Daso, USAF
Laughlin AFB, Tex.

After reading the "Intercom" column in the October '84 issue, I was disappointed to note that the author failed to grant any of the credit for the two-hour premiere to the people of Laughlin AFB, Tex. She stated that the base and flying sequences were done at Edwards AFB, Calif. That may be the case for the TV episodes, but the T-38 sequences and several of the

scenery shots in the premiere were filmed here at Laughlin AFB and Del Rio.

Several of our pilots, support personnel, families, and neighbors in Del Rio contributed time, manpower, and hospitality to the film crews. It was a great thrill for all of us to be a part of the *Call to Glory* experience, and I know that very few TV sets here weren't tuned in for that movie premiere.

Please don't forget to give credit to such an integral part of the movie's success.

Lt. Paul Scott Land, USAF
Del Rio, Tex.

Code Comment Continues

I am writing concerning Gen. T. R. Milton's "Viewpoint" column in your September '84 issue, "Amnesty and the Code." Instead of clamping down on the application of the service academies' honor code, as apparently advocated by General Milton, I respectfully submit that perhaps it is time to reevaluate the code itself.

The USAF Academy honor code is reputed to have three aims: to prepare cadets for effective service in USAF, to instill public confidence in our military leaders-to-be, and to prevent cheating. Application of the honor code fails on all three counts. Let's examine the situation.

General Milton quotes his West Point booklet that "an honor system, to be feasible and to endure, must not be bound by ironclad rules," yet he calls for unequivocal application of unchangeable rules. Also, by all accounts, the USAFA honor code recognizes no gray areas, no judgment calls, and no flexibility in behavior. Yet the real world, and the real Air Force as well, presents an ethical continuum, with many shades of gray and few recognizable boundaries.

An officer's life is full of ambiguous, ethical dilemmas, each with conflicting, valid considerations. Only rarely is an "ironclad" rule applicable, and seldom is one's behavior clearly dictated by simpleminded rules. Indeed, no activity involving large numbers of human beings can be led or managed without a healthy dose of reasoned judgment—a trait not developed by blind adherence to rigid precepts. In this light, the USAFA's honor code prepares cadets for a world that does not and cannot exist.

Ask the average citizen, whose tax dollars support the academies, what he thinks of cadet honor. If he has an opinion, it will invariably have been shaped by recurring and highly publicized cheating scandals. . . . The workings of the honor system actually brings public dishonor on the USAFA.

Perhaps the most glaring failing of the current honor systems is that they clearly do not prevent cheating. If the honor systems were effective in this goal, we would not be treated to these spectacles of dozens of cadets being cashiered. Ethereal ethics notwithstanding, perhaps it is time to install some system that is functional.

Instead of repeating the mistakes of the past, let's devise and use an honor system that is humanly flexible—one that reflects our real-world goals and, most importantly, one that works.

Maj. Nelson E. Cobleigh, USAFR
Thousand Oaks, Calif.

Regarding General Milton's article, "Amnesty and the Code," in your September '84 issue:

Balderdash! Why have compassion for those who practice deceit and deception? They have not made the cut. They should be sent home. . . .

Perhaps the General would be satisfied to have one of these fly wing for one of his grandchildren. Or perhaps he would prefer to have on their wing one of those of the professional officer corps who is probably responsible.

Such breaches of conduct are invariably the fault of leadership. I have never in my life seen people perform at a lesser level than the leaders around them. When that leadership is superb, so is the performance of those led. When the leadership falters, the performance generally carries on and falters only slightly for a while. It is only after the leadership has been precipitously questionable for some time that abominations of performance result.

In 1963, it was the professional officer corps using the code to enforce regulations that cheapened the code. The next thing I remember is something in the late 1970s, and the solution there, as I recall it, was that amnesty was to be offered to selected cadets if they had a high GPA. I went through a couple of barf bags on that one. Now we have had another letdown. And all I hear is "poor cadets."

Why hasn't anyone addressed the cause? I know some of those politicians out there wouldn't like to hear it, but to do so just might be doing the nation a service. And it just might enhance the image of the officer corps in the eyes of the cadet wing.

It is a safe bet that they are fooled by none of this.

Maj. Joe F. Peters, Sr., USAF (Ret.)
Austin, Tex.

Top Missile Crew

The article "The Blue Ribbon Crews" *(September '84 issue, p. 76)* was most informative. However, I feel that I must write to bring you up to date.

The overall winner of the 1984 Strategic Air Command Missile Combat Competition was the 90th Strategic Missile Wing of F. E. Warren, AFB, Wyo. This is the first time that I can recall that a wing has won both the overall operations and maintenance awards.

In fact, the 90th SMW has won the following: the Blanchard Trophy, denoting the "Best of the Best," the Best Minuteman Wing, Best Missile Operations in SAC, Best Missile Maintenance in SAC, Best Missile Communications in SAC, Best Missile Crew in SAC, Best Minuteman Crew, Best Crew Single Exercise, Best Minuteman Pneudraulics Team, Best Minuteman Munitions Team, and Best Minuteman Communications Team.

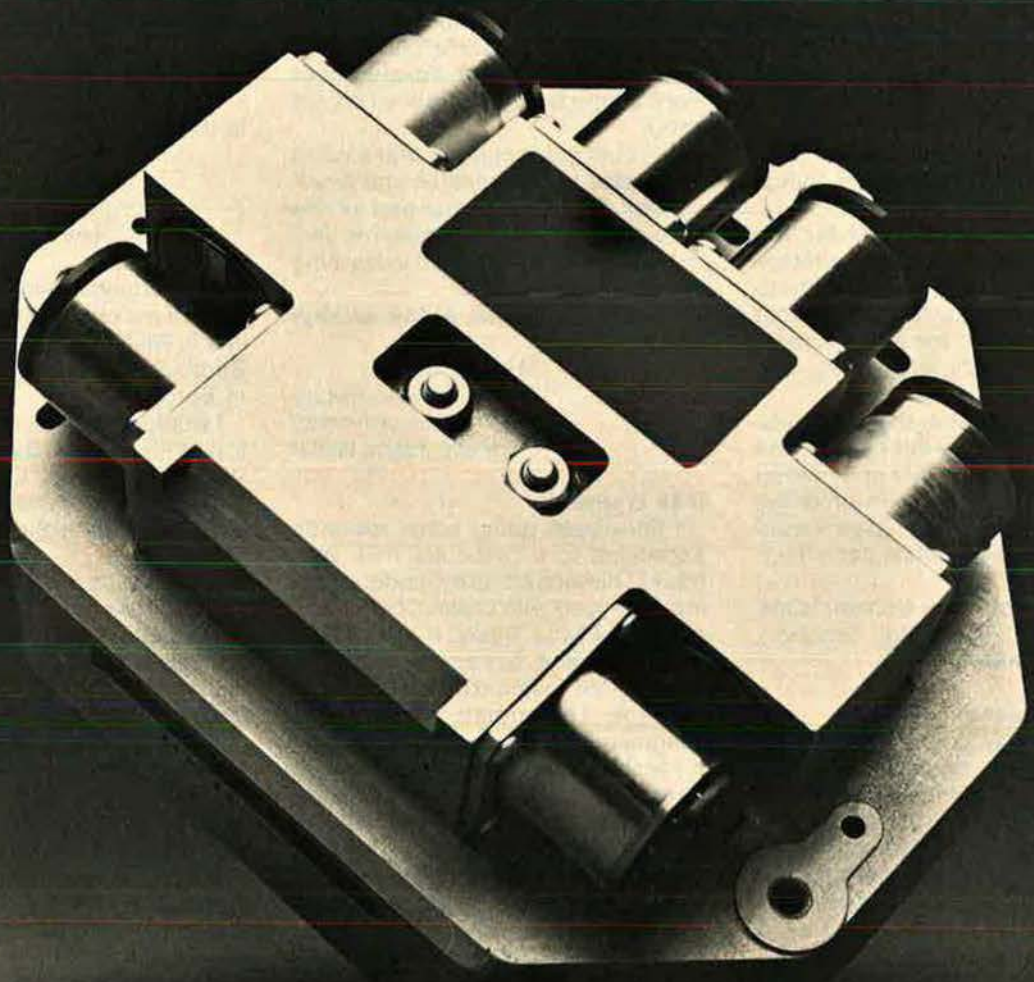
The team from F. E. Warren AFB led the competition from the first day of score posting and never faltered. Crew S-246 (Capt. Jan Kinner and 1st Lt. Steve Ernst) led the operations team by posting an incredible score of 293. That equates to one minor error and a few timing points from a possible perfect 300 points. The maintenance team posted an overall 1,158 out of a possible 1,200 points. The second-place maintenance team was fifty-seven points behind them! The communications team from F. E. Warren posted 191 points out of a possible 200. The closest anyone came to that was 178.

From the above, one can easily see that the title "Best of the Best" for 1984 belongs to the 90th Strategic Missile Wing.

Capt. Jan Kinner, USAF
Westport, Conn.

• *Many thanks to Captain Kinner for his update, and congratulations to the 90th SMW for the fine job! In our September '84 report on USAF's four top aircraft and missile crew awards, we pointed out in the third paragraph that "the nomination and selection process is extensive, so the awards to be presented at the AFA Convention in September [1984] reflect achievements in 1983."*—THE EDITORS

NORTHROP STRAPDOWN



© 1983 Northrop Corporation

SMALLER IS BETTER.

AMRAAM. Phoenix. Tomahawk. Harpoon.

Guidance systems from the world leader in strapdown technology: the Precision Products Division of Northrop Corporation.

Each system is smaller, lighter, more reliable than its predecessor system.

Northrop strapdown brings the high-performance of inertial guidance to tactical missiles and sub-munitions at lower cost.

Combines innovative microprocessor technology with the company's leadership in inertial instruments. Over 2,000 systems produced. Currently on duty with U.S. Air Force. Navy. NATO.

Strapdown from Northrop. Precise. Reliable. Affordable.

Northrop Corporation, Precision Products Division, 100 Morse St. Norwood, MA 02062 USA.

NORTHROP

Making advanced technology work

AIRMAIL

Things To Come

After reading "Hap Arnold's Charge to Dr. von Kármán" in your August '84 issue and Maj. Christopher Waln's "Airmail" letter *(October '84 issue, p. 14),* I was struck with some heartfelt pride and was pleased that attention was given to some of the history and charter of the USAF Scientific Advisory Board (SAB).

I served as an executive secretary for the SAB during an Air Staff Training (ASTRA) assignment and was indeed educated in some of the scientific developments for USAF. My tour with the SAB was short, yet I was involved with several important future programs. In the true spirit of the ASTRA program, the tour with the Scientific Advisory Board provided me with an eye-opening realization of things to come for our Air Force.

That assignment was by far the highlight of my career. I hope another ASTRA officer will get the opportunity to contribute to the SAB Secretariat and be exposed to the nation's most eminent scientists, engineers, and academicians.

In addition, I believe that AIR FORCE Magazine should pay due credit to the past and present military and civilian directors of the SAB. Inclusion of the SAB in the "Almanac" issue would certainly be a worthwhile consideration.

Capt. John Conkel, USAF
CFB North Bay, Ontario
Canada

Survival Research

I am currently doing research on tropical survival, emergency procedures, wilderness first aid, search and rescue, and disaster relief operations.

Any information shared in the form of letters, brochures, pamphlets, manuals, books, or other material will be greatly appreciated. Please send them to the address below.

Regino Cruz
1419 Looban St.
Paco, Manila 2802
The Philippines

TAC Scrapbook

I am working on a scrapbook of the Tactical Air Command from the end of World War II to the present. I want to have a brief history of each wing and squadron and a color picture of their patches.

I would appreciate any information that anyone could furnish. All color photos will be copied and returned, if necessary. Please contact the address below.

Chad W. Rosenhan
P. O. Box 456
Midvale, Utah 84047

B-70 Valkyrie

I am seeking information, photographs, or books about a plane that—judging from what little information I have—was very advanced for its time. That plane is the B-70 strategic bomber. Secretary of Defense Robert McNamara canceled development work on the B-70 for reasons I do not know.

If I could get in contact with anyone connected to the research and development program or any part of the B-70 program, it would help me very much. I am very interested in learning more about the B-70.

Please contact me at the address below.

Mike Jensen
#822 Garrison House
Idaho State University
Pocatello, Idaho 83209

P-40 Warhawk

I have been doing some research pertaining to a particular P-40 Warhawk. This aircraft, to my understanding, was used with Claire Chennault's group of Flying Tigers. It served with the 2d Pursuit Group and had the number "88" painted on the side of its fuselage. The aircraft flown by 88's wingman had the number "42."

I am hoping that some reader might be able to furnish the information I am looking for. What happened to the pilots and these aircraft?

Please contact me at the address below.

J. F. Hensarling
P. O. Box 160
Madisonville, Tex. 77864

Pacific Veterans

I am a filmmaker for PBS and am engaged in work on a new film to be titled *Pacific Warriors.* It will tell a personal story of war in the Pacific during World War II through the eyes of four veterans—two Americans and two Japanese.

I would like to contact American veterans of WW II combat in the Pacific who have become friends with Japanese veterans of the same battle or campaign.

Please contact me at the address below.

Sanford H. Low
Box 242
Cambridge, Mass. 02238

Looking for . . .

I would like to contact veterans who were stationed in the Southwest Pacific during World War II. More specifically, I want to hear from those who saw the USO show *Oklahoma!* when it was performed from March 1945 to September 1945.

I have just completed a book on the tour of the show, but to give what I consider the most complete picture, I am hoping to be able to incorporate the memories of the men who either saw the show or who might have known members of the cast.

I would also like to locate representatives of the 300th Bomb Group.

I would appreciate any assistance in this endeavor.

Kirsten Valbor
P. O. Box 20174
Columbus Circle Station
New York, N. Y. 10023

I am attempting to locate the members of my old B-17 crew from World War II. We flew together with the 401st Bomb Group, 615th Bomb Squadron, in Europe.

I would like to get in touch with the following: G. C. Byrd, Fred Calfe, Wayne Patterson, Charles Vickery, Floyd Skelton, and Mike Holzman. We were interned in Sweden on April 9, 1944.

If anyone can help me find any of the above persons, I would greatly appreciate it. Please contact me at the address below.

Joseph Exnowski
14586 Thomas
Allen Park, Mich. 48101
Phone: (313) 382-2895

I am currently gathering information on early B-29 crews ferrying aircraft to Germany in 1948.

In particular, I am looking for a Capt. John H. "Jack" Highly who flew with Col. Dave Schilling's group into Fürstenfeldbruck AB, Germany.

Please contact the address below.

J. N. Jackson
2600 Westward Dr., A-2504
San Antonio, Tex. 78227

Our association—the 352d Fighter Group Association—is trying to locate John B. Coleman. He was a fighter pilot with our group during World War II. We have been told that he retired from the Air Force and is residing in Florida.

Please contact the address below.

Richard J. DeBruin
234 N. 74th St.
Milwaukee, Wis. 53213

We are trying to contact an old friend who served with us in Karachi

in India during 1945. He is Thomas Taylor, formerly a sergeant with the Air Transport Command. His last known whereabouts after the war was in California.

Please contact us with any information at the address below.

Laurence and Dotty Johnson
26 High St.
Newport, Me. 04953

I wish to contact anyone who was assigned to the 80th Troop Carrier Squadron while at Laurinburg-Maxton AAB, N. C.; at Bottesford, England; at Membury, France; or at A-55 in France.

I am further interested in what happened to C-47 42-100537. During combat flights, she was lettered "7D" forward and "F" on the tail.

All communications will be answered immediately.

TSgt. William Elmendorf, USAF (Ret.)
1015 Lantern Lane
Lebanon, Ill. 62254

The Grim Reaper Association (Korea) requests the addresses of all former members of the 13th Bomb Squadron who served in Korea. We offer a locator service.

Persons knowing of deceased members are requested please to forward such information. Write to the address below.

Maj. Charles W. Hinton, USAF (Ret.)
585 Teakwood Ave.
Satellite Beach, Fla. 32937

I am trying to locate four of my former fellow crew members. They are Larry Novick, Walter S. Deahl, Jr., Alfred J. Titone, and Ralph Finello.

We served on Capt. Marston T. Westbrook's B-29 crew, flying out of Saipan with the 879th Bomb Squadron, 499th Bomb Group, 73d Bomb Wing, Twentieth Air Force, during World War II.

We want to hold a crew reunion (the whereabouts of the other seven crew members is known). Please contact me at the following address.

Ray Kohler
6748 Blanche Dr.
Lorton, Va. 22079

I would like to locate Maj. Sammy L. Hartman. He was stationed at Barksdale AFB, La., from 1962–66, and was assigned to a mobile rail radar warning system.

Please contact me with any available information.

John R. Gray
2725 Doles Pl.
Shreveport, La. 71104

I would like to find out some information about my cousin, Lt. Don Snow.

He crashed after takeoff while piloting a B-17 of the 748th Bomb Squadron, 457th Bomb Group. This happened on April 5, 1945—ten days before the squadron's last mission.

I would like to learn at which field this occurred and details about the aircraft's markings.

Robert L. Mathers
3357 W. 134th Pl.
Hawthorne, Calif. 90250

The 72d Strategic Reconnaissance Squadron was stationed in Alaska in the late 1940s. I would like to hear from former members of the unit from that time.

The unit was not in SAC at the time, so the designation then might have been the 72d Photo Squadron. In particular, I would like to know about the rescue of a crew member in Greenland and the circumstances leading up to it.

Maj. Lorrin C. Peterson, USAF (Ret.)
23024 Magnolia Glen Dr.
Valencia, Calif. 91355

I'm trying to locate four former AAF/USAF officers who served in the ETO during World War II and who may be able to clarify some data relative to a subject I'm researching.

Three of the officers were assigned to RAF Bovingdon operations during late 1944 and 1945. They are Lt. Col. Roscoe Murray, Jr., who was later assigned to Kincheloe and Dow AFBs; Lt. Col. or Col. Emil Podwodski (Podvojski?), later assigned to Hq. SAC in the mid-1960s; and Walter Ruhlman (rank unknown).

Another officer, Maj. William Hartzell (or Hartsell), was assigned to operations at Hq. Eighth Air Force, High Wycombe, during World War II.

I would like to hear from anyone knowing the whereabouts of these men.

Dale M. Titler
P. O. Box 7361
Gulfport, Miss. 39506

I would like to hear from former members of the 504th Bomb Group, which was stationed on Tinian in the Marianas in 1944–45. This group was originally commanded by Col. James T. Connally, and later by Col. Glen W. Martin. I was the sergeant major of this group.

Please contact me at the address below.

Gordon L. McKnight
P. O. Box 46
Washington, Tex. 77880

FREE

For a free color print of the F-15 Eagle as it appears on the following pages, simply fill in the coupon and mail to Pratt & Whitney, P.O. Box 568, Wethersfield, CT 06109.

UNITED TECHNOLOGIES PRATT&WHITNEY

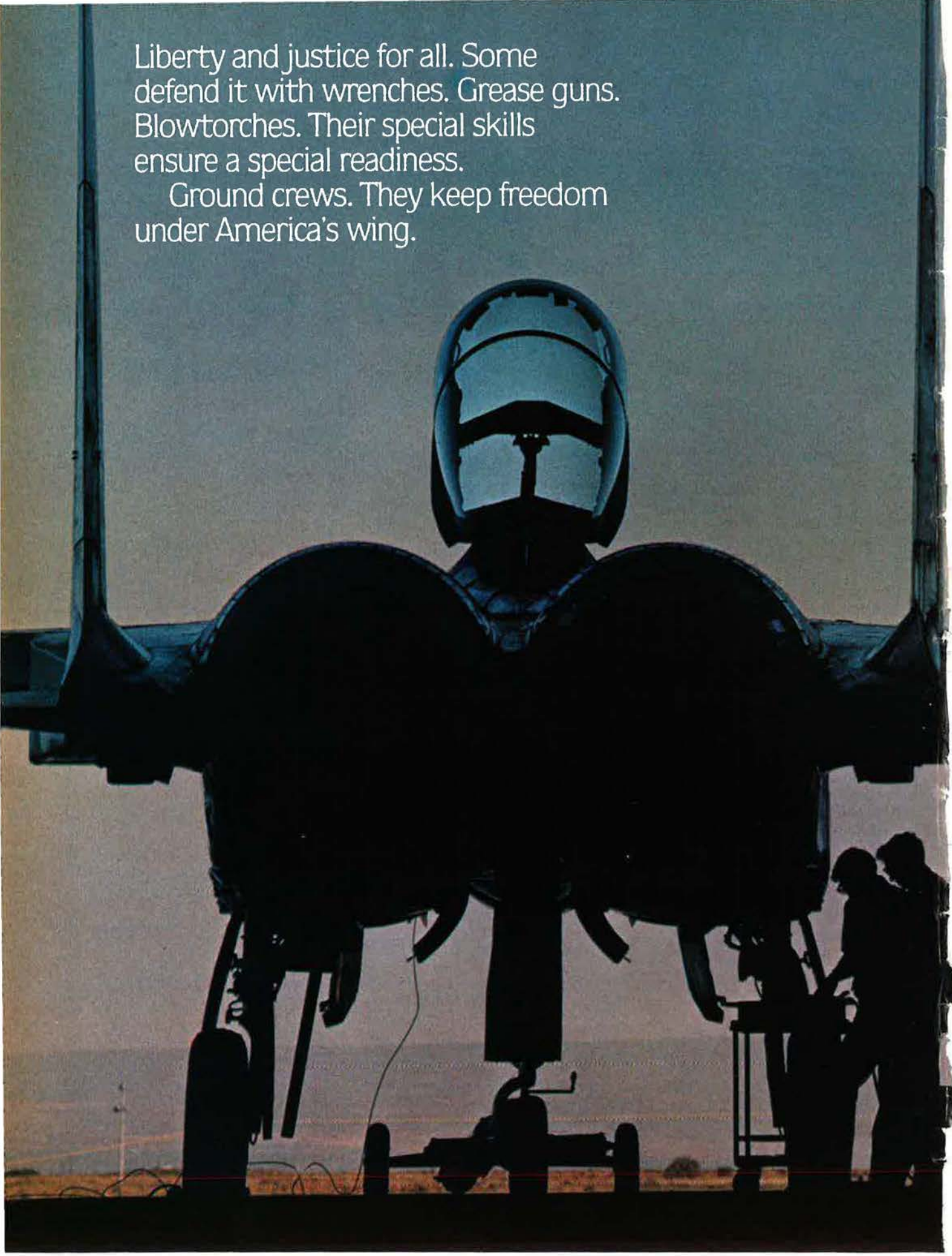
Please send my free color print of the F-15 Eagle.

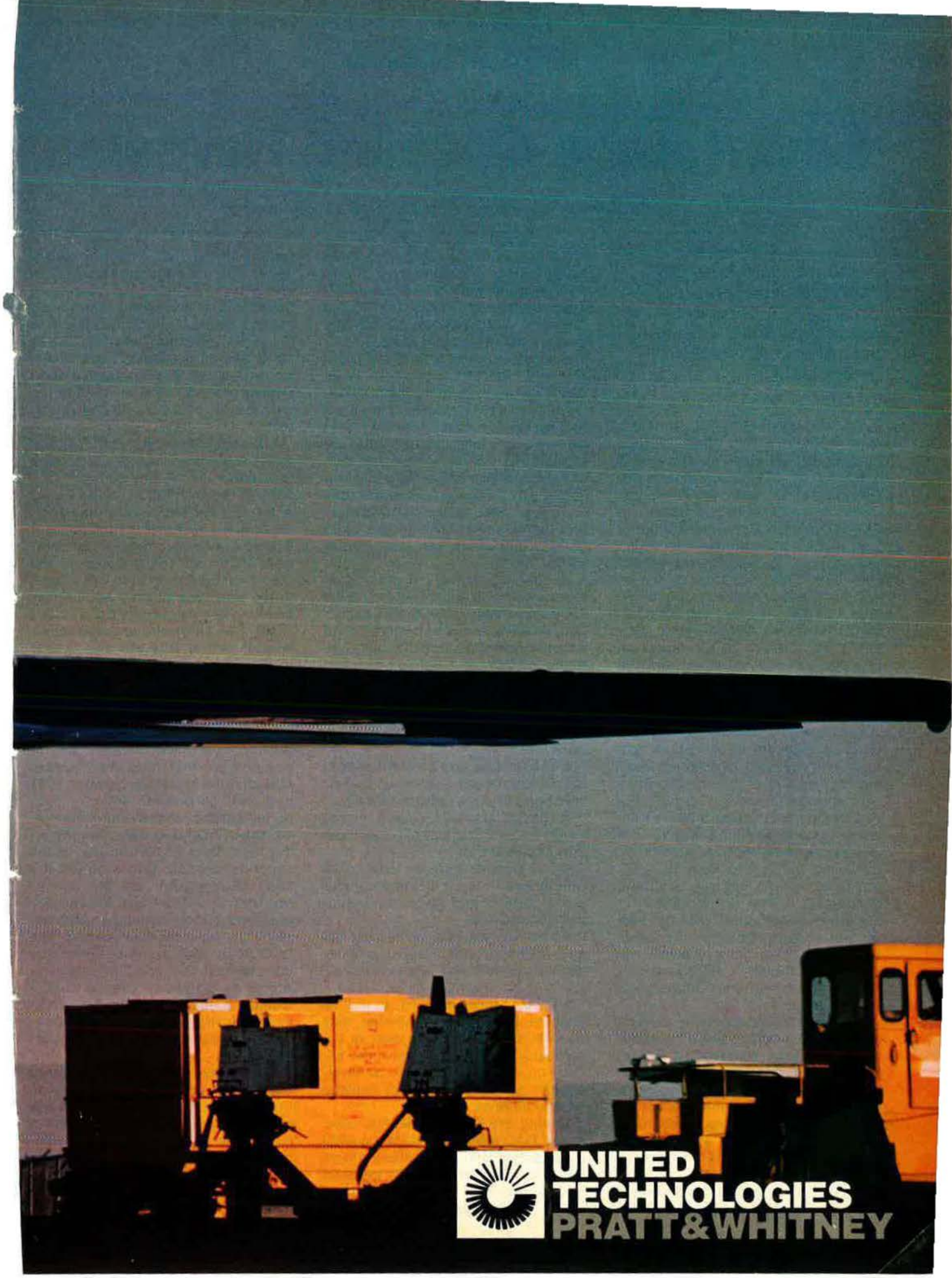
Name

Address

City

State Zip


Liberty and justice for all. Some
defend it with wrenches. Grease guns.
Blowtorches. Their special skills
ensure a special readiness.
Ground crews. They keep freedom
under America's wing.


UNITED
TECHNOLOGIES
PRATT&WHITNEY

Soviet Arms Cheating Revealed

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

Under pressure from the right, the White House discloses details on a long history of wholesale arms-control accord violations by the USSR.



Washington, D. C., Nov. 1

The White House, bowing to mounting pressure from right-wing lawmakers, has submitted to Congress the long-awaited report on Soviet arms-control violations by the bi-partisan General Advisory Committee (GAC) on Arms Control and Disarmament. President Reagan sent Congress two versions of the report on October 10—one classified and the other not—in accord with a legislative mandate appended to the FY '85 Defense Authorization Bill.

The report by the twelve-member GAC, as reported in this space last month on the basis of advance information, makes a convincing case concerning deliberate, wholesale Soviet violations of bilateral and multilateral accords to which Moscow is a signatory and claims to be abiding by. Spanning the period from 1958–83, the GAC report's central, profound conclusion is that Soviet actions in the arms-control arena over the past quarter century "demonstrate a pattern of pursuing military advantage through selective disregard for [Moscow's] arms-control duties and commitments."

The GAC report suggests that timorous and lax enforcement efforts by US authorities encourage Soviet breaches of arms-control accords. Warning that the US "has never had a long-range comprehensive strategy to deter and if necessary initiate measures to offset Soviet arms-control noncompliance," the committee stressed that the development of means to safeguard the US against Soviet noncompliance is essential "if the arms-control process is to avoid being further undermined, if it is to have favorable long-term prospects, if it is to build trust among nations, and if it is to contribute to US national security and the cause of peace."

In the absence of a firm, forthright stance on the part of this country on Soviet treaty violations, the committee found that Moscow's "denial activities significantly increased over the last quarter century and today are challenging US verification capabilities despite improvements in US verification technology." Moreover, this country's "near total reliance on secret diplomacy in seeking to restore Soviet compliance has been largely ineffective."

In specific terms, the committee found recurring instances of Soviet conduct involving "deliberate deception, misdirection, and falsification of data during negotiations." In addition to the military gains netted by the Soviets from various treaty violations, "the overall pattern of Soviet practices could have several possible motivations," according to the GAC report:

- The Soviets may be indifferent to US objections and responses to their violations of arms-control treaties.
- The Soviets may be attempting to weigh the effectiveness of US verification capabilities.
- The Soviets may be testing US willingness to reach definite conclusions concerning Soviet arms-control compliance.
- The Soviets may be testing US and international resolve and responses to their arms-control behavior.
- Lastly, these activities, as well as the other concealment activities, may be intended to raise the level of US confusion in order to hide more serious covert activities, such as development and deployment of ballistic missile defense systems.

Among the Soviet violations cited by the GAC report, those of the 1963 Limited Test Ban Treaty stand out as flagrant. This treaty, which received public attention during the recent election campaign, not only prohibits testing of nuclear weapons under water, in the atmosphere, and in space but also bans the venting of underground explosions when such venting causes radioactive debris to cross national boundaries. Since 1965, the report found, "the Soviet Union has repeatedly allowed such radioactivity to vent in connection with many of its nuclear weapon tests."

The committee concluded also that the Soviets breached the Montreux Convention of 1936 by dint of "violations of the prohibition on the transit of aircraft carriers through the Turkish Straits—by the recurring transit of Soviet *Kiev*-class aircraft carriers" from 1976 until the issuance of the report. In this context, the GAC report found that "the Soviets additionally have under construction at their Black Sea shipyards an even larger aircraft carrier that will also violate the Montreux Convention upon passage to the open seas."

The Helsinki Final Act of 1975 and the Conventional Weapons Convention of 1981 were also breached by the Soviets. In the first instance, the report charged that the Soviets failed in at least three instances between 1981 and 1983 to provide specified, required advance information concerning major military maneuvers involving more than 25,000 troops. In the second instance, they violated the 1981 Convention "by the use of booby-trap mines and incendiary weapons against civilians in Afghanistan" during a two-year period. The GAC report also confirmed previous US charges that the Soviet Union broke its oft-stated pledge that it would not build additional SS-20 ballistic missile launchers in Europe. The Soviets have continued to do precisely that.

In the case of the SALT I Interim Agreement on Offensive Weapons, the committee found the Soviets guilty of violating this accord from the day it was signed. Arguing convincingly that the 1972 Interim Agreement prohibits the conversion of launchers for light ICBMs into launchers for heavy ICBMs, the report charged that



The F-16C. New standard of excellence in advanced fighter aircraft.

With the introduction of the F-16C, the U.S. Air Force's peace-keeping role is further enhanced.

Expanded radar, avionics and weapons systems capabilities provide America with all-weather, round-the-clock fighter superiority, and an even more powerful deterrent to aggression.

The F-16A set the standard of excellence in fighter performance throughout the Free World. The new F-16C raises it.

GENERAL DYNAMICS

A TRAINING SYSTEM THAT FLIES WING-TO-WING WITH THE F/A-18...



BECAUSE SPERRY KNOWS HOW TO LISTEN.

Communicating with the onboard avionics of the highly computerized F/A-18 Hornet required data rates which overpowered conventional input/output systems.

That was until Sperry developed the first operational flight trainer able to match the sophistication of this "fly-by-wire" tactical aircraft. Our solution was a unique systems architecture—a new programming approach capable of greater speed and capacity, and of relieving the host computer of many input/output processing tasks.

Realism—coupled with instructional and growth flexibility—is the key element in training effectiveness. Computer-generated imagery displays panoramas ranging from carrier decks to airfields. A computer-linked G-suit/G-seat and a buffet system reproduce the physical dynamics and physiological cues of the full supersonic and subsonic flight environments.

We listened to the needs of fleet instructor pilots when we designed the instructor station. So even for new instructors, our system is easy to operate and offers flexibility in structuring and evaluating the training exercise. And the system is designed to keep pace with changing training requirements and aircraft developments. As aircraft features and objectives change, the simulation programs can be upgraded accordingly.

For more information on what we're doing—and can do—in the broad field of simulation and training, talk to us... we listen.

Write to Sperry Corporation, Electronic Systems, Great Neck, NY 11020. Attention: Marketing Department.



SPERRY

© SPERRY CORPORATION 1983

Soviet conversion "of launchers for the light SS-11 into launchers for the SS-17 and SS-19 ICBMs circumvents this provision, thereby defeating an essential, stated US objective and purpose in entering into the agreement." The committee found that these conversions, under way ever since the accord went into effect, "widened the disparity between Soviet and US missile throw-weight and increased significantly the threat to US ICBMs."

Soviet concealment activities and encryption of telemetry data violate all three SALT accords, according to the GAC report: "The SALT I agreements and the exchange of commitments made concerning SALT II bind the US and the Soviet Union not to use deliberate concealment measures which impede verification, by national technical means, of compliance with provisions of these agreements."

The Soviets, however, are stepping up their concealment efforts, according to the GAC. A clear-cut, deliberate Soviet concealment is the encryption of SS-X-25 data, which impedes US ability to determine the characteristics of this new ICBM, especially whether or not it meets essential SALT II criteria. The consequences of this denial of authorized verification data are profound. SALT II allows each party to develop only one new type of ICBM. Since the Soviets have designated the SS-X-24 as that one new type, the SS-X-25, which appears to be another new type of ICBM, violates the treaty.

According to the committee, the Soviets claim, however, that this missile is a modification of the SS-13, an ICBM developed in the mid-1960s. It flies in the face of common sense to contend that a high-tech missile that was put into flight testing about a year ago is merely an updated version of a twenty-year-old ICBM, the report charges. US analyses of what data are available concerning the SS-X-25 suggest that this design fits the treaty definition of a new type of ICBM and that it runs afoul of SALT II in terms of both data encryption and the limitation governing new designs.

The GAC report charges that the Soviets, in similar fashion, are breaching the prohibition against concealment and the limitations on MIRVing, also called throw-weight fractionation, by "testing a lighter warhead" than the SALT II treaty allows.

Another category of Soviet violations punctures the SALT I numerical launcher limits by the deployment of *Delta* submarines exceeding the limit of 740 launch tubes on modern ballistic missile submarines without dismantling corresponding numbers of older ICBM or SLBM launchers. The committee felt that this action was "part of a deliberate Soviet effort to challenge US arms-control verification capabilities."

The report found further that the Soviets might have violated SALT II in a crucial fashion "by the probable continued deployment of SS-16 ICBMs at Plesetsk and by falsifying the SALT II data base identifying specific systems and their numbers covered by the treaty," beginning in 1979. This accord prohibits the deployment of the SS-16 mobile ICBM. The report found evidence of "deliberate Soviet concealment [in connection with these missiles] which impedes verification of compliance by US national technical means."

The SS-16, the committee charged, "apparently has been maintained at Plesetsk since the signing of the treaty. . . . The probable existence of the SS-16 at Plesetsk also shows that the Soviets deliberately falsified the SALT II data base concerning the number of ICBM launchers. This data base was to be corrected semiannually; however, the Soviets have not corrected it."

The construction and operation—beginning in 1981 and continuing ever since—of a large, phased-array radar "not located on the periphery of the Soviet Union and not oriented outward," the GAC report charges, represents a violation of the SALT I ABM treaty. That accord "restricts the deployment of early warning radars to sites on the periphery of the national territory; such radars must also be oriented outward. The construction and orientation of such a radar near . . . Krasnoyarsk, an interior site, violates this provision. The design of the facility is substantially identical to another radar declared by the Soviets to be an early warning radar."

Moving into essentially gray areas of treaty compliance, the committee raised a host of alarming but unprovable issues. Among the most consequential is the suspicion of Soviet interference, meaning jamming, with such radar systems serving as US national technical means of compliance verification as Cobra Judy, Cobra Ball, and Cobra Dane and with various highly classified space-based systems.

With regard to the duty to act in "good faith" in dealing with other nations—a cornerstone of customary international law—the committee found Soviet actions in default: "Some Soviet actions in this category have been misrepresentations made during arms-control negotiations or after binding agreements came into effect. An example of such misrepresentation concerns the erroneous data provided by Soviet negotiators at the Mutual and Balanced Force Reduction negotiations in Vienna concerning Warsaw Pact troop numbers. This material misrepresentation has been a major barrier in these negotiations."

In a related, more general way, the GAC report found that "the Soviets have demonstrated a lack of good faith by their largely unresponsive posture concerning compliance concerns brought to their attention by the US government over a span of nearly two decades."

Washington Observations

★ Lt. Gen. James A. Abrahamson, Director of the Strategic Defense Initiative (SDI) Organization, recently told MITRE's annual National Security Issues symposium that the Soviet Academy of Sciences is trying to scuttle the SDI program by tagging it with exorbitant cost estimates. By floating the claim that SDI will cost trillions of dollars, they "are trying to discourage us from getting started."

★ Latest intelligence estimates suggest that the Soviets are proliferating mobile strategic targets. According to the latest count, there are now more than 4,000 imprecisely located or mobile strategic targets in the USSR. This requires significant adjustments to US deterrence capabilities.

★ High expectations are being attached by the Pentagon to the Teal Ruby infrared sensor satellite scheduled to be launched next year by the Shuttle from Vandenberg AFB, Calif. The revolutionary system is expected to detect and track aircraft as well as cruise missiles under all weather conditions. Potential users might include CONUS strategic air defense forces and naval battle groups that require tracking and targeting information on attacking aircraft and cruise missiles.

★ Recent press reports falsely suggested that the Pentagon is about to base USAF's Peacekeeper MX ICBMs in deeply buried facilities in order to attain an assured protracted nuclear

warfighting capability. The implication of these reports was that the Defense Department and the Administration planned to commit the nation to policies that irretrievably wreck the prospects for strategic arms control and that pivot on the notion that nuclear war is "winnable."

The concept of basing intercontinental ballistic missiles far enough underground so that they would be immune from attack has been the subject of low-key Air Force research and development efforts since the late 1960s. The Administration's Strategic Force Modernization program of 1981 specifically instructed the Air Force to study the feasibility of such a basing mode.

These preliminary studies were completed and the Air Force was subsequently requested to continue research and development efforts on Deep Underground Basing (DUB). In an official memorandum this summer, the Defense Department instructed the Air Force to continue to support the DUB option to the tune of about $9.6 million in FY '85 and at approximately $20 million in the following year. Purpose of these investments "is to accomplish the R&D necessary to provide an ICBM secure reserve force in the late 1990s."

As a senior Defense Department official told this column, the contention that the Air Force wants to build such a system, or that the Pentagon has bought off on such a plan, is a canard. Moreover, the media claim that the Pentagon's central policy document, the Defense Guidance, prescribes the development, in part by means of DUB, of a capability to fight a protracted nuclear war is untrue.

The Defense Department, he pointed out, is "concerned over the continued mistreatment by the press of ICBM issues. If a proposed basing mode, such as silos, is in the view of the press not sufficiently survivable, the Department is accused of building a first-strike capability. Attempts to reach the ultimate in survivability are claimed to be preparations for protracted nuclear war. The truth is at neither of these extremes but in the middle: We are striving to build the strongest possible deterrent."

★ Congress, meanwhile, requested that the Administration provide its relevant committees with "detailed information regarding options to enhance the basing mode survivability of deployed Minuteman II and III missiles, the soon-to-be-deployed Peacekeeper MX missile, as well as information about the basing options under consideration for the small ICBM."

IN FOCUS...

Congress specifically requested that this report, due by March 1 1985, include "an assessment of the merits of hardening existing silos, constructing new superhardened silos, multiple aimpoint configurations, and closely spaced array options," along with relevant cost estimates and predictable impact on arms control and environmental considerations. Congress expressed no interest in the Deep Underground Basing mode, which lacks a prompt response capability—a key characteristic of ICBMs—and which appears to be plagued by high cost and poor command and control characteristics.

★ In a recent memorandum to all major commands and separate operating agencies, Air Force Secretary Verne Orr and USAF Chief of Staff Gen. Charles A. Gabriel announced the formation of a working group of logisticians, operators, and acquisition specialists to develop an Air Force-wide action plan to boost the reliability and maintainability of Air Force systems. The working group—headed by the Deputy Chiefs of Staff for Research, Development and Acquisition and for Logistics and Engineering, Lt. Gen. Robert D. Russ and Lt. Gen. Leo Marquez, respectively—is to come up with procedures that "emphasize reliability and maintainability throughout the acquisition process—from requirement definition through concept development, design, production, and acceptance."

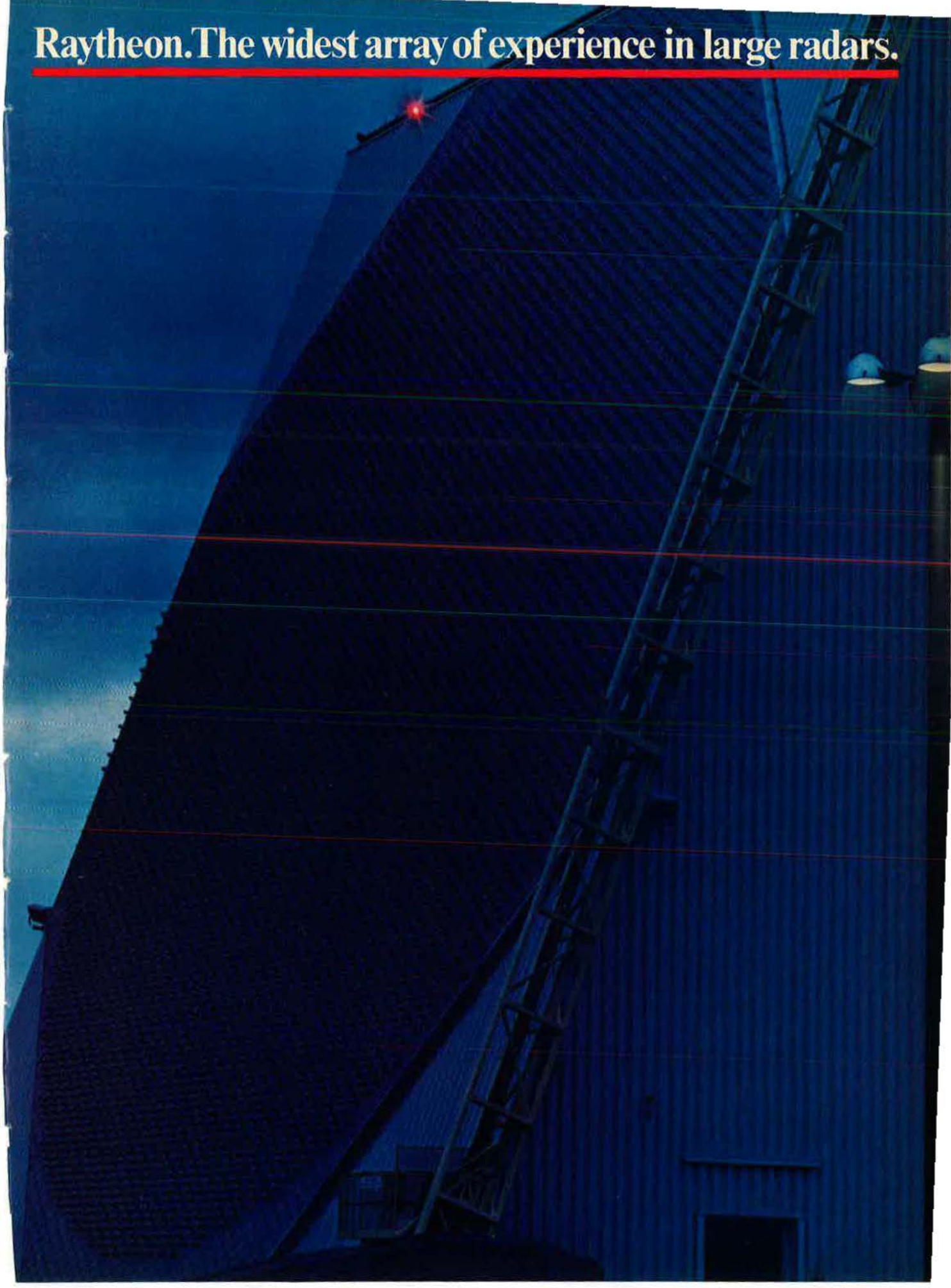
★ The Department of Defense Authorization Act for FY '85 requires the President to report to Congress by January 19, 1985, on the merits of a long-term program for renovation of the NATO nuclear deterrent keyed to reduce "pressures for the early first use of tactical nuclear weapons and to substantially reduce NATO's theater nuclear arsenal." Congress requested the Administration to examine in particular "possible elimination of NATO's reliance on short-range nuclear weapons, such as the atomic demolition munitions and the 155-mm and eight-inch nuclear artillery round; possible deployment of longer-range nuclear-weapon launchers capable of attacking Warsaw Pact targets but not those located in the Soviet Union; elimination of NATO's inventory of dual-capable nuclear/conventional weapons; and placement of control and operation of tactical nuclear weapons in a single NATO command."

★ Congress also folded into the FY '85 Defense Authorization a requirement for the Department of Defense to issue a report by April 1, 1985, "on the survivability of US strategic nuclear ballistic missile submarine force and the supporting command control and communications systems." Congressional staffers said news reports—including some that appeared in this space recently—concerning Soviet advances in relevant technologies, including antisubmarine warfare, triggered this congressional request.

★ Recent advances in special laser communications—the so-called blue-green regime—have given a shot in the arm to the submarine laser communications (SLC) satellite program. Dr. Robert S. Cooper, head of the Defense Advanced Research Projects Agency, told a MITRE-sponsored meeting that the blue-green laser can penetrate clouds and water to reach submerged missile-launching and attack submarines (SSBNs and SSNs) operating at maximum depth and speed. The advances in blue-green communications lasers are tied to a shift toward the blue part of the spectrum and show an improvement in the twenty- to thirty-decibel (dB) range over the previous approach. Acceptance of this technology will require a "whole new sociology" on the part of the submariners "to accept the notion that they are not a force unto themselves," he commented.

★ The Air Force and the other services are moving vigorously into the area of advanced low-observable standoff weapons for conventional warfare applications. The emphasis is on two basic designs, one a medium-size and the other a small weapon. Range of the weapons is to be up to about 200 kilometers and cost is to be held at a minimum by using off-the-shelf components. The new designs are to be usable by various launch systems and platforms to take full advantage of the economy of scale and of commonality. The larger weapon is to approximate the capabilities of the defunct USAF-US Army Joint Tactical Missile System that was terminated when its cost approached the $2 million level. The "stealthy" follow-on weapon is to accommodate a 1,000-pound warhead and use a highly accurate terminal guidance system. ■

Raytheon. The widest array of experience in large radars.



On land and sea: Raytheon phased array radars fo



Cobra Dane radar on Shemya Island tracks test flights of Soviet missile systems.

Missions like these require high data rate tracking of many targets... and nothing does this better than electronically steered phased array radar. And no one has more experience than Raytheon in developing and building these radars for national defense.

Warning of missile attack.

Submarine-launched ballistic missiles would come under the watchful eye of Pave Paws radars operating now on the



Wide Area Active Surveillance system helps in control and analysis of naval fleet exercises.

U.S. East and West Coasts, and soon in the Southeast and Southwest. Able to spot basketball-size objects as far away as 1,200 miles, these phased array radars also track objects in space that



Cobra Judy radar system on stern of USNS *Observation Island* can

come within their coverage. Working for the Air Force, Raytheon has responsibility for Pave Paws design, development, manufacture, installation and testing.



Phased array elements form the antenna of this radar for range instrumentation.

Across the top of the world, the Ballistic Missile Early Warning System (BMEWS) has long kept watch for ICBM's. Raytheon has been selected to modernize a key BMEWS installation to allow the system to continue to perform its critical role.

Monitoring foreign missile tests.

From Shemya, one of the outermost Aleutian Islands, Cobra Dane keeps an attentive eye on Soviet ballistic missile tests. This powerful 100-foot-high radar, designed and installed by



;arly warning, intelligence, range instrumentation.



)bserve the terminal phase of Soviet missile tests.

Raytheon for the Air Force, can also provide early warning of ICBM launches and detect and track satellites.

Aboard the USNS *Observation Island,* a Raytheon-developed phased array radar called Cobra Judy also gathers intelligence data. In addition to the radar, Raytheon's systems responsibility also included refurbishment of the ship from mothball status.

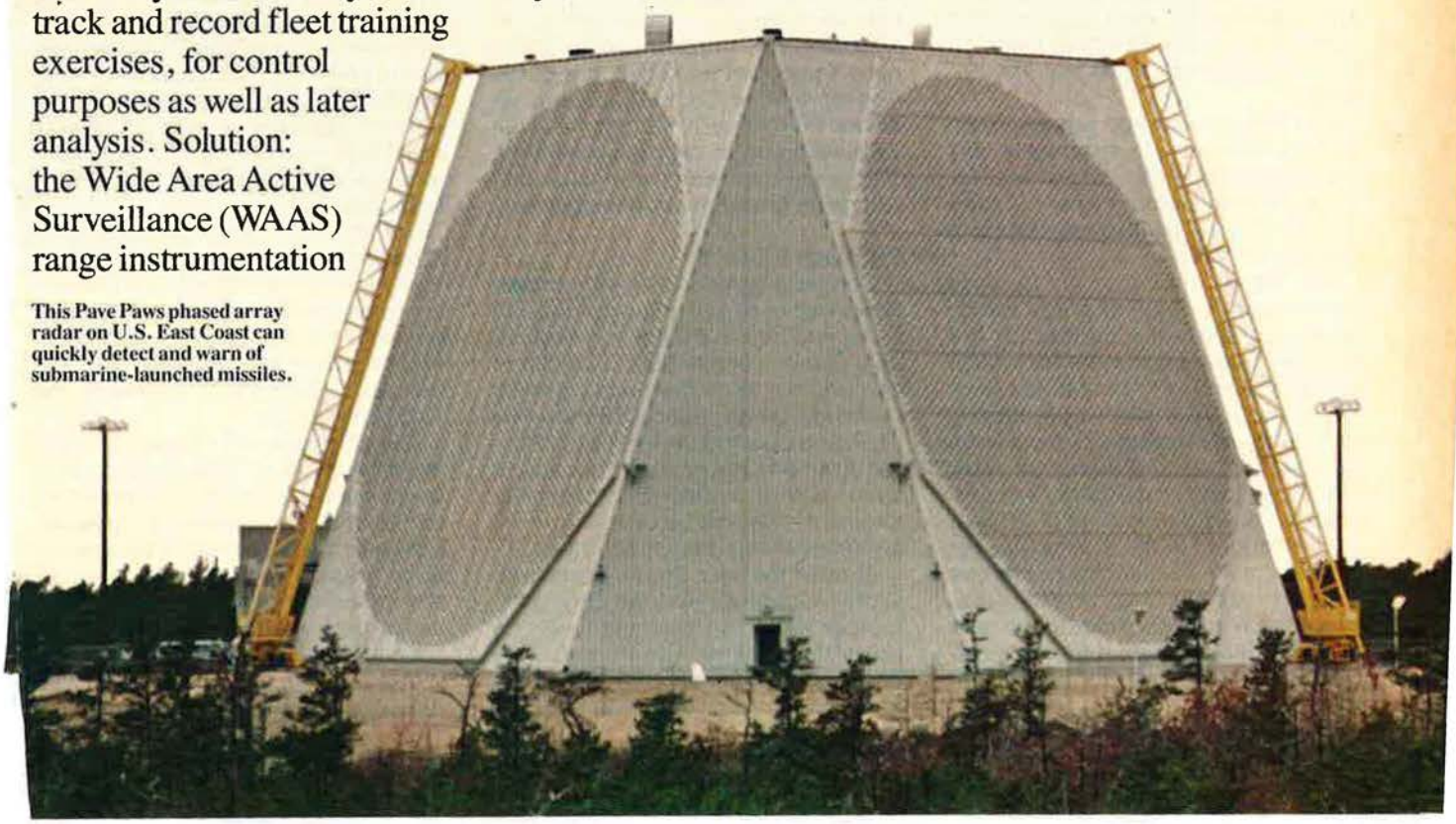
Tracking our own training and testing.

The Navy wanted a way to accurately track and record fleet training exercises, for control purposes as well as later analysis. Solution: the Wide Area Active Surveillance (WAAS) range instrumentation system. At work now in Puerto Rico, this Raytheon-developed phased array system also insures improved range safety and aids in the evaluation of new weapons systems.

A similar but transportable Raytheon phased array radar called MIR (Multiple-Target Instrumentation Radar) will help the Navy track test flights of aircraft and missiles at its Naval Air Test Center.

To sum up: by any measure—number of installations, range of frequencies, variety of uses—Raytheon has unsurpassed across-the-board experience in large, computer-driven phased array radars. Raytheon Company, Government Marketing, 141 Spring Street, Lexington, Massachusetts 02173.

RAYTHEON



This Pave Paws phased array radar on U.S. East Coast can quickly detect and warn of submarine-launched missiles.

CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., Oct. 26

Defense Spending Approved

Congress approved an omnibus stopgap funding measure containing $274.4 billion for DoD in FY '85 just before adjournment of the Ninety-eighth Congress. The omnibus funding bill was adopted in lieu of regular appropriations bills for several government agencies. The defense spending level, when combined with funds for military construction and Department of Energy nuclear-weapon activities, is in line with the $292.9 billion defense budget compromise worked out by House Speaker Thomas "Tip" O'Neill (D-Mass.) and Senate Majority Leader Howard Baker (R-Tenn.), ending a months-long stalemate between the House and Senate.

The spending measure includes deferral until next spring of $1.5 billion for production of twenty-one MX missiles, subject to House and Senate approval. The $1.5 billion would not be newly appropriated money but rather unobligated funds transferred from various defense programs that achieved savings in previous years. Those programs were appropriated matching funds in FY '85 to make up for monies going into the MX account.

The five percent real growth in the defense budget is substantially less than the President's original request for a thirteen percent after-inflation growth and the revised request for a 7.8 percent hike.

The significant cut in the Defense Department's original plans raises questions about the budget for the next five years. Plans were for a $333 billion budget in FY '86 at 9.2 percent real growth. That was to be the last year for a large increase. Growth rates were set to drop and then level off in FY '87 at just 3.5 percent, with increases of 3.8 percent in FY '88 and 3.9 percent in FY '89. But the budget squeeze in FY '85, causing numerous program delays and stretchouts, could force up those rates in the next five-year defense plan if the Administration wants to keep its buildup on track.

Strategic Defense Slashed

Congress slashed $377 million from the President's $1.7 billion request for his Strategic Defense Initiative (SDI), a program comprising technologies that have been going on for many years. The cut is viewed with concern by some in DoD. A spokesman for the program said that certain programs will now fail to reach planned decision milestones and others will have to be zeroed. The Administration planned to spend some $25 billion over a five-year period for these technologies, although the Pentagon is not yet able to provide any reliable estimate of the total cost for a multi-layered defense against ICBMs.

The $377 million reduction takes SDI below the levels planned for the technologies before SDI was conceived. DoD planners added only $250 million to the technologies after they were grouped into one collective program.

Of deep concern to SDI planners is the requirement to report to the Appropriations Committees exactly which technologies will be cut and by how much. Presumably, the committees want veto power over specific reductions. This requirement, in effect, makes program managers out of the Appropriations Committees and removes from the SDI manager the vital responsibility for program direction. This is another example of a trend in Congress toward micromanagement.

Funding ELVs

Congress agreed to provide the Air Force half of its $10 million request to study and define a follow-on expendable launch vehicle (ELV) capable of carrying the large payloads currently launched by the Space Shuttle. The Air Force convinced Congress of the requirement for assured access to space with a standby ELV capability should the Shuttle be unable to meet all national security launch needs.

Early in the year, the Air Force presented Congress with an ELV commercial financing package involving no initial federal investment. This concept was rejected by Congress and OMB in favor of conventional financing through the appropriations process. In addition to the $5 million appropriated, NASA was provided $6 million to work jointly with USAF on the follow-on ELV program. The funds are to be used for initial study of an ELV with adequate growth potential, a requirement not met by previously considered ELV alternatives. This follows a Senate concern for the need to develop a heavy lift vehicle in the 1990s.

DoD was directed, in conjunction with NASA and OMB, to submit to Congress by January 15, 1985, a study of ELV needs for the short and long term, including analyses of costs, options available, potential of Shuttle-derived technology, and the reliability of the Shuttle as a sole means of access to space in the late 1980s. The Air Force is also to provide a revised five-year funding profile for development and procurement of ten follow-on ELVs.

ASAT Restrictions

The Air Force will be allowed to conduct three tests of its antisatellite (ASAT) system after March 1, 1985, against objects in space. An earlier agreement by congressional leaders would have permitted USAF two "successful" tests, but this was rejected by defense appropriations conferees. ASAT opponents viewed this as a loophole for the Air Force to conduct unlimited testing.

For the ASAT tests to begin, the President, as in the past, must certify to Congress that the US is endeavoring to negotiate limits on ASAT weapons with the Soviets, that ASAT testing is vital to the national security, and that ASAT testing will not violate the 1972 ABM Treaty.

The delay of ASAT testing until next March was viewed by some as a minor concession by Senate conferees on the defense appropriations measure. However, a 120-day lead time is needed to prepare for such testing. Other scheduled tests for ASAT not involving targets in space will proceed as scheduled until March 1.

The sum of $65 million was also provided to begin ASAT production. ■

Sidewinder air-to-air missiles have been made more effective with an advanced active optical target detector. In case of a near miss, the sensor detects a laser reflection off the target aircraft and detonates the missile warhead. Compared to earlier passive sensors, it provides greater intercept capability and is more reliable and less vulnerable to false alarms. The Santa Barbara Research Center, a Hughes Aircraft Company subsidiary, produces the DSU-21/B sensor for AIM-9B, 9E, 9J, and 9P missiles for the U.S. Air Force and Foreign Security Assistance Programs.

Without ever having to visually identify its target, a flight crew can fire the Laser Maverick missile and withdraw with a high probability of scoring a direct hit. The seeker in the air-to-surface missile scans a broad area in front of the attacking aircraft, looking for the reflection of an invisible laser beam directed at a target by a ground or airborne designator. Upon detecting the properly coded signal, the missile automatically locks on and tracks the designated spot prior to launch. Laser designation allows the missile to be launched safely day or night at targets located near friendly troops. Hughes developed Laser Maverick for the U.S. Marine Corps for such close air support missions. The missile uses many of the elements found in Air Force TV-guided and infrared-guided missiles, such as the airframe and propulsion system. It also incorporates a heavy 300-pound penetrator warhead. Now in production, Laser Maverick was successfully launched 15 times in 15 operational test firings.

Artificial intelligence, the programming that lets computers "think" almost like humans, is the focus of a new advanced technology center at Hughes. The facility brings research and development efforts under one roof. Scientists and engineers will work closely with universities throughout the country to develop software and equipment. Finished systems will be able to make far more complex decisions than the simple "yes" or "no" decisions that traditional software programs require. Projects will include self-controlled systems and image understanding—both of which can be used in such applications as geological surveys from space, manufacturing technology, and defense.

An advanced long-range radar can be used for air defense or civil air traffic control, thanks to its versatility. As the primary element in an air defense system, the Hughes Air Defense Radar (HADR) uses high-power electronic pencil-beam scanning to detect targets automatically at precise ranges and altitudes. Advanced digital signal processing filters out clutter. These same attributes can be applied to air traffic control. HADR can oversee arrivals and departures of many aircraft while at the same time monitoring traffic.

Hovering helicopters and fast low-flying aircraft can be detected quickly and precisely by a mobile battlefield radar. The Low Altitude Surveillance Radar (LASR) is an advanced radar designed to help protect front-line troops and armor. It radiates pencil-thin beams from an electronic-scanning, rotating antenna to provide 360-degree coverage. LASR detects threats the moment they pop up on the horizon, filtering out clutter caused by terrain or electronic countermeasures. Hughes LASR systems are being built for use with Norwegian Hawk antiaircraft missiles.

For more information write to: P.O. Box 11205, Dept. 64-3, Marina del Rey, CA 90295

HUGHES
AIRCRAFT COMPANY

AEROSPACE WORLD
News, Views & Comments

By James P. Coyne, SENIOR EDITOR



Northrop's second production F-20 Tigershark made its first flight in August 1983 at Edwards AFB, Calif. The crash of the first production F-20 in October is not expected to affect the ongoing flight-test program at Edwards AFB.

Washington, D. C., Nov. 2

★ The October 10 crash of Northrop's F-20 Tigershark at the conclusion of a demonstration in Korea has in no way changed the company's plans for continuing to market the aircraft, a spokesman told AIR FORCE Magazine.

The aircraft has now completed more than 1,000 test and evaluation flights. "The Tigershark continues to fly a heavy and demanding flight-test schedule at Edwards AFB, Calif., with the assistance of the US Air Force as executive agent," a company spokesman said.

The plane that crashed, killing Darrell E. Cornell, Northrop's chief test pilot, was the first Tigershark produced. Ironically, the crash occurred just after the last pass of the last demonstration of an around-the-world tour that had started at the Farnborough Air Show in England.

Demonstrations had been given at Farnborough as well as in Germany, Switzerland, Portugal, Morocco, Tunisia, Egypt, Jordan, Saudi Arabia, Pakistan, Thailand, Malaysia, Singapore, Indonesia, and Korea during the one-month tour. Response had been enthusiastic, the company spokesman said.

AIR FORCE Magazine will carry a full-length article in the January issue on the Tigershark and its demonstration tour.

★ A radical new weapon dispenser to be carried by such fighters as the F-15 Eagle is now in the planning stage at Air Force Systems Command's Armament Division, Eglin AFB, Fla.

The system, called the Advanced Weapon Carriage Integration Technology (AWCIT), is expected by Armament Division to double the speed and range of tactical fighters carrying munitions and to increase survivability in the target area. The AWCIT will be of conformal blended-body design, which reduces drag dramatically. A fighter will carry four AWCITs.

An AWCIT will launch from the fighter, fly to the target, and then dispense a variety of submunitions. The fighter carrying it can "launch and leave."

The new dispenser will be sleek, just over three feet wide and about thirteen feet long. It will weigh 2,000 pounds, be constructed of composite materials, and utilize advanced hydraulic bomb-rack technology.

Armament Division officials expect the first AWCIT to be fabricated sometime in 1986, with flight testing, probably on the F-15, to take place in the 1987–88 time frame.

★ A new FAA statistical summary shows near midair collisions in the US decreased by almost fifty percent between 1980 and 1983. Actual figures were 568 near midairs in 1980 and 286 in 1983. The summary was compiled as part of an ongoing study to identify safety trends.

Among key findings were that near midair collisions most frequently involve one pilot flying in the air traffic control system while the other pilot is operating under Visual Flight Rules (VFR) and most often involve at least one general-aviation aircraft.

Near midairs occur more frequently in the May through August time period, most frequently when weather is not a factor, and generally at altitudes between 1,000 and 5,000 feet.

In releasing the statistical summary, FAA Administrator Donald D. Engen stressed the ultimate responsibility for all pilots to "see and be seen." He noted this responsibility exists even for pilots flying under positive control of the air traffic control system.

★ Unit sales of US business, private, and light transport aircraft plummeted from 17,811 to 2,691 in the five-year period ending in 1983, a new study by the Aerospace Industries Association of America reveals. During

the same period, billings climbed from $1.82 billion to $2.9 billion in 1981, but then dropped to $1.4 billion.

Inflation, high interest rates, and the 1981–83 economic slowdown, along with increasing foreign competition, were given as reasons for the decline.

The report says the recent upturn in the US economy and the expected continuing increase of corporate profits and capital spending portend some improvement in US general aviation production. Exports, however, which traditionally account for twenty-five to thirty percent of the total US aviation market, are expected to drop to less than fifteen percent for 1984. According to the AIA, exports will be hit hard by continuing price disadvantages stemming from the strong US dollar, foreign government subsidies to overseas manufacturers, and trade barriers in many countries.

But equally important, AIA says, is the continuing erosion of the technological advantage formerly enjoyed by US manufacturers over their competitors. This is partly due to foreign government support of industry and subsidization of research and development efforts.

The study concludes that the US government should establish monetary and fiscal policies that reduce high dollar values, enhance incentives for research and development, provide competitive export financing and other export incentives, and establish a consistent technology transfer policy.

★ Beginning in January, a new computer system will revolutionize the way the Air Force manages its munitions inventory, according to Air Force Logistics Command. The new centralized system will replace the current method of tracking munitions through base supply computers.

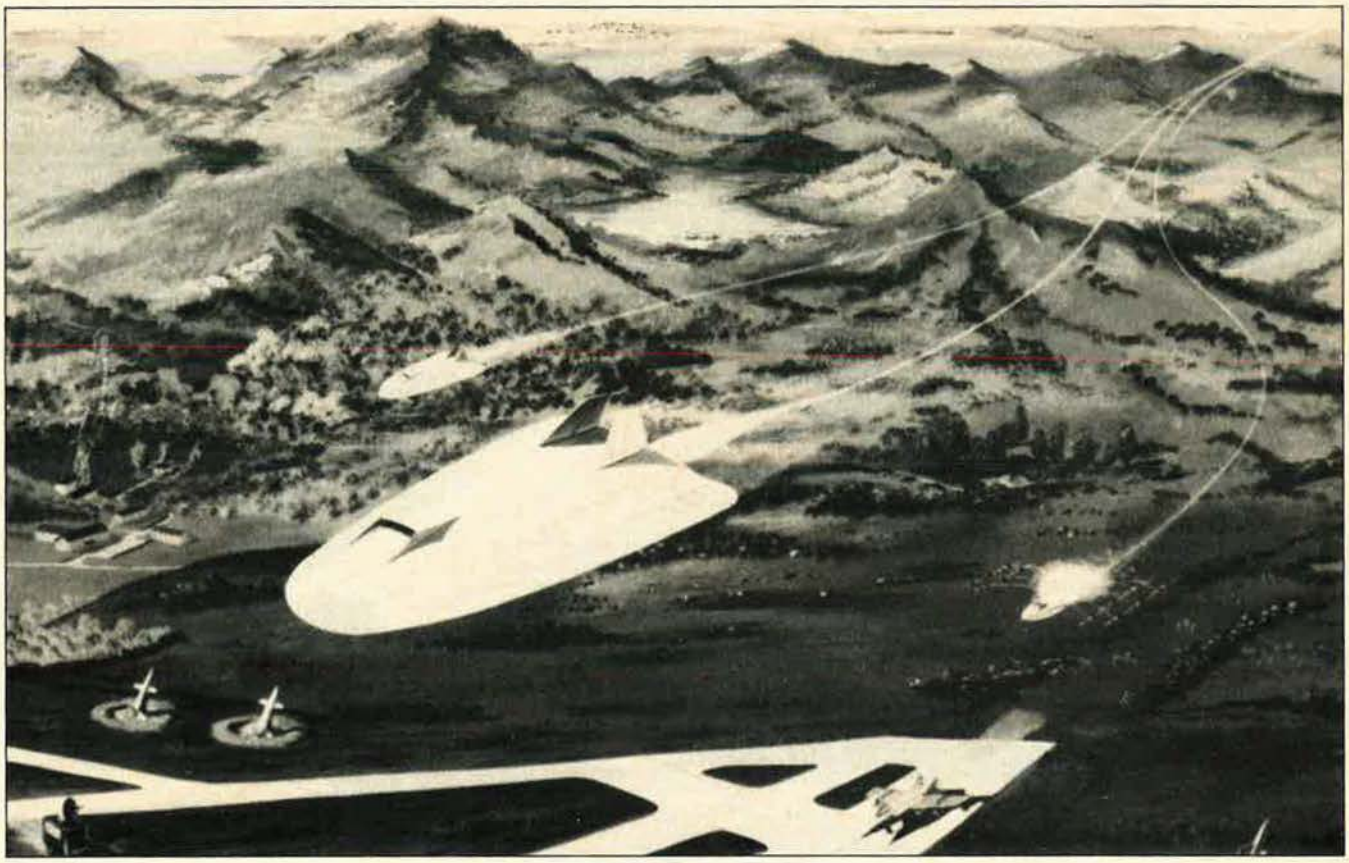
Under the new system, all munitions will be marked with a bar code like that used on products in civilian grocery stores. Supply specialists will inventory munitions using code-sensitive wands attached to handheld "readers." Information will be fed into a worldwide munitions inventory through computer terminals at each base.

With testing expected to continue into the fall of next year, the system will yield an accurate worldwide count of the munitions inventory, automate record-keeping, and provide timely planning information for distribution, transportation, and resupply.

★ The Air Force has established a new award and named it after the only enlisted airman to receive the Medal of Honor since World War II. The John L. Levitow Award is to be presented to honor graduates of noncommissioned officer professional military education courses, including NCO preparatory courses, NCO leadership schools and academies, and the US Air Force Senior NCO Academy.

While a crew member on a gunship mission over Vietnam, then-Airman First Class Levitow, after suffering more than forty shrapnel wounds, dragged an activated flare across the cabin floor of his aircraft and threw it out an open cargo door moments before it exploded, saving the aircraft and the lives of the crew.

★ Gen. Timothy F. O'Keefe, USAF (Ret.), died October 14 at Malcolm Grow Medical Center, Andrews AFB, Md. Before his retirement in September 1974, he was Commander, United States Support Activities Group/Seventh Air Force, with headquarters at Nakhon Phanom Royal Thai Air Force Base, Thailand.



The Advanced Weapon Carriage Integration Technology (AWCIT), now in the planning stage, is designed to significantly increase the speed, range, and survivability of fighters carrying it. The AWCIT, a "launch-and-leave" conformal blended-body weapons dispenser, will be launched from a fighter outside the target area. The AWCIT will then fly into the target area and dispense a variety of submunitions on designated point targets. (See item.)

AEROSPACE WORLD

During the Korean War, he commanded the famed "Mosquito Group," the 6147th Tactical Control Group, which underwent equipment improvement and tactical advances under his command that were pivotal in the later development of tactical air control in Vietnam.

In 1954 and 1958, General O'Keefe led the Tactical Air Command gunnery teams in Worldwide Gunnery Meets at Nellis AFB, Nev. He graduated from the National War College in 1960.

★ The United States is the world leader in creating new technology, but, paradoxically, it lags in using new technological developments. "The application and use of technology is where our international trading partners have scooped us—and often by using the very technology we've created," observed Dr. Joseph W. Ray, associate director of Battelle Memorial Institute's Columbus Division. He recently addressed about 200 industry and government leaders attending a Battelle technology briefing.

The US is recovering some of its momentum, he said, as research and development spending by US industry has averaged more than five percent real growth for the past six or seven years. However, other countries view technology advancement as a key to international success—Japan and Western Europe are increasing R&D investments at the same pace and, in some cases, at a greater pace than is the US.

Many newly developed countries have already applied high-tech solutions that have resulted in significant economic growth, and many developing countries realize the efficacy of tying their future to the high-tech bandwagon, he pointed out.

Dr. Ray warned that while high-tech development may enable nations to compete, it does not provide a solution to unemployment. Of 20,000,000 new jobs created in the US during the 1970s, he said, less than three percent resulted from high-technology industry, and it is expected to provide less than six percent of new jobs created over the next ten years.

"An important point often overlooked in all the high-tech rhetoric," he said, "is that the biggest impact of high-tech industry will come from the application of its products in our more mature and our basic industries."

★ In a technological marriage that required congressional legislation to permit use of major US military equipment in civilian law enforcement of drug smuggling, the radar used in the Air Force's F-15 Eagle has been installed in a US Navy P-3A Orion patrol aircraft used by the US Customs Service.

Providing what the Customs Service says is an order of magnitude increase in drug-smuggling detection capability, the first P-3 equipped with the Hughes APG-63 radar is under evaluation while flying out of New Orleans, La., and Tucson, Ariz.

The radar is especially well suited for the special requirements of the job, which include detecting and tracking slow, small, low-flying aircraft possibly attempting to smuggle contraband into the United States.

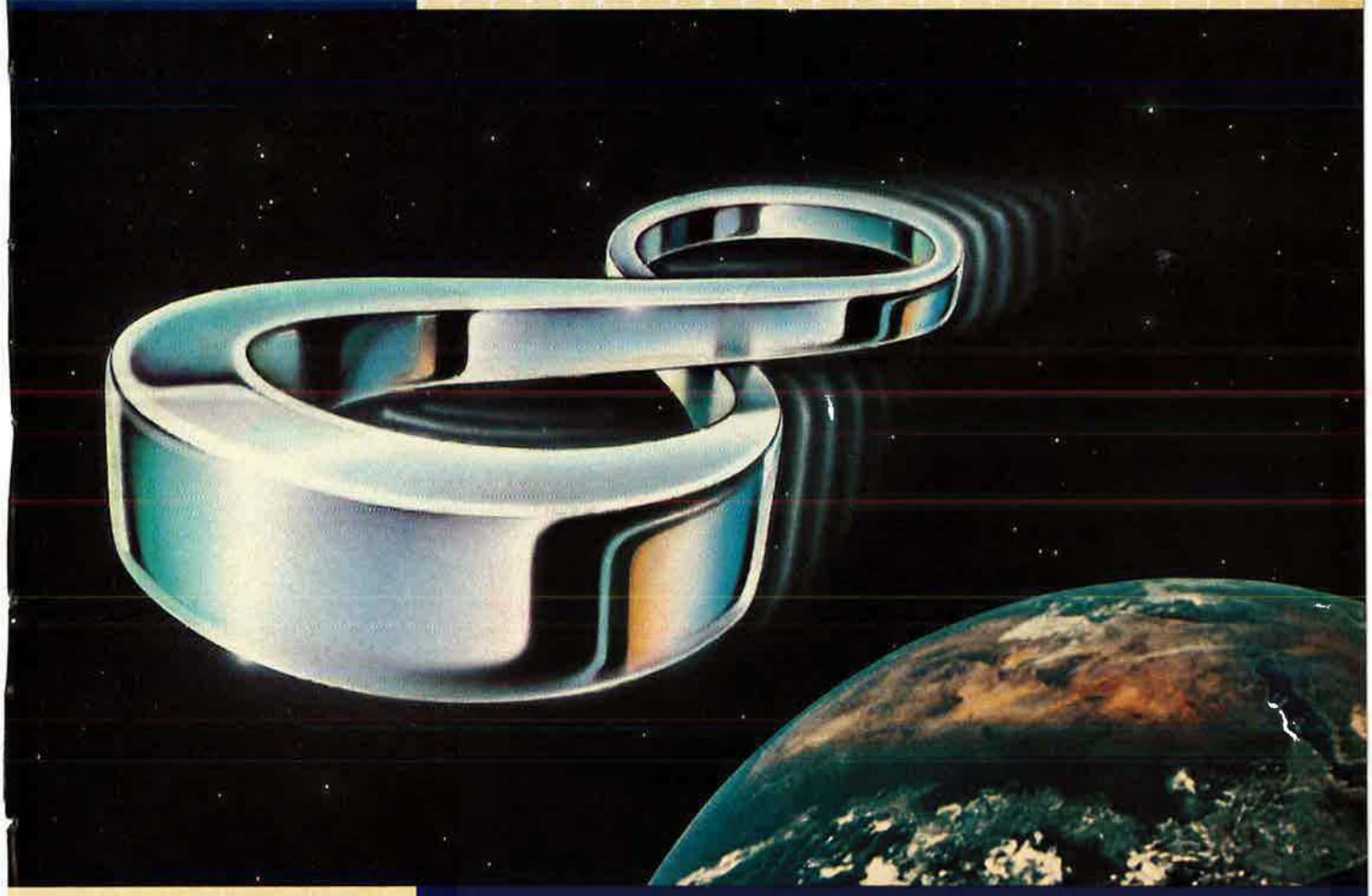
A fleet of six P-3 aircraft with F-15 radars is planned by the end of 1986. The Navy tested the system at Patuxent River Naval Air Station, Md., and it passed with high marks.

★ The first selectee for the General Lew Allen, Jr., Research Chair at the Air Force Institute of Technology is Dr.



Northrop Corp.'s first two-seat F-5F tactical jet fighter, tail number 00889, celebrated the tenth anniversary of its initial flight in September. The aircraft is currently used in the training of USAF and foreign air force instructor pilots at Williams AFB, Ariz. The F-5F is a member of the F-5/T-38 family of tactical aircraft. Northrop has produced more than 3,700 F-5s and T-38s. Production of F-5s continues at the company's two assembly lines in California.

When good just isn't good enough...



Come to Fairchild Weston

Our cost-effective systems solutions combine innovation, high technology and rugged reliability to meet your needs in:

- Aerial Reconnaissance
- Battlefield Surveillance
- C^3 Countermeasures
- Automatic Test Equipment
- Telemetry
- Data Recording

Building on an experience base developed over 60 years, our high performance products are known for their quality the world over.

When your need is for the best solutions to your systems problems, *come to Fairchild Weston.* 300 Robbins Lane, Syosset, New York 11791 (516) 349-2200 · TWX 516-221-1836

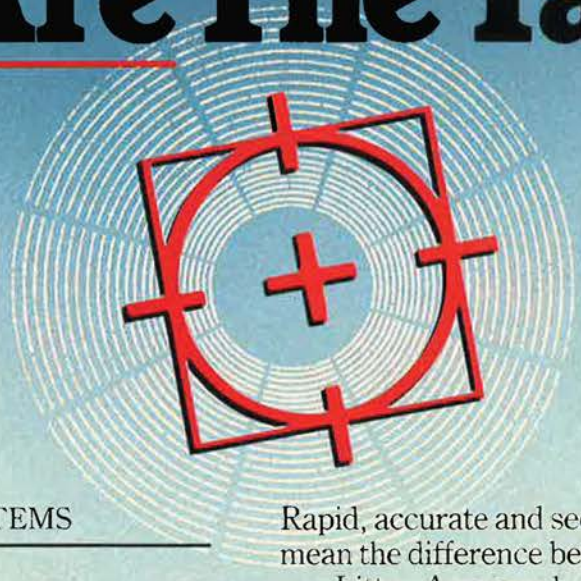
FAIRCHILD WESTON SYSTEMS INC.

FAIRCHILD WESTON
Schlumberger

Excellence in Defense Systems Technology . . . Worldwide

In C^3I, If Your Technology Isn't On Target,

You Are The Target.



COMMUNICATIONS SYSTEMS

BROADBAND HF

EHF

VOICE & DATA SWITCHING

MULTIPLE LEVEL SECURITY

LOCAL AREA NETWORKS

SECURE FACSIMILE

Rapid, accurate and secure communications can mean the difference between life and death.

Litton Amecom holds a commanding position because we understand the importance of tactical and strategic command, control, communications and intelligence. And the consequences of failure.

At Litton Amecom, we design, develop and build technical solutions to C^3I problems. We install our systems and provide integrated logistical support, training and maintenance.

We're Litton Amecom. We build the systems you can bet your life on.

Litton Amecom, 5115 Calvert Road,
College Park, Maryland 20740 (301) 864-5600

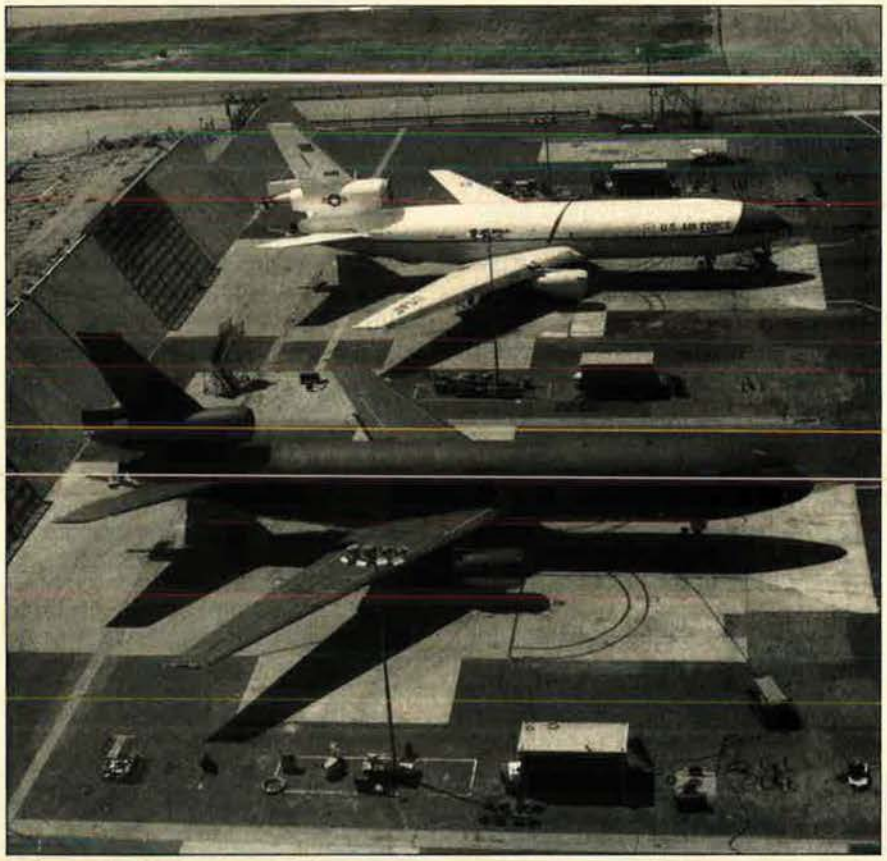
Litton Amecom

AEROSPACE WORLD

John L. Brown, Jr., a professor of electrical engineering at Pennsylvania State University.

The first of its kind at AFIT, the General Lew Allen, Jr., Research Chair is sponsored by the Air Force Systems Command, the Aeronautical Systems Division, and AFIT to commemorate General Allen's extraordinary contributions during his long professional career.

Beginning his one-year appointment in September, Dr. Brown will focus on dynamic technologies of vital interest to the Air Force. He will carry out avionics research for ASD and also teach at AFIT.



The newest Air Force KC-10 Extender tanker/transport (foreground) sports its new, subdued paint job, in marked contrast to the earlier paint design (shown on the KC-10 in background). Effective with this aircraft, the twenty-sixth to be accepted by the Air Force, the new paint scheme will be used on all subsequent KC-10 aircraft.

★ More than ten percent of fatal nonmilitary aircraft accidents involve alcohol-impaired pilots, a report in the November 1 issue of *Aviation Safety* states. The report is based on a National Transportation Safety Board (NTSB) review of accidents covering a seven-year period ending in 1981. Alcohol levels were determined during autopsies performed as part of the accident investigations.

Practically no pilots employed by scheduled airlines were involved in alcohol-related fatal accidents. However, alcohol-impaired pilots were involved in 6.4 percent of fatal accidents by on-demand air taxi services and in 7.4 percent involving scheduled commuter airlines.

General aviation, which includes privately owned and company aircraft, had a much higher rate. During the seven-year period, 3,256 out of 4,596 fatal general-aviation accidents allowed conclusive toxicology testing. Of these, 343 cases (10.5 percent) showed alcohol impairment of the pilot.

Surprisingly, the majority of these accidents—seventy-seven percent—occurred not during the most difficult takeoff and landing phases of flight but during the in-flight portions.



Flight Safety International is training 240 USAF pilots assigned to fly the Air Force's new C-21As, the military version of the Gates Learjet Model 35A. Shown in one of Flight Safety International's simulators at the Tucson Learjet Learning Center are Gen. Thomas M. Ryan, Jr., left, CINC MAC, and Maj. Gen. Donald D. Brown, MAC's DCS for Operations.



Lyle Remde, longtime National Vice President for AFA's Midwest Region, died November 3. He was seventy-eight. A native of Omaha, Neb., Mr. Remde served six terms as Nebraska State AFA President and six terms (1975–77 and 1980–82) as Vice President for the Midwest Region.

While a higher proportion of alcohol-related fatal accidents happen at night as compared to all fatal accidents (thirty-eight percent vs. twenty-two percent), sixty-two percent still happen during daylight flying. NTSB says the problem is hard to control because many drinking pilots fly at night and mostly use uncontrolled airports.

AEROSPACE WORLD

★ Air Force Logistics Command has awarded a contract to update the B-52 radar system and to ensure readiness of the weapon system well into the 1990s.

Boeing Military Aircraft Co. was awarded a $105 million first production contract to provide logistics support, spares, training, and modification kits for the first eleven of the 264 strategic bombers in the Air Force fleet.

The present radar system, which uses vacuum tubes, will be replaced with state-of-the-art electronics. Approximately fifty components used in the present system will be replaced by eight high-speed integrated circuits to improve the system and make it easier to maintain.

The existing system requires maintenance after every fifteen hours of flight, on the average. The new system is expected to require maintenance after only every 102 flight hours.

Two other B-52 modifications have been under way. The environmental control system is being upgraded to improve pressurization, reduce noise, and decrease maintenance. In the other modification, much of the B-52's outdated avionics system is being replaced with state-of-the-art digital equipment. Modification of aircraft to carry the air-launched cruise missile also continues.

★ Air Force Secretary Verne Orr wrote a sharply worded reply to a New York *Times* editorial that charged the service with paying exorbitant prices for items like flashlights and high-technology aircraft.

The Secretary noted the Air Force pays only $1.35 for its flashlights, not the $170 claimed in the editorial. "The 'flashlight' discussed is not a flashlight," he wrote. "It was designed for emergency situations—situations our experience tells us can occur. The same item on civilian aircraft typically costs twice the amount," he continued. "Our pilots do not use it to read maps and inspect wheels."

Responding to the *Times's* charge that the service pays extravagant premiums to cover extreme cases, the Secretary noted that design choices do not fall into clear-cut alternatives of complex, expensive weaponry vs. simple, dependable, inexpensive systems.

"Saying that the Air Force could put three F-16s in the air for each F-15

Hitler's "Greatest Lost Battle"

The comments on strategic bombing in the new Harrison Salisbury book, *A Journey For Our Times,* and the riposte by Gen. T. R. Milton, USAF (Ret.) *(see p. 79)*, once again spotlight the now-forty-year-old dispute on the effectiveness of strategic airpower in World War II and what the United States Strategic Bombing Survey *really* said about it.

The survey, in its summary report, states clearly that "Allied air power was decisive in the war in Western Europe. . . . Its power and superiority made possible the success of the invasion. . . . It brought the economy which sustained the enemy's armed forces to virtual collapse, although the full effects of this collapse had not reached the enemy's front lines when they were overrun by Allied forces."

Critics point out that German production of aircraft and some other war armaments actually increased after the US bombing campaign started in 1942. The survey explains that the Germans accomplished this, first, because with the appearance of victory on the Russian front, Hitler had actually called for a cutback in production before the campaign started, so they were then operating well below normal capacity, and second, no industry was operating on more than one shift a day until after the start of the campaign. Even with reduced factory floor space, production went up by adding second and third work shifts. (Later, the Nazis used slave labor to build new underground factories in remote areas.)

Another reason is that real saturation bombing did not start until well into 1944. Before then, there were, at first, insufficient bomber assets, and later, for a time, much of the bomber effort was diverted to support of the war in Africa and the Mediterranean. In fact, more than seventy percent of the tonnage dropped on Germany was not delivered until the last ten months of the war (July 1944 to April 1945).

Then, the survey stated, "In the course of these raids, Germany's steel industry was knocked out, its electric power industry was substantially impaired and industry generally in the areas attacked was disorganized."

Supporting the findings of the Strategic Bombing Survey are the observations of the man who should know better than any other the results of the strategic bombing of Germany: Albert Speer, Hitler's Minister of Armaments, who had performed miracles of industry mobilization until the bombing campaign overwhelmed Germany.

He points out in his book, *Spandau: The Secret Diaries,* that effects of bombing on the German economy were not the most significant results of the air war. "The real importance of the air war," he wrote, "consisted in the fact that it opened a second front long before the invasion of Europe. The front was the skies over Germany. The unpredictability of the attacks made this front gigantic. . . . Defense against air attacks required the production of thousands of antiaircraft guns, the stockpiling of tremendous quantities of ammunition all over the country, and holding in readiness hundreds of thousands of soldiers. . . . No one has yet seen that this was the greatest lost battle on the German side."

In a conversation with Lt. Gen. Ira C. Eaker, USAF (Ret.) *(see* AIR FORCE *Magazine, April '77 issue)*, Speer commented, "Air Marshal Milch told me that your combined air effort forced us to keep 900,000 men tied down on the so-called 'West Wall' to defend against your bombers.

"I suspect that well over a million Germans were ultimately engaged in antiaircraft defenses, as well as 10,000 or more antiaircraft guns. Without this drain on our manpower, logistics, and weapons, we might well have knocked Russia out of the war before your invasion of France." —J.P.C.



Westinghouse MRT. When the message must get through.

The message will get through. Why? Because communications from command to the Air Force strategic bomber force will be loud and clear with our Miniature Receive Terminal.

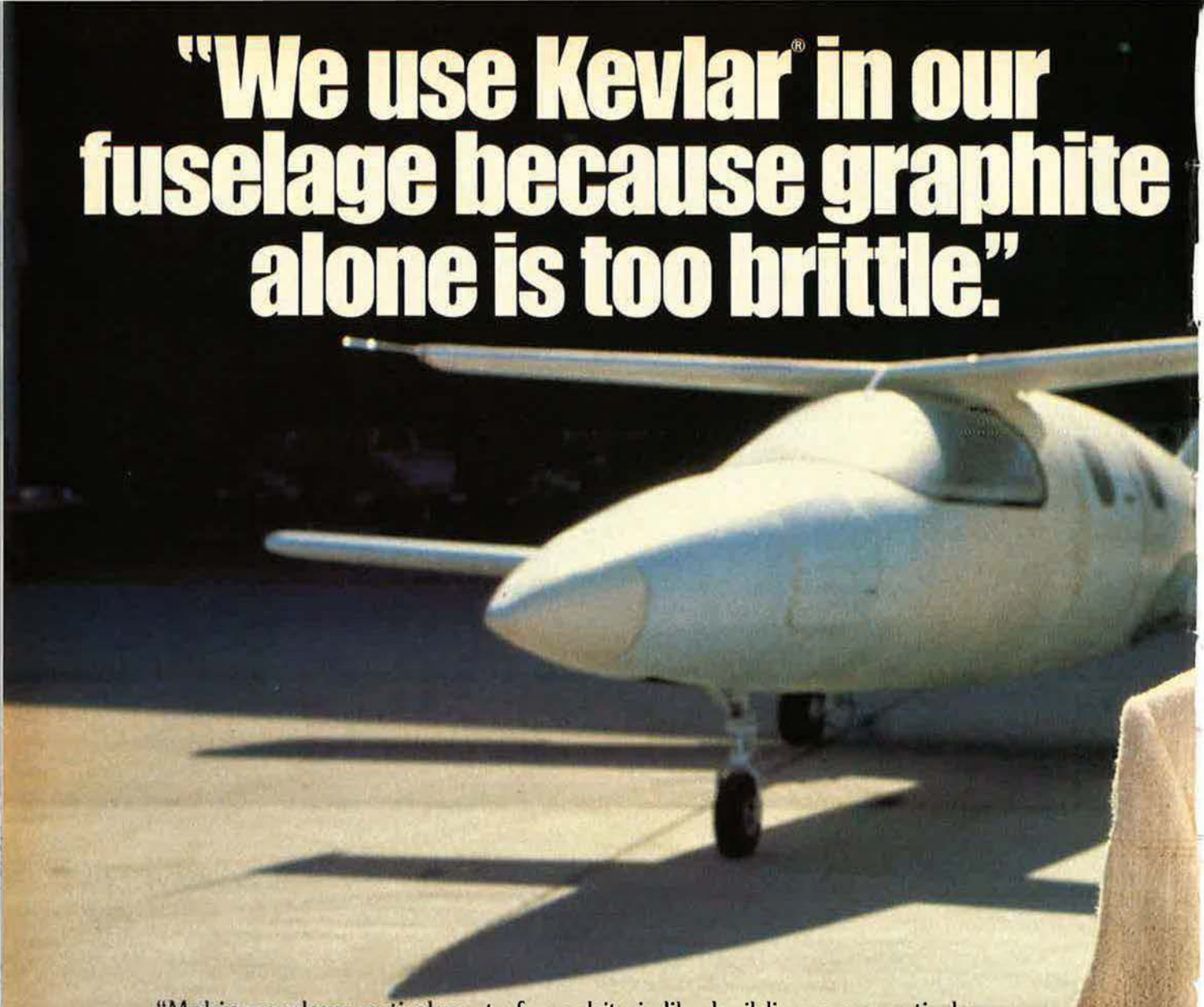
Westinghouse is well qualified to close the loop. After developing the 487L survivable communications system and the 616A update to the 487L, we have continued R&D to key MRT technology. And because space is so critical, our MRT is designed to be the most miniature available.

We and our team are ready and able to complete the B-1B communications. Ready when the B-1B is.



You can be sure . . . if it's Westinghouse

"We use Kevlar® in our fuselage because graphite alone is too brittle."



"Making a plane entirely out of graphite is like building a car entirely out of high carbon steel—as soon as something hits it hard, it'll shatter."

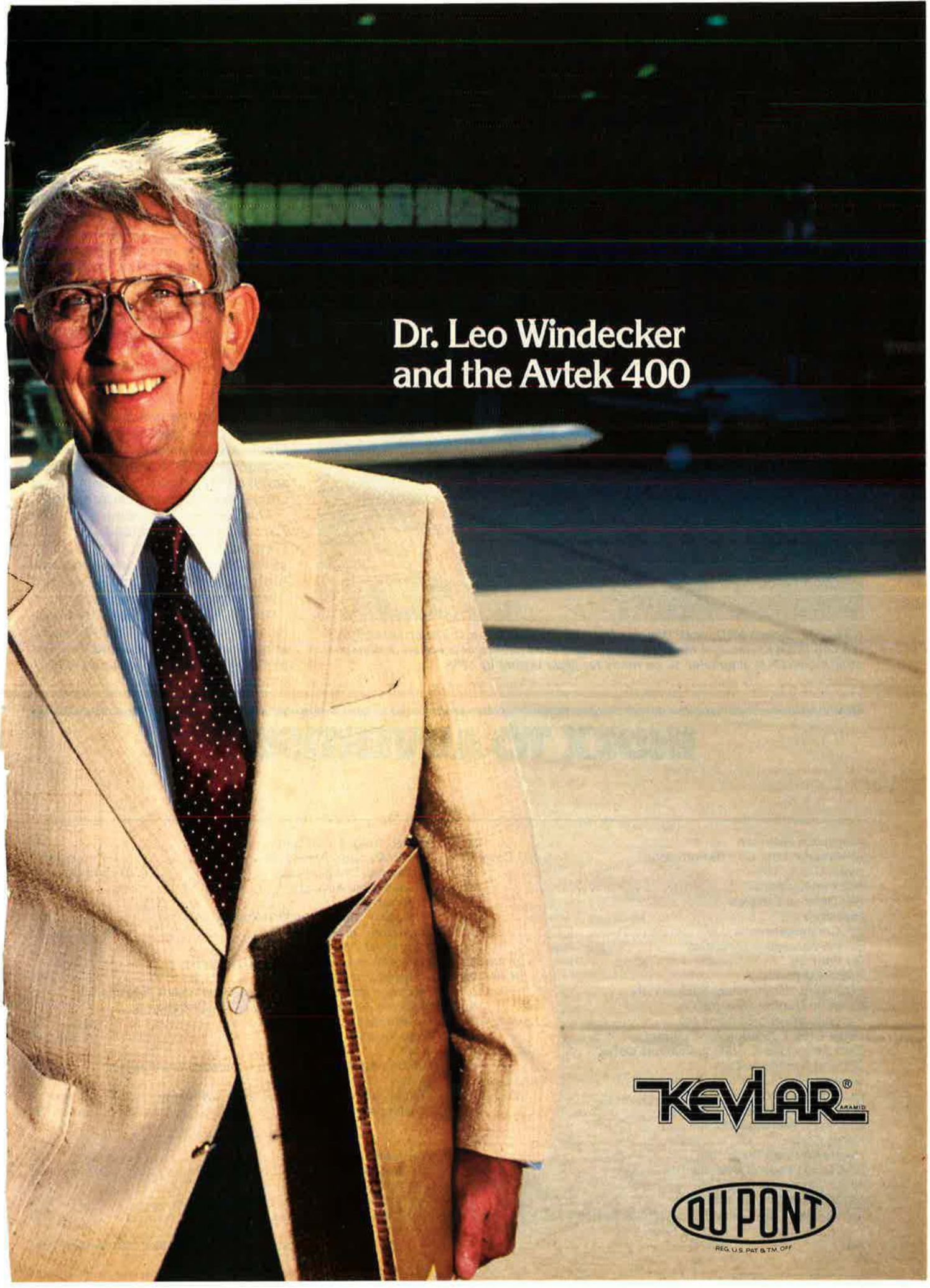
It's not surprising, then, that Dr. Windecker—who built the first FAA-certified all-composite plane—has now developed one that contains more KEVLAR* aramid fiber than graphite.

According to Dr. Windecker, the big problems with graphite are "fractures and failure to pass static tests—in short, brittleness. What's needed is something that won't crack up or break apart. KEVLAR is the ideal material. Alone, or in hybrids using graphite, KEVLAR has all the characteristics you need for pressurized fuselages and structural components." In fact, KEVLAR helped the Avtek 400 pass its proof-load static tests with flying colors on the first try.

KEVLAR also outperforms other materials in manufacturing. Molded panels with skins of KEVLAR and honeycomb cores of NOMEX* simplify construction and entirely eliminate the use of rivets that could add as much as 15% to a plane's weight.

If you'd like to learn how combining KEVLAR with graphite can help your new designs take shape, or improve existing designs, call 800 4-KEVLAR. Or write Du Pont Company, Room G-40660, Wilmington, DE 19898.

* Du Pont registered trademarks for its aramid fibers. KEVLAR and NOMEX are made only by Du Pont.

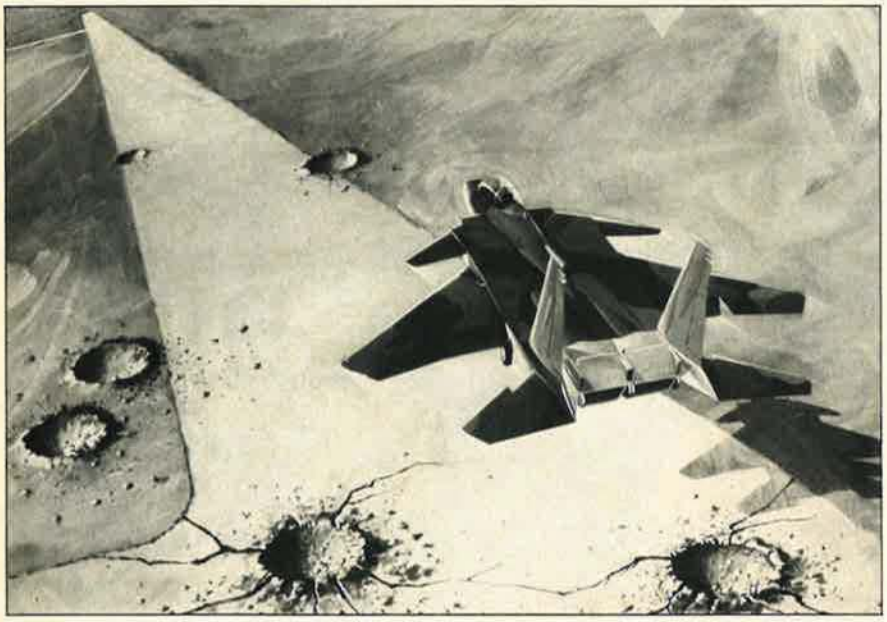

Dr. Leo Windecker
and the Avtek 400
KEVLAR®
ARAMID
DUPONT
REG. U.S. PAT. & TM. OFF

does not address the mission of each aircraft," he wrote. "The F-15 and F-16 complement each other and give us the combat effectiveness to meet a wide spectrum in which neither aircraft alone can do what the two together can do."

Effectiveness, the Secretary said, is the Air Force's first priority. "Sometimes this demands that we buy weapons that don't easily fit the mold of 'effective and inexpensive.' Technology is not always the cheapest solution to the problems of combat, but many have proven—the Israelis come quickly to mind—that it wins engagements effectively with a minimum of lives [lost]," he wrote.

While he was not specific, Secretary Orr was referring to the experience of the Israelis during the 1973 war, when they were at first completely denied control of the air by enemy missiles and ground communications UHF jammers, contrasted with their experience in 1982, when—with vastly improved electronics, avionics, and other expensive high-tech systems—they were able to destroy some ninety Syrian MiGs and nineteen surface-to-air missile sites without a loss.

AEROSPACE WORLD



USAF has chosen McDonnell Douglas Corp. to develop and test a short takeoff and landing (STOL) version of the F-15, shown here in an artist's conception. A demonstrator aircraft is scheduled to be ready for flight testing by 1988.

★ The Air Force has asked McDonnell Douglas Corp. to produce and flight-test an advanced technology version of the F-15 with short takeoff and landing capability and improved cruise and maneuver performance.

The purpose, according to the Air Force program manager, Lt. Col. Richard A. Borowski, is to demonstrate technology required to operate high-performance fighter aircraft from bomb-damaged airfields.

An F-15 demonstrator fitted with movable canards and thrust-directing engine nozzles is scheduled for flight testing by 1988. The canards will in-

INDEX TO ADVERTISERS

Aerospace Historian 197
AiResearch Mfg. Co., Garrett Corp. ..... 8 and Cover III
Alkan U.S.A., Inc. 99
BDM International 161
BEI Defense Systems 112
Blackbird 194
BR Communications 116
British Aerospace Dynamics 11
Du Pont Co. ..... 38 and 39
Eaton Corp. ..... 94 and 95
EDO Corp., Government Systems Div. 102
Fairchild Control Systems Co. 57
Fairchild Weston Systems Inc. 33
Ferde Grofe—Aviation A. V. Library 41
Ford Aerospace & Communications Corp. ..... 100 and 101
General Dynamics Corp. 21
General Electric, Aircraft Engine Div. ..... 1 and Cover II
Goodyear Aerospace ..... 58 and 59
Gould Inc., NavCom Systems Div. 61
Grumman Aerospace Corp. 12
Harris Corp. 135
Hughes Aircraft Co. 29
IBM Corp., Federal Systems Div. ..... 48 and 49
Jesse Jones Box Corp. 197
Litton Industries, Amecom Div. 34
Litton Industries, Guidance & Control Systems Div. 72 and 73
M.A.N. Truck & Bus Corp. 47
Martin Marietta Aerospace ..... 6 and 7
McDonnell Douglas Corp. ..... 80, 81, and Cover IV
Meehan Fine Arts, Ltd. 194
Northrop Corp. 15
Pentagon Federal Credit Union 177
Raytheon Co. ..... 25, 26, and 27
RCA Missile & Surface Radar 2
Rockwell International, Collins Defense Communications Div. 136
Rockwell International, Collins Government Avionics Div. 5
Rockwell International, Space Transportation & Systems Group 69
Rolls-Royce Ltd. ..... 114 and 115
SDC 82
Smith Industries Aerospace & Defense Systems Inc. 78
Sperry 22
United Technologies Corp., Pratt & Whitney ..... 17, 18, and 19
Westinghouse Defense 37

AFA Field Supplies 195
AFA Insurance ..... 198 and 199
AFA Symposium 182
AFA Visa Card 193
AIR FORCE Magazine 168



World War I aces at the Pentagon are (seated, from left) Robert M. Todd; A. Raymond Brooks; (standing, from left) Harold Kellogg (aide to Mr. Todd); Kenneth L. Porter; their host, Lt. Gen. Robert H. Reed, USAF Assistant Vice Chief of Staff; Henry Forster; and George A. Vaughn.

crease the aircraft's lifting power and reduce drag. The rectangular exhaust nozzle will vector engine thrust during takeoff and in-flight maneuvers and will reverse thrust to shorten the landing roll.

The Air Force expects the aircraft to be capable of takeoff with full internal fuel and a 6,000-pound payload from a 1,000-foot runway. Landing roll with payload expended is expected to be under 1,250 feet on a wet runway.

Controls for the canards and nozzles will be integrated with existing F-15 controls through a digital fly-by-wire system. Flight and propulsion controls will work together with brakes and steering to improve the pilot's ability to steer and stop the aircraft on slippery, wind-swept runways.

Thrust reversing will shorten landing rolls, and the landing gear will be modified to permit high-sink-rate landings for improved touchdown accuracy. Radar, infrared, and inertial navigation systems will generate data to locate the runway and furnish guidance cues.

★ Five surviving World War I aces and members of the Lafayette Flying Corps were honored in Washington at a series of events on October 16, 17, and 18, 1984, celebrating passage of Joint Congressional Resolution 333, which designates September 21, 1984, as World War I Aviators Day.

The former flyers were hosted at a reception in the Pentagon by Lt. Gen. Robert H. Reed, USAF, Assistant Vice Chief of Staff, on the afternoon of October 16. That evening, they were honored at Bolling AFB with a larger group of World War I aviators during a Founder Member Dinner of the National Capital Flight of the Order of Daedalians.

On October 17, they visited the World War I section of the National Air and Space Museum and viewed a film featuring the types of planes they had flown. Later, they were guests of honor at a reception at the French Embassy in Washington, where they were decorated with the prestigious *Médaille Aéronautique*.

They completed their Washington stay on October 18 with a visit to the White House, where they were hosted by Presidential Counselor Edwin Meese and Air Force Secretary Verne Orr.

In the group were Henry Forster, Lafayette Flying Corps and US Navy, George Vaughn, thirteen victories, Kenneth Porter, six victories, and A. Raymond Brooks and Robert M. Todd, five victories each.

★ For the first time, the Air Force and Army have initiated an officer exchange program at the Deputy Chief of Staff level.

The exchange program is part of the effort initiated by Gen. Charles A. Gabriel, Chief of Staff, US Air Force, and Gen. John A. Wickham, Jr., Chief of Staff, US Army, to enhance the ability of both services to conduct joint airland combat operations.

The fourteen action officers, seven from each service, will work in the plans and operations divisions on subjects ranging from space operations to doctrine and concept development planning. The tour of duty is for one year. ■

Aviation A.V. Library Presents



THE VIDEO BOOK PAK

We proudly offer you **two** great volumes; **U.S. Bombers** (1928-1980's) & **U.S. Fighters** (1925-1980's) by Lloyd S. Jones . . . a full 632 pages & exciting photos . . . **2** great reference books of America's air might.

Plus

Combat Pilots

The Air Force Story

A video history of the Air Force. 32 complete volumes from the original archives. **More than seven and one-half hours** of aviation combat, custom transferred to four video cassette albums. A fantastic reference library from the Wright Brothers and bloody scraps in ragwing Kites over France through World Wars I and II to jet dogfights over Korea. Billy Mitchell, Doolittle, Lindbergh, WWII, N. Africa, Ploesti, Schweinfurt, the Super-forts, the Japanese Air War, the jetage, scrambles with Migs over the Yalu and much, much more. **Combat Pilots—The Air Force Story, offered for the first time in its entirety on ½ inch video cassettes,** is a magnificent 7½ hours of the history of air power. A living motion picture document as told by the men who made this history. A rare and memorable treasure. All four video cassette albums and U.S. Bombers/Fighters – both volumes, only

$249.95

The complete collection includes:

Album I
- The Beginning 1906-1919
- After the War 1919-1924
- Struggle for Recognition 1924-1930
- Between the Wars 1930-1935
- Air Power Advances 1935-1937
- Prelude to War 1937-1939
- Air War Starts 1939-1941
- Drawing of the Battle Lines ..... Dec. 1941-Apr. 1942

Album II
- AAF Fights Back ..... April-June 1942
- The Tide Turns ..... June-Dec. 1942
- North Africa ..... Nov. 1942-May 1943
- Expanding Air Power ..... June 1943
- Schweinfurt & Regensburg ..... August 1943
- Maximum Effort ..... October 1943
- Road to Rome ..... Sept. 1943-June 1944
- Two Years at War

Album III
- Superfort ..... Aug. 1943-June 1944
- Prelude to Invasion ..... Jan. 1944-June 1944
- Ploesti Raid ..... Mar. 1944 Aug. 1944
- Retreat & Advance ..... June 1944 Mar. 1945
- Victory in Europe ..... June 1944 May 1945
- Air War Against Japan 1944-1945
- "D" Day ..... June 1944
- A New Air Force 1945-1947

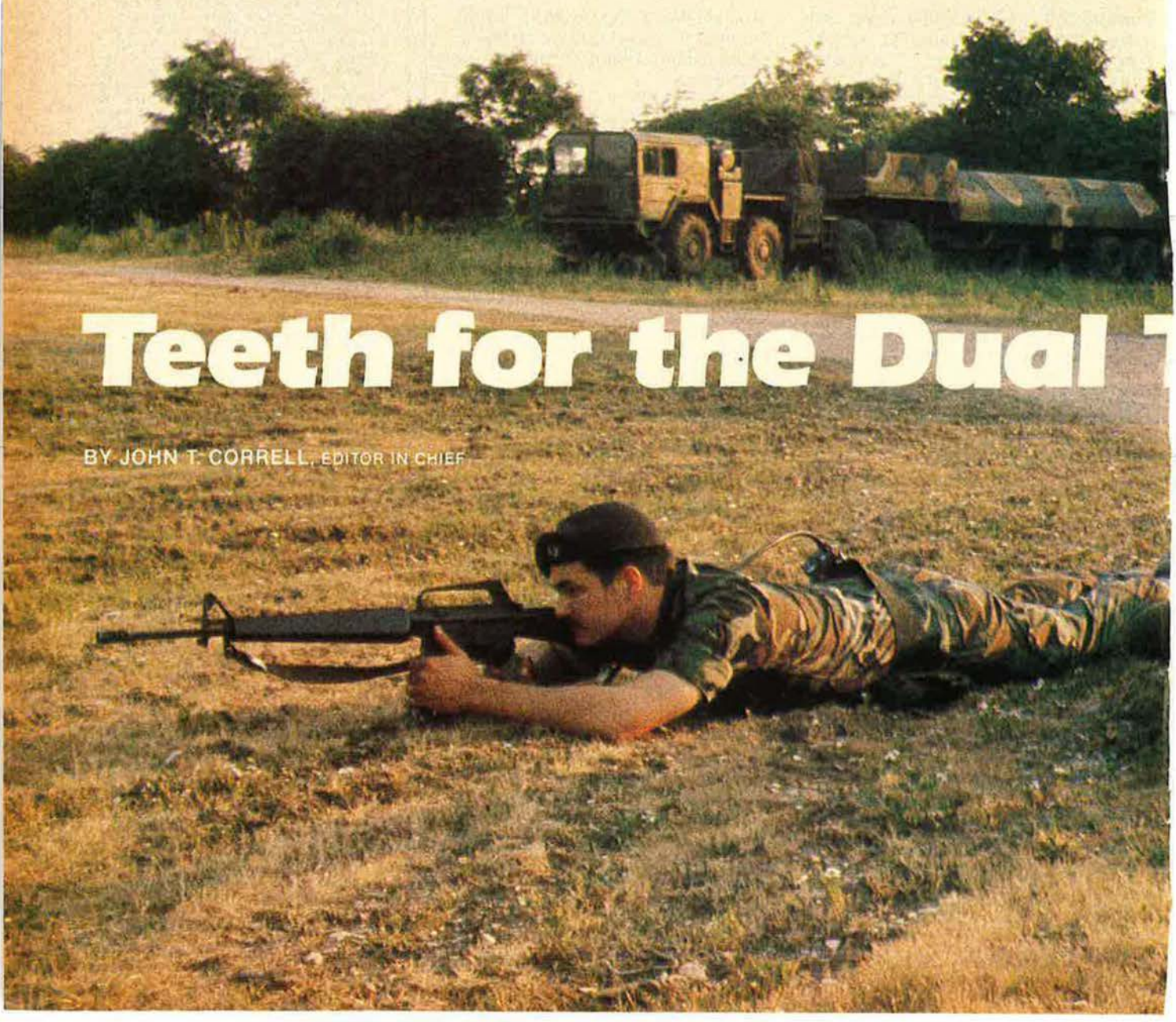
Album IV
- Air Force Global Operations 1946
- The Cold War 1948-1950
- Meeting the Red Challenge Korea ..... June 1950
- On to the Yalu, Korea ..... June 1950
- Final Phase, Korea 1952
- Our World Wide Air Force 1953-1959
- Air Force and the "A" Bomb 1944-1955
- Tactical Fire Power 1950-1960

Send to: **FERDE GROFE FILMS**
3100 Airport Ave., Santa Monica, CA 90405
U.S. and Canada, add $2.50 shipping, foreign orders, add $3.50. CA res. add 6½% Sales Tax
Visa & Master - include card no. & expiration.
ORDER TOLL-FREE (800) 854-0561, ext. 926.
In Calif. (800) 432-7257, ext. 926.

One year after IOC, ground-launched cruise missiles are on alert in England and Italy, and deployments continue.

Teeth for the Dual T

BY JOHN T. CORRELL, EDITOR IN CHIEF



UNDER heavy security and with thousands of antinuclear activists demonstrating outside the gates, the ground-launched cruise missile (GLCM) achieved initial operational capability a year ago this month at RAF Greenham Common. Today, a few demonstrators still occupy the "peace camp" at Greenham Common, but their numbers have diminished vastly and their rallies no longer draw the huge crowds they did in 1983. Their views on the GLCM presence are not shared by the majority of the British public.

On the inner side of the fence, crews of USAF's 501st Tactical Missile Wing carry out their daily alert and training in routine fashion. The crews have been able to practice off-base dispersal operations on at least four occasions.

The deployments of GLCM and of the US Army's Pershing II missiles are a response, ordered by NATO, to the relentless buildup of tactical nuclear force in Europe by the Soviet Union. Substantial concern remains among West Europeans about the new NATO missiles, but the Alliance has been firm in its resolve to do what had to be done.

The second flight of GLCMs, assigned to the 487th Tactical Missile Wing at Comiso, Sicily, became operational in March 1984, and the third unit, the 485th Tactical Missile

Wing, was activated at Florennes, Belgium, in August. Eventually, twenty-nine flights of cruise missiles will be stationed at six main operating bases in five European countries—unless NATO and the Soviets can reach some arms-control agreement on theater nuclear weapons.

Spinoff from SLCM

GLCM is a weapon that neither the United States nor its allies wanted to field. This ground-launched version of the BGM-109 Tomahawk was not even part of the original US cruise-missile program. Its development, spun off from the Navy's sea-launched cruise missile (SLCM) program, was ordered in 1977 as a possible counter to menacing new Soviet missiles in Europe. By 1979, multiple-warhead Soviet SS-20 missiles were proliferating, posing a threat to every point in Western Europe.

It was grave concern about this situation that led NATO to its "dual-track" decision: Unless the Soviet Union stopped SS-20 deployments and negotiated in good faith, the Alliance would field GLCM and Pershing II in an effort to alleviate the dangerous imbalance of power. SS-20 deployments continued, and, a year ago, NATO began to implement the dual-track decision it had hoped to avoid.

The Air Force's GLCM requirements will account for only about an eighth of the total production of Tomahawk cruise missiles. Most of the output will go to the Navy for its three ship-launched variants of Tomahawk. Priority has been given to GLCM production, however, in order to meet NATO's deployment schedule.

Procurements under the FY '84 budget will bring Air Force GLCM acquisitions to 269. The FY '85 budget request seeks funding for another 120. USAF hopes to complete the buy, a total of 560 missiles, with FY '87 money. Of the 560 total, 464 will go to equip GLCM flights in Europe, with the remainder held



ack

Greenham Common security troops assume protective stations near a GLCM transporter-erector-launcher and a launch control center.



Soon after its arrival in Great Britain, a GLCM system gets its initial checkout. GLCMs are now operational in England and Italy, with deployments planned in three other NATO nations.

back for spares, replacements in the event of unscheduled maintenance, the missile recertification pipeline, training, and testing.

Compared to the typical defense system acquisition, GLCM moved rapidly from concept to operational capability, but it was hardly a smooth process. Big cost overruns were an annual feature of the GLCM program in the early years. Costs are now under control, but the Joint Cruise Missiles Project Office, the Air Force, and the two GLCM coproducers, General Dynamics and McDonnell Douglas, are still trying to work some of the technical kinks out of the system.

The ongoing GLCM test program, like the SLCM test program before it, has been marred by a number of failures. Still, Pentagon officials say they are confident that the problems can be fixed and that, when GLCM reaches maturity, the technical hitches will be far behind them.

The Convair Division of General Dynamics is the prime contractor for GLCM; McDonnell Douglas Astronautics is coproducer. At first, General Dynamics concentrated on the Tomahawk airframe and systems integration while McDonnell Douglas built the guidance system. A technology exchange has since enabled either company to produce the complete missile.

Flexibility for NATO

The Tomahawk GLCM, which is unlike anything else the Air Force has had in its operational lineup for quite a while, provides NATO with new flexibility as well as new firepower. Its presence means that some manned aircraft previously committed fully to nuclear strike roles could now be directed to other missions if the course of the battle so suggested. The mobility of GLCM, which can move from one place to another as fast as its big M.A.N. diesel tractor can pull it, will make it very difficult for the Soviets to target the missile and keep it targeted. Although GLCM is too lightweight for use against hardened missile silos, its accuracy and the yield of its small W84 nuclear warhead make it lethal for many fixed targets of moderate hardness.

The combination of GLCM and the ballistic Pershing II falls short of matching the SS-20s warhead for warhead, but for a defensive alliance that has conceded its adversary the first shot in any conflict, this level of theater nuclear modernization may be enough—for now. The counterthreat of the new NATO missiles and the difficulty of knocking them out in a preemptive strike would make it unwise for the Soviets to press their military advantage through direct aggression.

Launch and Cruise

The GLCM Transporter-Erector-Launcher (TEL) trailer is towed about the countryside by a rugged M.A.N. tractor that can haul the launcher almost anywhere the crew wants to situate it. The TEL is accompanied by a Launch Control Center trailer, similarly towed, and other vehicles in its support entourage. A GLCM flight, the basic operational unit, has four TELs, each loaded with four cruise missiles. There is no reload capability, but that is a limitation imposed by political restraint, not by technology.

If launched, the missile will fly a precise, preprogrammed route to a target hundreds of miles away. GLCM's range is approximately 2,500 kilometers. Any spot that's handy, on or off the main operating base, will do for a launch site. The crew punches the whereabouts of the TEL, along with wind and temperature information, into the launch computer. The computer cues the missile to fly to its initial timing control point, from where it begins its programmed mission. If need be, GLCM can be retargeted quickly prior to launch.

The missile itself is an "all-up round," meaning it comes packed, ready to fire, in its aluminum canister. The stubby wings, the tail fins, and the engine air inlet are folded for a snug fit inside the tube. At launch, a booster charge propels the missile through the breakaway end cover of the canister. Seconds later, the fins, wings, and inlet pop out, the booster drops off, and the missile engine fires up to begin the mission.

Powered by a Williams Interna-

tional F107 turbofan that generates some 600 pounds of thrust, GLCM zips along at high subsonic speed, flying low to the ground and screening itself where possible by hills and other features of the landscape. Stored in the on-board computer are electronic maps that the terrain contour matching (TERCOM) system can compare with radar altimeter readings of the geography below at various points en route. Updated with this information, the inertial guidance system adjusts the flight path and keeps the missile on a true course to its target.

GLCM does not have—or need—the bull's-eye accuracy of the Navy's conventional-warhead variant of Tomahawk, which has Digital Scene Matching Correlation (DSMAC) in addition to TERCOM.



This GLCM test shot was conducted in the United States. Seconds after launch, the booster section drops away, the wings, fins, and engine inlet pop out from their folded positions, and the missile begins to fly under its own power. Each transporter-erector-launcher (TEL) carries four missiles.

DSMAC provides a superb degree of terminal guidance by scanning for recognizable structures and installations as well as for features of the natural terrain when the missile gets near its target. GLCM, with a nuclear warhead, does not require such precision.

Through the Defenses

Mission planners say that GLCM as presently configured has a high probability of getting through enemy defenses and reaching its target. An interceptor aircraft with look-down/shoot-down capability, in the right place at the right time, has a fair chance against GLCM. On the other hand, the missile—just twenty feet long, with a maximum diameter of twenty-one inches—presents a small radar signature and not much to shoot at. Its route will have been selected with an eye to natural protective cover, and it can be programmed to fly evasive maneuvers. A lucky shot from the ground might also bring down a GLCM, but the air defense batteries would have to be quick. With GLCM's speed and altitude, it will move from horizon to horizon in a hurry.

When and if enemy defenses become a major problem, electronic countermeasures (ECM) could be added, and so could low-observable "Stealth" features. An ECM package would probably mean making the missile longer. About twenty more inches of headroom are available in the current GLCM canister, which would be plenty. So far, neither an ECM nor a Stealth enhancement is in progress.

A more powerful engine for GLCM has been discussed, but that is not in progress either—for the very good reason that mission planners say the current engine gets the job done just fine. The allegation has been that the small engine is insufficient for climbing over rough terrain on hot days when the air is thin, thus forcing GLCM to fly at higher altitudes than it might otherwise have to. So long as a high probability of success is indicated with the present engine, though, the developers see no reason to take on the costs and complications of a bigger one.

Program Problems

In the beginning, GLCM planners underestimated the complexity of the launch control equipment that would be required. The idea seems to have been that the Navy Tomahawk missile, slightly modified, could be matched up with a simple van and trailer, and GLCM would be in business. As it turned out, the GLCM transporter-erector-launcher, the launch control center, communications, and the general infrastructure were far from simple—and far more costly than imagined.

The program suffered horrendous cost growth—overruns averaging forty-four percent a year—in the early phases, almost all of it attributable to launch equipment and support. The cost line has now leveled out, and USAF's most recent report to Congress shows unit cost for the missile (without warhead) at $1.8 million and weapon system unit cost (prorating R&D and military



The TEL and the LCC are towed by strong M.A.N. diesel tractors. The operational concept is to deploy off the main operating bases for action. GLCM's mobility makes it difficult for the Soviets to target it.

construction and also including support equipment) at $6.6 million.

Because of the near commonality of the missiles, the GLCM test program has drawn extensively on the completed Tomahawk flights in the SLCM program. Follow-on test and evaluation continues by the Air Force, and, so far, fourteen GLCM tests have been flown. Of these, nine have been successes, one was ruled a "no test" when an outdated guidance set was discovered, and four have been failures. In the most recent test, on September 14, the missile crashed shortly after launch when the engine air inlet failed to deploy, thus preventing start of the cruise missile engine.

A number of crashes in the earlier SLCM tests had led the Joint Cruise Missiles Project Office to decertify the missile on two occasions. A great deal of effort went into correcting the problems—especially the manufacturing quality control and airframe-related difficulties—and the entire Tomahawk program has had the benefit of that work.

The September crash, the first GLCM test failure in almost a year, was discouraging, but the specific malfunction, failure of the inlet to pop out from its retracted position, sounds more readily fixable than if it had been some systemic problem with the more complex components.

Personnel Imbalance

GLCM is a system unique to Europe, and this creates several kinds of problems. There is no operational unit in the United States. The only Stateside assignment that crews can rotate back to in their GLCM specialties is with the 868th Tactical Missile Training Squadron at Davis-Monthan AFB, Ariz. This creates a classic overseas personnel imbalance because the training squadron's replacement needs are far short of the numbers of crewmen completing tours in Europe.

The problem becomes more classic. Since facilities for families are not available at most GLCM locations, the crews will return at the end of twelve-month short tours. At present, Greenham Common is an accompanied tour, but Comiso and Florennes are not. The Air Force is trying to convince Congress that the family support package is a bargain because it would allow USAF to employ GLCM-trained crews in their specialties longer.

For a variety of reasons, Congress has been reluctant to go along with that approach. One consideration is keeping down the size of the US military community abroad. Another is that, in the event of an arms-control agreement, the United States might have to abandon costly housing, schools, and other facilities it had just built.

As the diplomats search for that elusive arms-control agreement, the Air Force will concentrate on its part of the job: putting teeth in the dual-track option that must be pursued so long as the Soviet Union refuses to bargain.

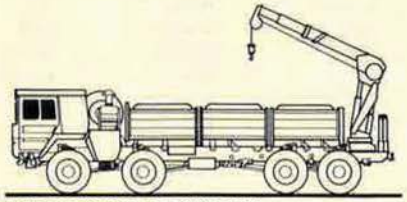
There are some, such as the pickets outside Greenham Common, who will persist in seeing the NATO missiles as the problem rather than as a response to the problem, but others take a different attitude.

When GLCM went to England in 1983, the British magazine *The Economist* put it this way: "The first American cruise missile has arrived in Europe, and Europe is a slightly safer place as a result." ■

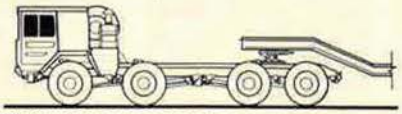
M·A·N
MILITARY VEHICLES

THE TOTAL SYSTEM: FOR ALL REASONS/SEASONS

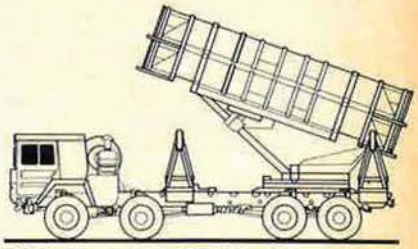




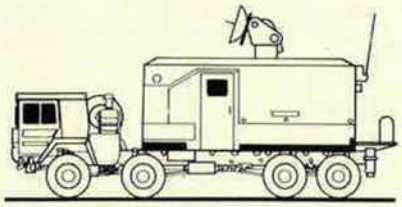
CARGO/AMMO RESUPPLY



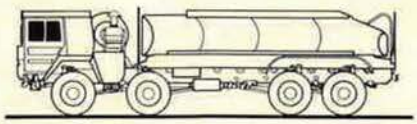
TRACTOR-SUPPORT VEHICLES
FOR NUCLEAR FIRING SYSTEMS



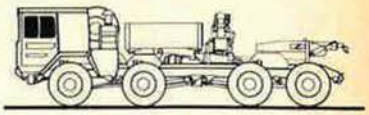
ROCKET LAUNCH VEHICLE



FIRE CONTROL



REFUELLING



RECOVERY VEHICLE

USA: M.A.N. Truck and Bus Corporation • 201 South College Street • Charlotte, North Carolina 28244 • Telephone: (704) 376-6000

Germany: M.A.N. • Dachauer Strasse 667 • 8000 München 50 • Dept. VB • Telephone: 089-1480-2538

See us at the AUSA-Booth C506 and Outdoor Exhibit

bread	division	fully	Highness	keeps	like	old	qualified	rustling
break	divisions	fum	Highness'	kennel	likely	oldest	quality	's
breaking	divorce	fur	hill	Kent	likeness	oldness	quarrel	sa
breaks	dizzy	furnishings	him	Kent's	likes	on	quarrel's	sacred
breath	do	furr'd	himself	kept	liking	once	quarrels	sacrifice
breathe	doctor	furrow	hire	key	lily	one	que	sad
breathes	does	further	his	kibes	line	one's	queasy	saddle
breathless	dog	fury	history	kick'd	lion	ones	Queen	safe
bred	dog's	fut	hit	kill	lip	only	queen	safer
breeches	dogs	future	hither	kill'd	lips	on's	quench'd	safety
breed	doing	gad	hitherward	kin	Lipsbury	on't	quest	said
breeding	dolors	gain	hizzing	kind	list	ope	question	sake
breeds	dolphin	'gainst	ho	kinder	lists	open	questrists	sallets
brewers	domestic	gait	Hobbididence	kindle	litter	operation	quick	salt
bridegroom	dominions	gale	hog	kindly	little	operative	quicken	salutatio
bridges	done	gall	hold	kindness	live	opinion	quickly	same
brief	door	gallow	holding	King	liver'd	opportunities	quit	sampire
briefly	doors	gap	holds	king	lives	oppos'd	quite	sands
briefness	dost	garb	holla	kingdom	lives'	oppose	rabble	sap
brim	do't	garden	hollow	kiss	living	opposeless	rack	sapient
bring	dotage	garments	hollowness	kite	loath	opposite	radiance	Sarum
bringing	dote	garters	holp	knapp'd	loath'd	opposites	radiant	sat
Britain	doth	gasted	holy	knave	loathed	oppress'd	rage	satisfact
British	double	gate	home	knaves	loathly	oppressed	rages	saucily
broils	doubt	gates	honest	knee	lock'd	oppression	rageth	saucy
broke	doubted	gather	honesty	kneel	lodge	opulent	raggedness	savage
broken	doubtful	gathers	honor	kneeling	lodging	or	rags	sav'd
brothel	Dover	gauntlet	honorable	knees	loins	orbs	rail	save
brothels	dower	gave	honor'd	knife	long	order	rail'd	'save
brother	dowerless	gav'st	honor's	knight	longer	ordinance	rails	save
brother's	dowers	gazing	honors	knighthood	loo	ordinary	raiment	savor
brothers	down	geese	hope	knights	look	organs	rain	saw
brought	dow'r	General	hoping	knives	look'd	origin	raineth	say
brow	dow'r'd	general	Hoppedance	knots	looking	Oswald	rais'd	sayest
brown	dow'rless	generation	horn	know	looks	other	raise	says
brows	dow'rs	generous	horns	knowest	loop'd	others	rake	say'st
bruise	dowry	gentle	horrible	knowing	loose	o'thing	rank	scald
brutish	dragon	gentleman	horrid	knowledge	loosen	ought	ranks	scalding
build	Dragon's	gentlemen	horror	known	Lord	ounce	ransom	scant
building	draw	gentleness	horse	knows	lord	our	rare	scanted
buoy	drawn	gentlewoman	horse's	know'st	lord's	ours	rarest	scape
buoy'd	draws	germains	horses	know't	lords	ourself	rarity	scarce
Burgundy	dread	Germany	hospitable	La	lordship	ourselves	rascal	scarcely
burn	dreadful	get	host	la	lose	out	rash	scar'd
burn'd	dream	gets	hot	labor	loses	outface	rashness	scatterec
burning	drench'd	ghost	hotly	laboring	losest	outjest	rat	scene
burst	drew	giant	hound	labors	loss	outlaw'd	rather	school
bursts	dried	gift	hour	lack	losses	outrage	rats	schoolma
bury	drink	gilded	hourly	lacks	lost	outscorn	ratsbane	schoolma
bush	drinks	girdle	hours	lad	loud	outside	ravish	scope
business	drive	give	house	ladies	louder	outward	raz'd	score
businesses	dropp'd	given	houseless	Lady	louse	over	read	scornful
bussing	drops	gives	hovel	lady	lov'd	overlusty	reading	scourg'd
busy	drown'd	glad	how	lady's	love	overrul'd	ready	scurvy
but	drum	gladly	howe'er	lag	love's	overtake	realm	Scythia
butter'd	drunkards	glance	however	laid	loves	overture	reason	sea
butterflies	dry	glares	howl	lake	loving	owe	reason'd	seal
button	Duchess	glass	howl'd	lameness	lov'st	owes	reasons	search
buy	duchess	glib	how's	lamentable	low	owest	rebel	season
buzz	ducking	globe	huge	lance	lowest	owl	receiv'd	seasons
by	due	Gloucester	hum	lances	lowness	own	receive	second
cackling	dues	Gloucester's	humanity	land	loyal	ow'st	received	seconds
cadent	Duke	gloves	humbled	landed	loyalty	oyster	reciprocal	secret
cage	Duke's	gnawn	humh	lands	lubber's	pack	reconciles	secrets
cagion	Dukes	go	hundred	large	lugg'd	packings	recounting	sectary
caitiff	dukes	goatish	hunt	largest	lunatic	packs	recreant	sects
Caius	dull	goddess	hunting	lark	lurk	pah	red	secure
call	dullard	God's	hurricanoes	lash	lust	pain	redeem	see
call'd	dumbness	gods	hurt	last	lustre	pains	redeems	seeing
calls	dung	godson	hurtless	latch'd	lusts	painter	redress	seek
call'st	dunghill	goes	hurts	late	lusty	palace	redresses	seeking
came	during	goest	husband	lately	luxury	palaces	reeking	seeks
Camelot	durst	going	husband's	laugh	lying	pandar	Regan	seem
can	dust	gold	husbands	laughs	lym	pant	regard	seem'd
candle	duteous	golden	hush	laughter	machination	panting	regards	seeming
canker	duties	gone	hysterica	law	machinations	pantingly	region	seems
cannot	duty	Goneril	I	lawful	mad	paper	rein	seen
canst	dwells	good	i'	laws	madam	papers	reliev'd	sees
cap	each	goodliest	Ice	lawyer	madam's	paramour'd	relieve	seest
capable	ear	goodman	I'd	lay	madded	par'd	relish	see't
capital	Earl	goodness	idle	laying	made	pardon	remain	seize
captain	earnest	goose	if	lead	madman	'parel	remainders	self
captives	earnestly	gor'd	ignobly	leading	madman's	parent	remediate	sembla
carbonado	ears	gorg'd	ignorance	leads	madmen	parents	remedies	send
carbuncle	earth	gorge	ignorant	leak	madness	parings	remedy	sense

troops
trot
troth
trotting
trouble
trowest
true
truly
trumpet
trumpet's
trumpets
trundle
trunk
trust
trusts
trusty
truth
truth's
try
tune
t'unsettle
Turk
Turlygod
turn
turn'd
turns
tutors
twain
'twas
'tween
twelve
twenty
twice
'twill
twinkled
'twixt
two
'twould
tyrannous
tyranny
tyrant's
ugly
unable
unaccommodated
unbolted
unbonneted
unburthen'd
unbutton
uncaught
unchaste
unconstant
uncover'd
under
understand
understanding
undertake
undivulged
undo
undone
unfed
unfee'd
unfitness
unfold
unfortunate
unfriended
ungovern'd
ungracious
unhappily
unhappy
unkind
unkindness
unknown
unless
unloose
unmannerly
unmerciful
unnatural
unnaturalness
unnecessary
unnumb'red
unpossessing
unpriz'd
unprovided
unpublish'd
unquietly

war
ward
warlike
warm
warmth
warp'd
warrant
warring
wars
was
wash'd
wast
waste
watch
watch'd
watches
water
waters
wat'rish
waved
wawl
wax
way
ways
waywardness
We
we
weak
weakens
weal
wealth
weapon
weapons
wear
wears
wear'st
weary
weather
weaves
web
wed
weeds
weep
weeping
weigh'd
weight
welcome
welk'd
well
we'll
wenches'
went
were
were't
wert
wet
what
what's
wheat
wheel
when
whence
where
wherefore
wherein
whereof
where's
wheresoe'er
whereto
whereupon
whether
which
while
whiles
whilst
whining
whip
whip'st
whipt
whirlpool
whirlwinds
whisper'd
whistle
whistling
white

wind
window'd
winds
wine
wing
winged
wins
winter
winter's
wipe
wisdom
wise
wish
wishes
wit
witch
with
withal
withdraw
wither
within
without
witness
wits
woe
woeful
woes
wolf
wolves
wolvish
woman
woman's
womb
womb'd
women
women's
wonder
wont
wooden
wool
word
word's
words
wore
work
working
world
world's
worm
worse
worser
worships
worst
worsted
worth
worthied
worthier
worthy
would
wouldest
wouldst
woundings
wrap
wrath
wrathful
wreath
wren
wrench'd
wretch
wretched
wretchedness
wretches
wrinkles
writ
write
writes
wrong
wrong'd
wrongs
wrote
wrought
y'
yard
ye
yea

young
younger
youngest
your
yours
yourself
yourselves
youth
zed
zir
zo
zwagger'd

Anyone could have used these 4,178 words. In the hands of William Shakespeare, they became *King Lear.*

All the writers of his day had the same elements to work with — the same words to form the same language. But Shakespeare's real talent was his ability to choose from all these elements combining them with one another flawlessly — in a unique organization of words.

At IBM Federal Systems Division we understand it takes the same basic talent to design and manage today's advanced complex systems. It's that special ability to take a myriad of separate pieces and make them work together — with precision.

And we're doing it.

For NASA's Space Shuttle we have designed a system to coordinate the individual operations of the most technologically advanced flying machine ever built.

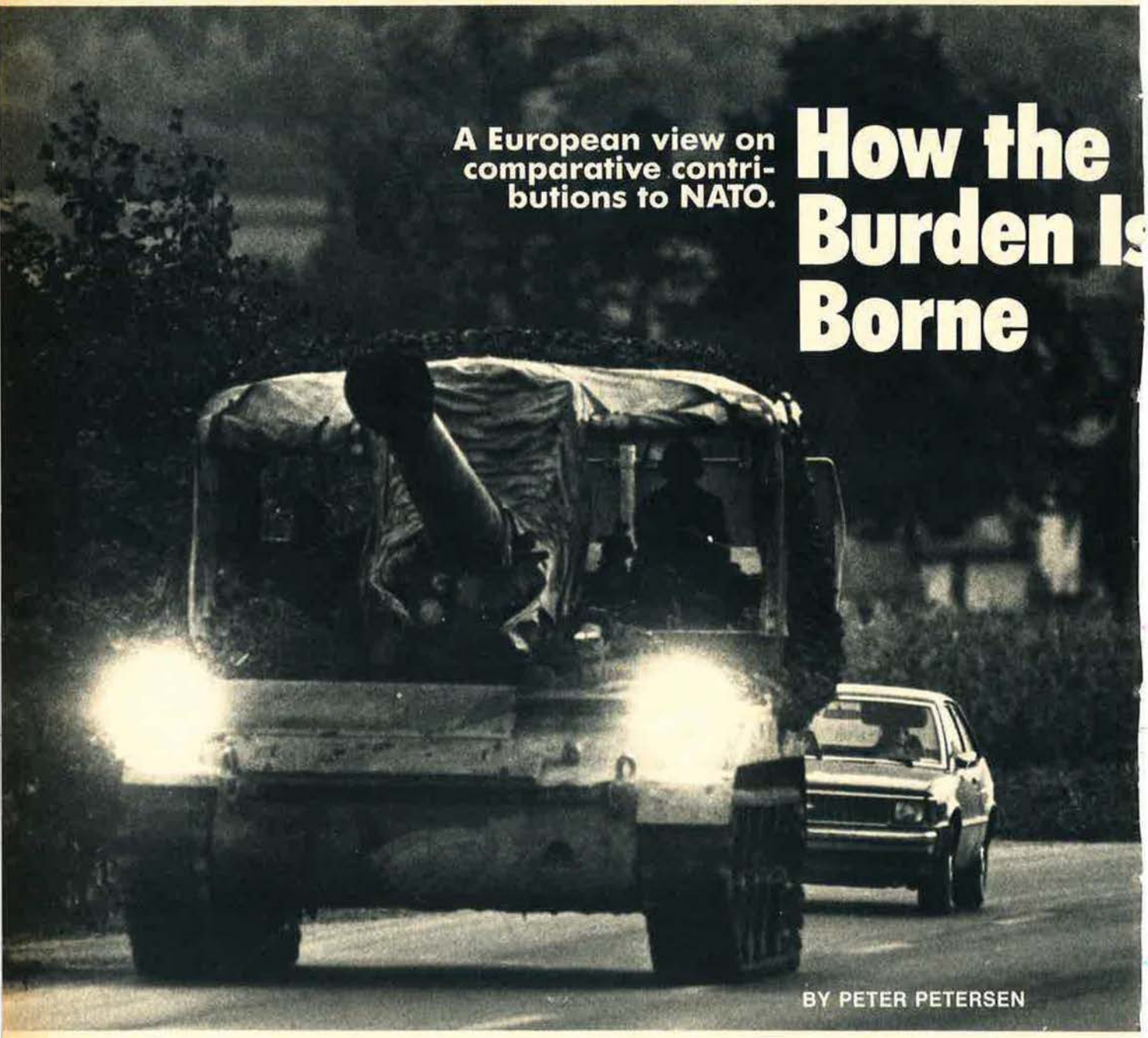
For the Navy's LAMPS MARK III program we have electronically linked ships with helicopters improving their ability to keep vital sea lanes open.

And, for the Air Force's Global Positioning System, our role will help usher in a new era of precision navigation.

Each of these is a prime example of a unique challenge met by a mastery of complex systems. We start with many individual elements, as separate as the words of Elizabethan English. And make them act as one. It isn't easy. But the more complex the task, the more we manage to make it happen.

IBM®

Federal Systems Division



A European view on comparative contributions to NATO.

How the Burden Is Borne

BY PETER PETERSEN

RECENTLY, a young man came to my office in my district, which is located between Stuttgart and the Black Forest. He was frustrated and angry. After twelve years in the German Army, he had been released in the grade of sergeant and had gotten a job as a civil servant in the county administration. He was upset because—for the third time in three years—he had been called up for a ten-day exercise with his reserve unit.

I tried to explain to him that the Army, of course, needs experienced NCOs more urgently than it needs privates. I don't know if I was able to convince him.

Two days later, another young man came to my office. He had served a compulsory fifteen months and had also been called up for a ten-day exercise. His father had a butcher shop in a village, with a restaurant on the side. The old man had broken a leg, and they would have to close their shop for ten days if I couldn't get him off. He was grateful when I did but wondered whether or not I could have his name removed from the list of reservists. He didn't know how he and his young wife would be able to build up his business if he had to be ready to be called up every second year. A typical hard-working southern German, he knew he would not have any vacation for the next ten years.

There are many aspects of our contribution to the NATO defense effort that cannot be measured in dollars and cents. I would be very popular here, for instance, if I published a declaration that we should follow the American example and abolish the draft.

Three times a year, before the date when new recruits have to re-



A US Army eight-inch self-propelled howitzer moves into position during a recent NATO exercise.

port, many parents and girl friends plead with me, trying to persuade me to let their men off because their education would be interrupted or their employment opportunities would take a turn for the worse.

For very good reasons, we made the decision years ago that we will draft every young man to serve for fifteen months. Right now, we are debating whether or not that term should be extended to eighteen months. We have organized our armed forces, which today number 495,000, so that they could grow to 1,250,000 within three days in case of emergency. That is why we call up reservists all the time. As far as I know, no other NATO partner is able and ready to do that.

Today, the NATO troops under the Supreme Allied Commander in Europe (SACEUR), Gen. Bernard Rogers, USA, are ninety percent European. The American troops in Europe make up only ten percent of NATO ground forces. If you look at his air force planes, eighty percent are European and twenty percent American. Eighty percent of General Rogers's tanks are European, twenty percent American. Seventy percent of all NATO ships are built, bought, and manned by Europeans.

Every other year in Washington, our friends in Congress debate whether or not the Europeans are doing enough or are dragging their feet in our common effort. Members of Congress represent the taxpayers and, therefore, are quite naturally worried about the steadily increasing costs. On both sides of the Atlantic, it is, of course, more popular for a politician to build a hospital than an airplane. My friends in Congress have exactly the same difficulties that I have with my voters when I try to explain why a single fighter plane costs as much as a modern hospital.

Let's look at the dollars and cents. Defense spending by America decreased between 1971 and 1981 by seven percent in real terms while the other NATO countries increased their defense spending in the same period by twenty-three percent. (Secretary of Defense Caspar Weinberger published these figures in March 1983.) I think one ought to keep these figures in mind when criticizing the Europeans for not following President Reagan's lead dramatically when he reversed that trend. This year in Germany, defense spending will increase at a rate twice as much as the general budget.

I am grateful that the dialogue across the Atlantic between the governments and also between the congressional and parliamentary committees is closer than it has ever been in my almost twenty years of experience as a member of the Armed Services Committee in my country.

There are very important decisions ahead. For instance, one involves the location of American troop barracks in my country. Currently, most of the 300,000 American troops are stationed in big cities like Frankfurt, Wiesbaden, or Stuttgart. It would, of course, make much more sense to deploy them closer to the East German border.

We need to do much more in the so-called "host nation support" area. Everybody agrees that we would need six additional American divisions as quickly as possible in case of emergency. The airports and equipment here have to be ready for them.

Together, we need to think through what we mean when we talk about the necessity of raising the nuclear threshold. Obviously, an American President should never be faced with the bleak choice of either giving up Europe or starting a nuclear war if faced with a massive Warsaw Pact conventional attack.

Fear in my country exploded into hysterical dimensions last autumn when hundreds of thousands demonstrated against the deployment of new American missiles on our territory. But we stuck to the decision to deploy because it was right.

I understand that fear because, as a child, I spent many nights in the basement of our home while we were on the receiving end of the first thousand-bomber raids in history. Some 50,000 people were killed in seventy-two hours. And we know, of course, that the destructive power of modern conventional weapons is many times that of the bombs dropped on Germany in the last war.

The joint effort of the United States and its allies in Europe is vital. We must be strong enough, in both conventional and nuclear capabilities, to make the Soviet planner realize that, if he started a war, he could not succeed. He would have to pay a price he could not calculate and could not afford to pay. ■

Peter Petersen is the ranking member of the West German Bundestag's Armed Services Committee. A native of Hamburg, Mr. Petersen is a member of Germany's Christian Democratic Union and of the German Society for Foreign Policy.

Too often, we have seen the enemy's technology and it is ours.

Moscow's Technology Parasites

BY EDGAR ULSAMER
SENIOR EDITOR (POLICY & TECHNOLOGY)

THE MOST productive, booming Soviet industry bends no metal and engages in only one kind of engineering, "reverse engineering," meaning the art of figuring out how somebody else's weapon systems are being produced and integrated. The sole function of this "industry" is the systematic, no-holds-barred acquisition of US and other free-world technologies with direct or indirect military application. Orchestrated by the Kremlin's all-powerful Politburo, this massive, parasitic dragnet employs untold thousands of Soviet and other East European agents, hundreds of ostensibly legitimate business fronts, and hordes of Western collaborators whose commitment to the profit motive is not swayed by laws, loyalties, or even logic.

Sen. William Proxmire (D-Wis.), hardly an alarmist on defense matters, thundered at a recent Senate committee hearing that "I will not quietly accept a situation in which we spend tens of billions [of dollars] to develop critical technologies and then, through feeble export controls, allow the Soviets to obtain these technologies for next to nothing." Sen. William L. Armstrong (R-Colo.) was also dead serious when he complained that the US economy is "groaning under the strain of financing two military budgets—our own and a significant portion of the Soviet Union's."

The bitter irony, according to senior intelligence and other government experts, is that major portions of US defense spending are required just to offset Soviet weapons made possible by US technological breakthroughs. The CIA's Deputy Director, John N. McMahon, bemoans the demoralizing effect on the US intelligence community "when we spend a lot of our effort to find out about Soviet weapon systems [only to discover that they are actually] ours."

The purloining of Western technology is deeply rooted in Soviet doctrine and history. Vladimir Ilyich Lenin bragged with considerable prescience more than sixty years ago that "the capitalists . . . and their governments will shut their eyes to the kind of activities on our side . . . and will in this manner become not only deaf mutes but blind as well. They will open credits for us. . . . They will supply us with the materials and technology which we need for our future victorious attacks upon our suppliers. In other words, they will work hard in order to prepare their own suicide."

CIA analyses stress that Moscow's piracy of Western technology started to mushroom in the years immediately following World War II, when the Soviets stole Western nuclear secrets that led to the development of their own nuclear weapons. At about the same time, the Soviets copied a US bomber in its entirety and put it into production as their Tu-4. The pattern has remained the same since then: To achieve major improvements in their military capabilities quickly, they resort to a combination of espionage, stealing, and copying Western systems.

A $100 Billion Heist

Conservative estimates presented to Congress indicate that what is euphemistically called "technology transfer," meaning the overt and covert hemorrhage of Western technology to the Soviet Union, has demonstrably saved the Kremlin far in excess of $100 billion in military research and development costs. According to the CIA, the acquisition of these technologies is well-organized, highly centralized, and under the direct supervision of the highest organs of the party and the state, including the Politburo of the Communist Party and the Council of Ministers. The CIA's congressional testimony suggests that primary control over technology acquisition and exploitation rests with the VPK, the Soviet Military Industrial Commission. This organization—which has been around in one form or another since the 1930s—is meant to ensure that the Soviet military gets the resources it needs.

In the late 1960s, the VPK mounted a steadily growing

The Soviet Military Industrial Commission provides a want list of Western technology to its collection agents.

effort to purloin US and other Western defense technologies. According to the CIA, the VPK directly oversees the participation of the twelve Soviet industrial ministries that are involved in military production as well as in the assimilation of Western technology into Soviet military production programs. In addition to VPK, a shadowy organization called the Technical Center operates inside the State Committee for Science and Technology. According to US intelligence, this Center functions as a clearinghouse for technology acquisition and exploitation activities and is responsible for collecting the requirements and reports submitted to the VPK by the defense industrial ministries and for the intelligence information and materials acquired by the collecting agencies.

Well-Organized Piracy

The defense industrial ministries, according to US analysts, are required to report regularly to the VPK on their progress in assimilating pirated Western technology into their weapons programs. The "collection agencies" that work on specific technological "shopping lists" blessed by the VPK are the KGB (the Soviet Committee for State Security), the GRU (the chief Intelligence Directorate of the Soviet General Staff), the State Committee for Science and Technology, the Soviet Academy of Sciences, the Ministry of Foreign Trade, and the intelligence services and foreign trade missions of the Warsaw Pact allies. The KGB and the GRU are thought to account for about seventy percent of the most significant military-related items acquired from the West. This includes not only classified items, such as weapon system components, but also such key dual-use and export-controlled items as computers, microelectronics, fiber optics, powder metallurgy, composites, lasers, and associated production technologies.

The covert espionage and other surreptitious acquisition efforts supporting the collection of Western technology data are large and growing. The Director of Central Intelligence, William J. Casey, warned in a forceful public alert that "there are now several thousand Soviet-bloc collection officers at work primarily in the United States, Western Europe, and Japan." Augmenting the take from conventional intelligence operations are what Mr. Casey termed "sophisticated international diversion operations," meaning a tangled, ingenious web of front organizations that are hard to trace and monitor and that divert high-tech products of military value from seemingly legitimate foreign buyers to the Soviet Union.

US intelligence, he said, has "identified some 300 firms operating from more than thirty countries engaged in diversionary schemes. And there are probably more that remain unidentified." Most diversions, he suggested, occur through Western Europe, which "is why we have made such a strong effort to enlist the help of our European allies in combating illegal trade activities." Dr. Stephen D. Bryen, Deputy Assistant Secretary of Defense for International Economic, Trade, and Security Policy, told this writer that the increasing blatancy of Soviet technology transfer operations has caused a closing of ranks on the part of most free-world countries, with the result that the acquisition by Moscow of complete "turnkey" systems will probably be slowed considerably. Presumably, this will force the Soviets to step up their espionage operations, which normally don't produce as rich an intelligence yield as the wholesale diversion of operational hardware.

An Insidious Network

US intelligence was able to identify more than 30,000 samples of Western production equipment, weapons, and military components and well over 400,000 classified and unclassified technical documents acquired by Soviet intelligence operatives over a five-year period ending in 1982. The majority of the purloined material was of US origin. Most of this material was obtained via Western Europe and Japan. This "technology transfer" advanced and enhanced several hundred Soviet weapon programs, thereby helping significantly to reduce the US technological lead over the Soviet Union.

Assistant Secretary of Defense for International Security Policy Richard N. Perle emphasized in recent congressional testimony that Soviet piracy of Western computer and microelectronic technology over the past decade "has allowed the Soviets effectively to reduce the US lead in these technologies from ten to twelve years in the mid-1960s to the present three to five years." Secretary Perle disclosed at the same time that "the most accurate intercontinental ballistic missile warhead in the world today sits not on an American but on a Soviet ICBM [because of diversion to the Soviet Union of specialized US ball-bearing manufacturing techniques] that have gone into [their] ICBM guidance."

One of the major components of the Soviet network assigned to the piracy of Western technology, according to the CIA's McMahon, is the Soviet Academy of Sciences, which—along with the State Committee for Science and Technology (GKNT)—works very closely with the Soviet intelligence services: "Soviet scientists traveling to the West are briefed by Soviet intelligence services on S&T [science and technology] intelligence requirements before they leave the country. They are also expected to assess their Western colleagues for their potential as intelligence agents. Moreover, an increasing number of intelligence officers [receive] S&T

The world's most accurate ICBM warhead is on a Soviet missile, thanks to pilfered US manufacturing techniques.

training to allow them to masquerade as scientists in part of these exchanges."

Technology transfers involving illegal trade operations in general are handled by the Ministry of Foreign Trade (MFT). The Ministry operates a large network of trade offices, joint companies, and purchasing missions whose staffs and offices serve as a cover for KGB and GRU operatives. Most of the Soviet operatives expelled by Western countries for espionage are attached to these trade missions.

East European agents in the US and other Western countries are another key component of the Soviet technology transfer network. The reason is twofold, according to CIA analysts: "First, the East European countries generally have a better image in the West than the Soviet Union, and, thus, their intelligence collectors are often able to . . . operate more freely. Second, the Soviets must have multiple channels for acquiring Western technology so that none of their defense industrial ministries becomes dependent on a single channel." The most active surrogates are East Germany, Hungary, Czechoslovakia, and Poland.

Another rich lode in the Soviet technology acquisition effort is the US-Soviet student-exchange program. According to US intelligence assessments, at least three-fourths of the Soviet students coming into the US are in scientific and engineering fields, while their US counterparts are primarily in the social sciences and humanities. The Soviets who come to this country under the graduate and young faculty program generally already have the Soviet equivalent of a US Ph.D. degree, average about thirty-five years of age, and have eight years of practical experience in their specialty. They are, without exception, capable scientists usually involved in military-related work in the USSR. Not too surprisingly, they seek out research activities involving technologies that have direct military applications in fields in which the Soviets are deficient.

One of the most glaring examples of how the Soviets exploit the student-exchange program involves one S. A. Gubin, who attended classes several years ago taught by a US Navy consultant on fuel air munitions. After Gubin returned to the USSR, there was a marked increase in Soviet development and testing of these advanced-technology weapons.

The Hemorrhage of Strategic Technology

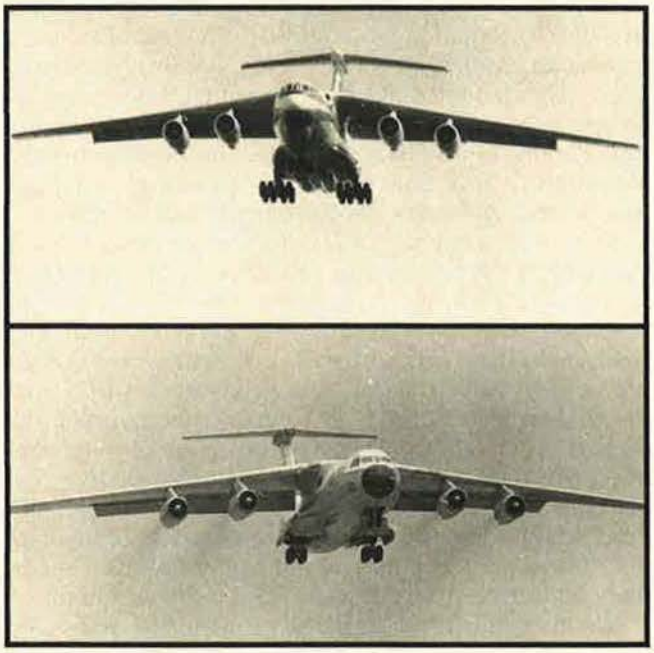
Each year, the US must spend hundreds of millions of dollars to offset the effects of the hemorrhage of military technologies to the USSR, according to Secretary Perle. He told Congress recently that "we have had to develop new generations of ballistic missiles, antiaircraft defenses, and other costly systems years earlier than we planned because of Soviet success in acquiring and deploying our own technology against us. In the case of modern tanks, we have had to increase our outlays per vehicle by 400 percent to cope with Soviet advances which were derived from Western technological strides in armor."

Recent US intelligence analyses suggest, for instance, that the striking similarities between the US Minuteman ICBM silo and the Soviet SS-13 silo "very likely resulted from acquisition of US documents and expedited development of this, the first Soviet solid-propellant ICBM." It is profoundly ironic that Soviet military aircraft designers, capitalizing on the gullibility of US bureaucracies, were able to "order" documents on Western aircraft designs and actually to receive them within a few months. Among the plans and drawings acquired legally by the Soviets—without need even to resort to subterfuge—were those of the C-5 Galaxy. As a CIA report points out, "These plans, although dated now, have contributed to current Soviet development of a new strategic military cargo plane. [Soviet] designers were in particular need of data on US technological advances, but, more importantly, they needed information on aerospace manufacturing techniques."

The list of Soviet systems spawned by technology pirated from the US, according to the Director of Central Intelligence, "goes on and on" and includes the USSR's soon-to-fly Space Shuttle, which, he said, is "a virtual copy of ours." Both the Il-76 and Il-86 air transports resemble US designs and, not surprisingly, were developed within a compressed gestation cycle. The Il-76 serves both as a military tanker and transport as well as the platform for the new Soviet AWACS (Airborne Warning and Control System) that US intelligence expects to become operational within about a year. This system will provide the Soviets with the means to attack low-flying bombers and cruise missiles reliably and under all weather conditions. The SU-AWACS is strikingly similar to the Air Force's E-3A AWACS.

Rope to the Soviets

The new Soviet strategic bomber, code-named Blackjack and now undergoing flight-testing, borrowed heavily from the older B-1A of the US Air Force, according to Secretary Perle. The Blackjack, however, is larger than the US aircraft and can operate at supersonic speed. US aeronautical technology also played a seminal role in the design and production of the An-72



Il-76 Candid (top), a Soviet military transport, tanker, and warning-and-control aircraft, bears a suspiciously strong resemblance to USAF's older C-141 StarLifter (lower photo).

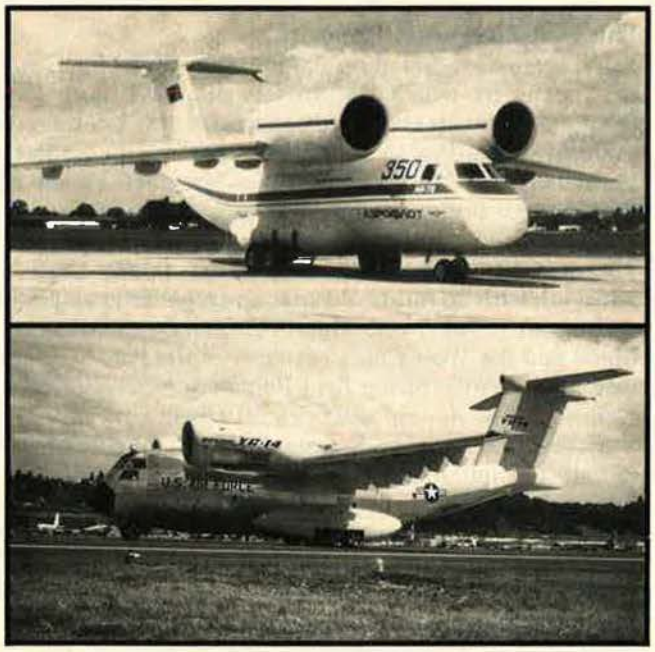
Coaler, a short-takeoff-and-landing aircraft that copied the Boeing YC-14 STOL prototype down to the latter's pioneering use of upper-surface blowing engines. This similarity, Defense Department spokesmen stress, is the result of extensive and highly successful technology piracy carried out by the Soviets against a range of US aerospace companies.

The Soviet Navy, Secretary Perle told Congress earlier this year, succeeded in acquiring two floating drydocks from Japan and Sweden, essentially by legal means: "The drydocks, among the largest and most technically advanced in the world, are capable of providing out-of-the-water repairs of the largest ships in the Soviet Navy. These include *Kiev*-class aircraft carriers and the *Typhoon* and *Oscar* classes of missile-carrying nuclear-powered submarines." US intelligence experts point out that the drydocks themselves are so large that no Soviet shipyard would have been capable of accommodating their construction without major facility modifications, associated capital expenditures, and interruptions in weapon programs in progress.

These drydocks will gain in importance when the Soviets begin—probably within a few years—the construction of large US-style naval carriers capable of accommodating high-performance combat aircraft. US analysts point out, incidentally, that the Soviets—with typical foresight—also acquired Western aircraft carrier catapult equipment and operating procedures for these new large carriers; catapult technology, though relatively common in the West, had been outside the ken of Soviet naval engineers in the past.

In support of its naval requirements, the USSR, within the past few years, has put foreign-built oceanographic survey ships equipped with some of the most modern Western-manufactured equipment on its technology transfer shopping list. Because some of this equipment was embargoed by the US, the ever-resourceful Soviet "purchasing agents" installed other Western equipment on these vessels. This surreptitious modernization of what has become the world's largest oceanographic fleet with the best Western technology will help support the development of Soviet weapon system programs and antisubmarine systems whose targets are the US Navy.

The Kama River truck factory—a classic example of US and Western willingness to provide Moscow with what Lenin called "the rope we will need to hang Western capitalism with"—is the largest-capacity truck plant in the Soviet Union. Capable of producing 150,000 vehicles annually, its principal customer is the Soviet military, according to Secretary Perle, who told Congress that "the computers, machinery, and the financing to produce Kama trucks—the casting equipment for foundries, automatic engine-assembly lines, machine tool lines, and truck assembly lines—were obtained from the US and other Western countries." He stressed that these very trucks were used in the invasion of Afghanistan and disclosed that the Kama plant is "now employing this Western technology to produce a new line of trucks to military specifications."



Soviet copying of US designs and technologies is evident in, and exemplified by, this comparison of military STOL aircraft. TOP: Soviet An-72 Coaler. BOTTOM: USAF YC-14.

A Compulsive Habit

US intelligence experts are quick to point out that the Soviet compulsion to pirate Western technology must not be construed as meaning that Moscow's own technology base is intrinsically deficient. This is simply not so. The Soviet Union's strong indigenous technology reservoir could support the development of a large modern arsenal without resorting to technological plagiarism. It is true that, in some cases, their acquisitions satisfy occasional deficiencies in Soviet technology, such as smart weapons and electro-optical guidance systems. Signal- and data-processing devices keyed to air defense functions also fall into this category. In most instances, however, the pirated technology is used to speed up development programs in progress, to reduce technological risk, or to improve on original Western designs in an expeditious manner.

In the conventional warfare arena, the Soviets appear to have concentrated their technological bootlegging on Western tank, antitank, and air defense-related design approaches and equipment, with the idea of enhancing their own development programs while creating countermeasures to US and other Western weapon systems. The Soviet AA-2 Atoll family of air-to-air missiles, for instance, is copied from the US AIM-9 Sidewinder missile, while the Soviet SA-7 Grail surface-to-air missile is clearly derived from the US Army's hand-held Redeye antiaircraft weapon.

In the case of Soviet computers, Secretary Perle told Congress recently that "we are caught up in the ironic position of approving exports which support Soviet RYAD computer systems entirely copied from US designs just a few years ago." He explained that "by exporting advanced Western computers, we have helped the Soviets build a [quintessential] infrastructure and means for the indigenous development of advanced RYAD computers and other Soviet computer series, such as the SM-3." This technology heist netted benefits for the Soviets across the spectrum of military functions. These include, according to DoD, command control and communications and an array of strategically

The USSR's own technology base is strong, but secrets stolen from the West enable the Soviets to proceed much faster.

crucial support functions that extend from nuclear weapon design to the automation of engineering design and manufacturing processes.

The single most important industrial technology acquired by the Soviets since the end of World War II involves US microelectronics design and production, according to Mr. Casey: "In the late 1970s alone, Moscow acquired several thousands of pieces of Western microelectronics equipment worth hundreds of millions of dollars in all of the major processing and production areas, [to wit], wafer preparation, circuit mask processing, device fabrication, and assembly and test equipment, which they are most in need of." These purloined technologies, according to the Director of Central Intelligence, have become the building blocks for a modern microelectronics industry: "For example, the Zelenograd Science Center, the Soviet equivalent of Silicon Valley, was equipped, literally from scratch, with Western technology. All [their] monolithic integrated circuits are copies of US designs, [down to] the imperfections contained in some of the US samples."

The VAX Caper

In a welcome break from the long string of successful diversions of US equipment to the Soviet Union, West German and Swedish customs officials seized several advanced VAX computers and thirty tons of computer-peripheral equipment late in 1983 and early this year that were being smuggled to the USSR by, to quote Mr. Casey, "the notorious illegal trader Richard Mueller." This interception, the CIA admits, represents but the tip of the iceberg, with "much larger quantities of computing and electronic equipment [having] been successfully diverted to the USSR." The Defense Department's Dr. Bryen told Congress that the "VAX computer case represents the single largest attempted diversion to date of militarily sensitive equipment." Less than half of the equipment—seven out of fifteen containers—was recovered; the bulk of the equipment, he told AIR FORCE Magazine, got through to the Soviets. Conservatively estimated, Moscow gained five years in terms of research and other savings in resource development in computer technology, data communications, computer software, and integrated-circuit technology as a result.

The equipment intercepted by the Germans and Swedes in literally the last few minutes before its irretrievable transfer to the USSR "was state-of-the-art computer hardware which would have supported and accelerated Soviet military modernization programs." Dr. Bryen told Congress that "this computer system had a configuration identical to a number of highly classified US defense systems." Some of the unclassified applications of this US VAX system include, according to Dr. Bryen's testimony:

- Simulation of the operation of military systems, such as missile targeting, at faster than real time (the time it takes for a missile to hit its target).
- Simulation of terrain-following radar for cruise missiles and of flight paths of intercontinental ballistic missiles.
- Command and control for targeting guns and missiles of antiaircraft batteries.
- The design and manufacture for very-high-speed integrated circuits. This technology, essential for the manufacture of "smart weapons," is totally embargoed to the Soviet Union and Eastern Europe.

The mastermind behind the diversion of the two seized US VAX 11/782 computers and related equipment, according to the CIA, was a West German by the name of Richard Mueller. Deputy CIA Director McMahon termed him a "master at proliferating a maze of front companies with no ostensible connection to himself, and I must say that personally I stand in awe of his ability."

Up to six free-world countries served as unwitting conduits to launder the VAX computers' odyssey from the US to a Mueller front company in South Africa, from there to another one in Germany, and then on to Sweden, final jumping-off point to their ultimate destination in the Soviet Union. Even though he did not use them in the VAX case, Mueller, who now operates from behind the Iron Curtain, is known to control a network of more than sixty companies. Another West German "buyer" for the Soviet Union, Werner Bruchhausen, according to the CIA, has operated as many as fifty "front companies" in Austria, France, the United States, Switzerland, West Germany, and the United Kingdom. Both Bruchhausen and Mueller were indicted by a US federal court in 1977 for illegal trade activities. But because illegal trade activities are not an extraditable offense, the two men remain at large.

The Bell-Zacharski Case

Espionage, rather than illegal trade diversions, was the means by which the Soviets obtained more than twenty significant classified reports on new US weapon systems, according to a detailed report by the Senate's Permanent Subcommittee on Investigations. William H. Bell, a radar project engineer employed by Hughes Aircraft Co., according to the subcommittee's report, was "burdened with debts and back taxes, family tragedy, and a job with no future." Enter an empathetic neighbor and tennis partner, one Marian Zacharski, a Polish national and the West Coast Manager of the Polish-owned machine manufacturing firm Polamco, incorporated in Delaware and Illinois and with offices in Chicago, Detroit, and Los Angeles. Snaring Bell with the prospect of lucrative employment with Polamco, and by providing him with cash to pay overdue taxes and to make a down payment on a condominium, Bell soon wound up in the clutches of the Polish intelligence agent.

According to the subcommittee report, Bell began photographing sensitive documents he brought home from Hughes. He went on four separate trips to Austria and Switzerland—all paid for by Zacharski—where he met with other Polish agents. These agents, Bell said at

We're specialists when it comes to advanced fluid control technology. Our products have appeared on every major space program since the X-15 and they have set new standards for compactness, light weight and reliability. In proprietary products from the Space Shuttle Prevalve, which combines the sealing characteristics of a poppet with the free flow path of a ball, to the MX 4th stage pressure regulator which has an accuracy of ±2%, Fairchild Control Systems Company has successfully met the most demanding challenges.

But, we're more than just component specialists. We're system specialists too. Our knowledge and experience in specialized advanced fluid control systems spans more than 25 years.

- Fluid & Propulsion Control Products
  Pressure Regulators
  Couplings/Disconnects
  Fill & Drain Valves
  Isolation Valves
  Thrusters

Fairchild Control Systems Company... a company fully committed to meeting the challenges of today's and tomorrow's aerospace/defense industry.

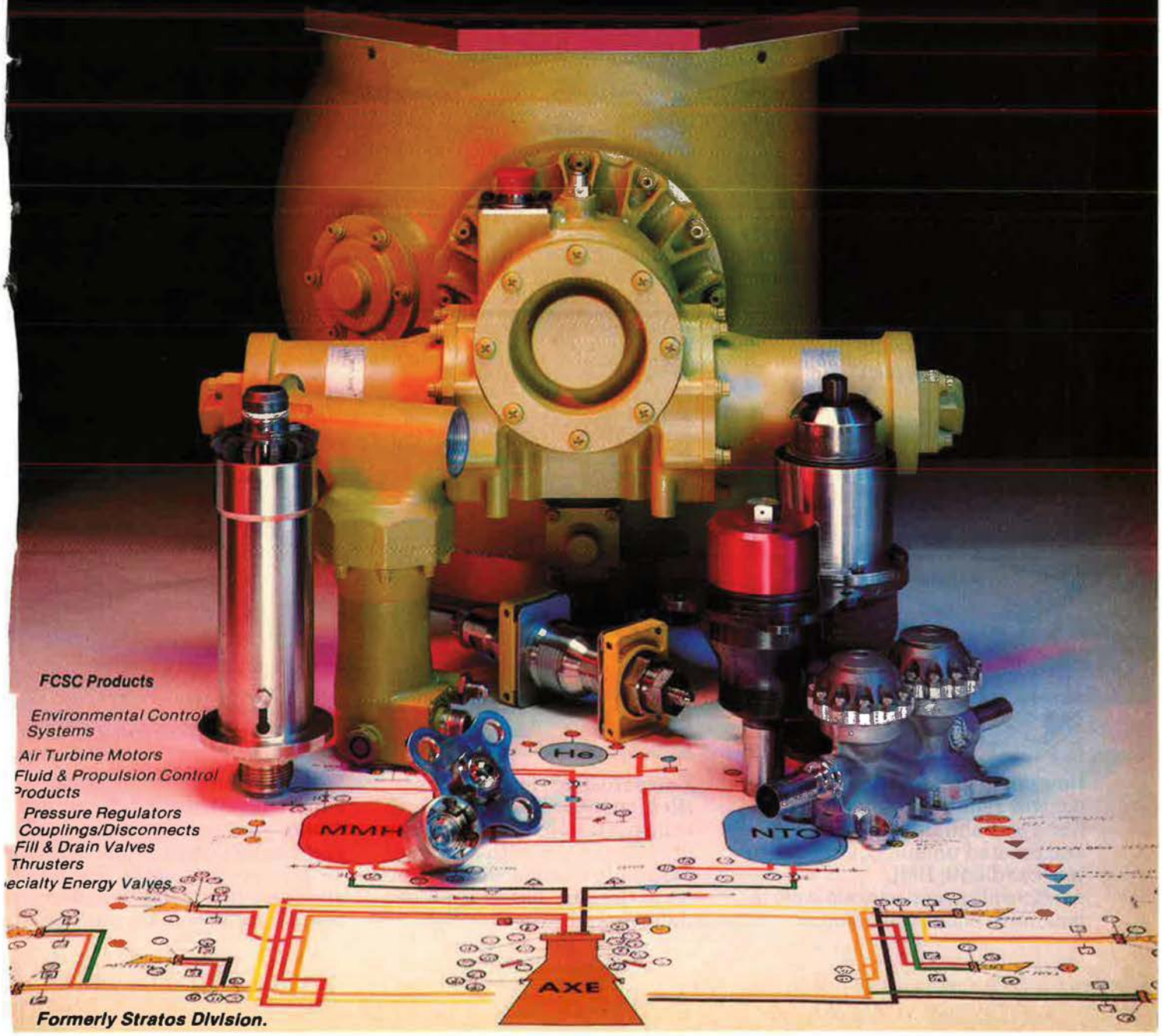
Fairchild Control Systems Company
Dept. AAIA 3
1800 Rosecrans Ave.
Manhattan Beach
California 90266
Tel.: (213) 643-9222
Telex:910-325-6216



We're more than fluid control component specialists.



FAIRCHILD
CONTROL SYSTEMS COMPANY

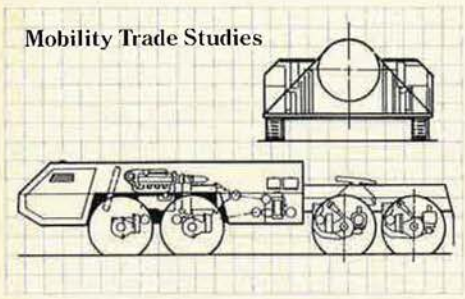


FCSC Products

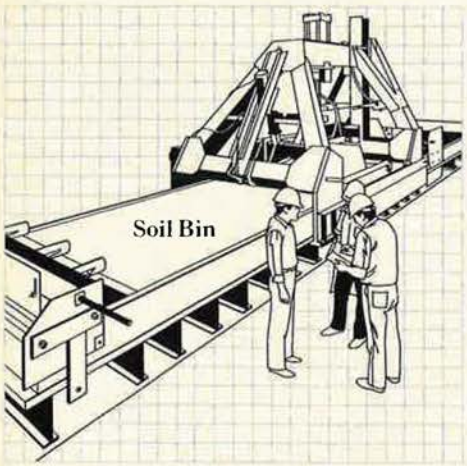
Environmental Control Systems
Air Turbine Motors
Fluid & Propulsion Control Products
Pressure Regulators
Couplings/Disconnects
Fill & Drain Valves
Thrusters
Specialty Energy Valves

Formerly Stratos Division.

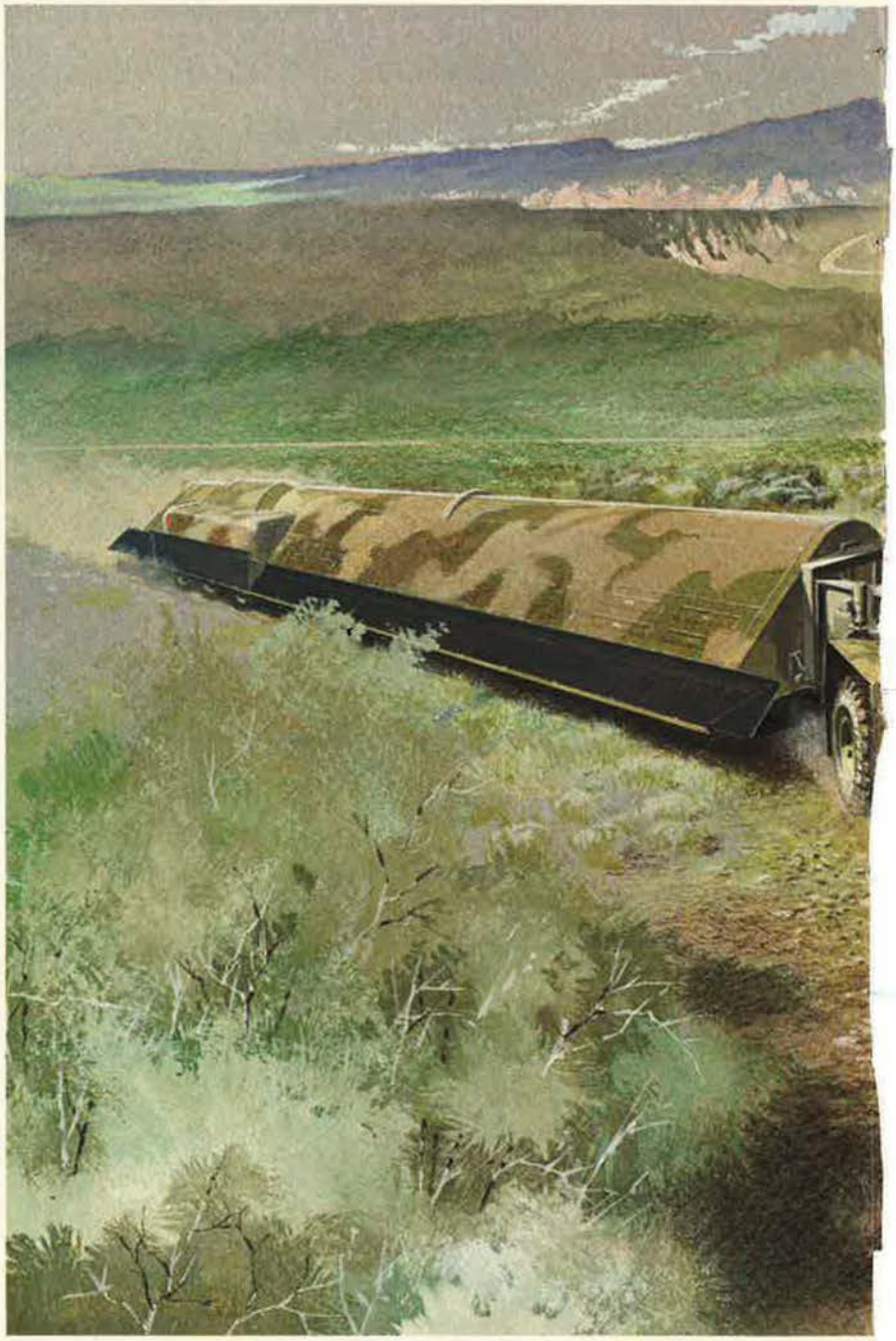
MISSION: SURVIVABILITY. HARD MOBILE LAUNCHER



The problem is developing a survivable, practical concept for mobile operations under a variety of conditions. What combination of speed, hardness, and off-road capability will optimize survivability, security, and operational cost while minimizing environmental impact?



How much ground friction will the designs require for survivability? Goodyear and Boeing designed and created unique equipment to test candidate HML configurations on various soils to maximize blast resistance.



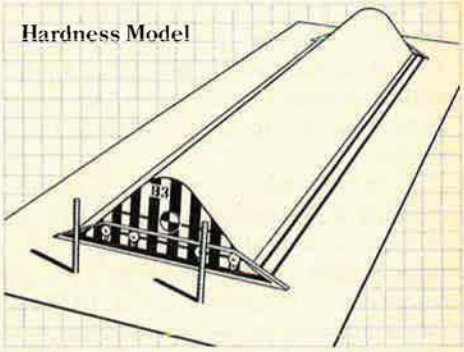
Two aerospace leaders in missiles, operational support, and transportation have teamed to provide the U.S. with a unique capability to enhance survivability of the land-based strategic deterrent: the Small ICBM.

With combined technological experience that spans a century of innovative design, developmer and production of equipment to protect the free world, Boeing and Goodyear have teamed to provide an affordable solution to

ÖFOR THE SMALL ICBM

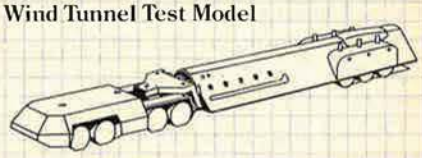


Hardness Model

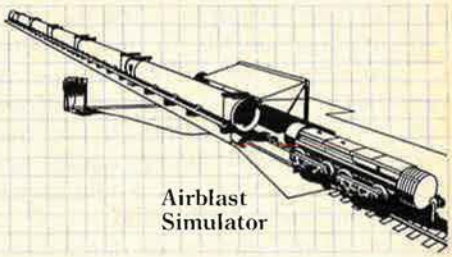


Preliminary concepts and shapes were evaluated during the Direct Course simulated airblast testing last summer.

Wind Tunnel Test Model



Test models were evaluated and refined in extensive wind tunnel testing.



Airblast Simulator

Additional scaled test facilities have been created to approximate actual operational conditions and to refine the HML concepts.

If you have an interest in a career with a leader in the aerospace industry, send your resume to:
Howard Walker, Manager, Salary Personnel
Goodyear Aerospace Corporation
1210 Massillon Road, Akron, Ohio 44315
EEO Employer

the requirement for a Hard Mobile Launcher.

We're two industry leaders working together to maintain the reputations we have earned singly: we deliver.

GOODYEAR AEROSPACE

his trial, "knew exactly what they wanted, right down to the company identification numbers." Because he was in financial straits, a subsequent CIA report pointed out, Bell was easily influenced by the cash "proffered—a total of $110,000 over a three-year period."

Among the classified reports Bell turned over to the Polish Intelligence Service, according to US intelligence, were: "The F-15 look-down/shoot-down radar system, the quiet radar system for the B-1 and Stealth bombers, an all-weather radar system for tanks, an experimental radar system for the US Navy, the Phoenix air-to-air missile, a shipboard surveillance radar, the Patriot surface-to-air missile, a towed-array submarine sonar system, a new air-to-air missile, the improved Hawk surface-to-air missile, and a NATO air defense system.

"The information in these documents put in jeopardy existing weapons and advanced future weapon systems of the United States and its allies. The acquisition of this information will save the Polish and Soviet governments hundreds of millions of dollars in R&D efforts by permitting them to implement proven designs developed by the US and by fielding operational counterpart systems in a much shorter time period. Specifications on current and future US weapon systems will enable them to develop defensive countermeasures systems."

Bell, who, according to the Senate subcommittee report, said that his own security clearance with Hughes had not been reviewed in twenty-eight years, was convicted of espionage and was given an eight-year prison sentence. Zacharski was also convicted of espionage and was given a life sentence.

One of the most intense recent Soviet intelligence efforts ever mounted, according to the CIA, centered on the "acquisition of knowledge on special materials, notably the weaving of carbon filaments in a three-dimensional configuration, which the [Soviet intelligence] services were tasked to acquire. The end products from this 3-D carbon-carbon weaving technology are useful for ablative heat shields for high-velocity reentry vehicles . . . and for other portions of rocket motors for large missiles. The Soviet acquisition of some of this technology is likely to enable them to eventually gain a capability for increased military options against the West—a capability that otherwise would have taken them several additional years to develop."

Among the dozens of flagrant technology transfer cases probed by the Senate's Permanent Subcommittee on Investigations, that of the Spawr Optical Co. occupies a special niche. That company, which held a DoD facility clearance and had performed laser optics work for TRW, Rocketdyne, the Los Angeles National Laboratory, the Redstone Arsenal, the Naval Weapons Laboratory, and the Air Force Weapons Laboratory at Kirtland AFB, N. M., "sold illegally to the Soviet Union some of the high-energy laser mirrors" destined for US laser weapon programs. The husband and wife owners of the company were convicted of "conspiracy, submission of false statements, and illegal exportation" and given suspended prison terms. Air Force experts pointed out at the time of the trial that the Spawrs, for a paltry $60,000, had provided the Soviets with a technological treasure trove that saved Moscow millions of dollars and about 100 man-years in research and development.

The Administration says that control of technology transfer is now a key element of national security policy.

Murder in Silicon Valley

At times, the line between conventional crime and espionage becomes murky, according to the subcommittee's report. Quoting Douglas K. Southard, Deputy District Attorney in California's Santa Clara County (which includes "Silicon Valley"), the report brings out details about the theft and disappearance of about $3.4 million worth of late-model integrated circuitry with military applications from a high-tech firm in Sunnyvale, Calif. Prosecution of the case was stymied because "one prosecution witness was beaten savagely by a stranger and was unable to testify. Another prosecution witness was murdered execution-style and his body dumped into a shallow grave in the Santa Cruz mountains." The subcommittee's report quotes Southard to the effect that, "to date, the trail of investigation is littered with dead bodies, assault, sophisticated thefts, drug sales, and more." The Deputy District Attorney speculated that, "undoubtedly, it will take years before the investigation is completed and prosecutions culminated."

One of the most interesting witnesses called by the Senate Subcommittee on Investigations was an emigré who came to the US in 1979. Testifying behind a screen and using the assumed name of Joseph Arkov to protect himself and his family, he was identified as a former Soviet engineer who had worked on "reverse engineering" and other technology transfer programs managed by the Kremlin. "Arkov" testified that the Soviet government wants to develop its ability to produce high-technology military equipment similar to that manufactured in the West. He said the Soviet Union seeks Western military technology for two reasons. One objective is to study the equipment with the intention of imitating and duplicating it. The second objective is to use it in the manufacture of other high-technology components.

The US intelligence community told Congress that the Soviets can be expected to continue their efforts to acquire a broad range of Western technologies in the years ahead. Most of their efforts will probably continue to concentrate on such high-technology areas as microelectronics, in-flight guidance computers, ballistic missile guidance, ballistic missile defense, and antisubmarine warfare technologies. There is reason to believe, however, that the task of Soviet intelligence operatives is going to become more difficult.

As Secretary of Defense Caspar Weinberger told Congress earlier this year, the "Administration has reversed the tide of a decade of neglect and naïveté and has made technology transfer control a key element of national security policy." But translating policy into working arrangements—not only in the US but throughout the free world—will, no doubt, take time and vigilance. ■

Gould...Innovation and Quality in Altimetry

We designed our AN/APN-232 Combined Altitude Radar Altimeter (CARA) on a modular basis with self-test and fault isolation at the card level. Failed cards can be quickly identified and simply replaced. So even though CARA has a Mean Time Between Failure of 2,000 hours, when a problem does arise CARA gets well quickly and inexpensively.

It's the first time "throw aways" have really worked out. Life cycle costs are cut considerably when compared to the use of expensive test equipment and service time. And operational readiness is enhanced greatly. That leaves CARA to do what it does best. Perform up to the exacting standards of the U.S. Air Force.

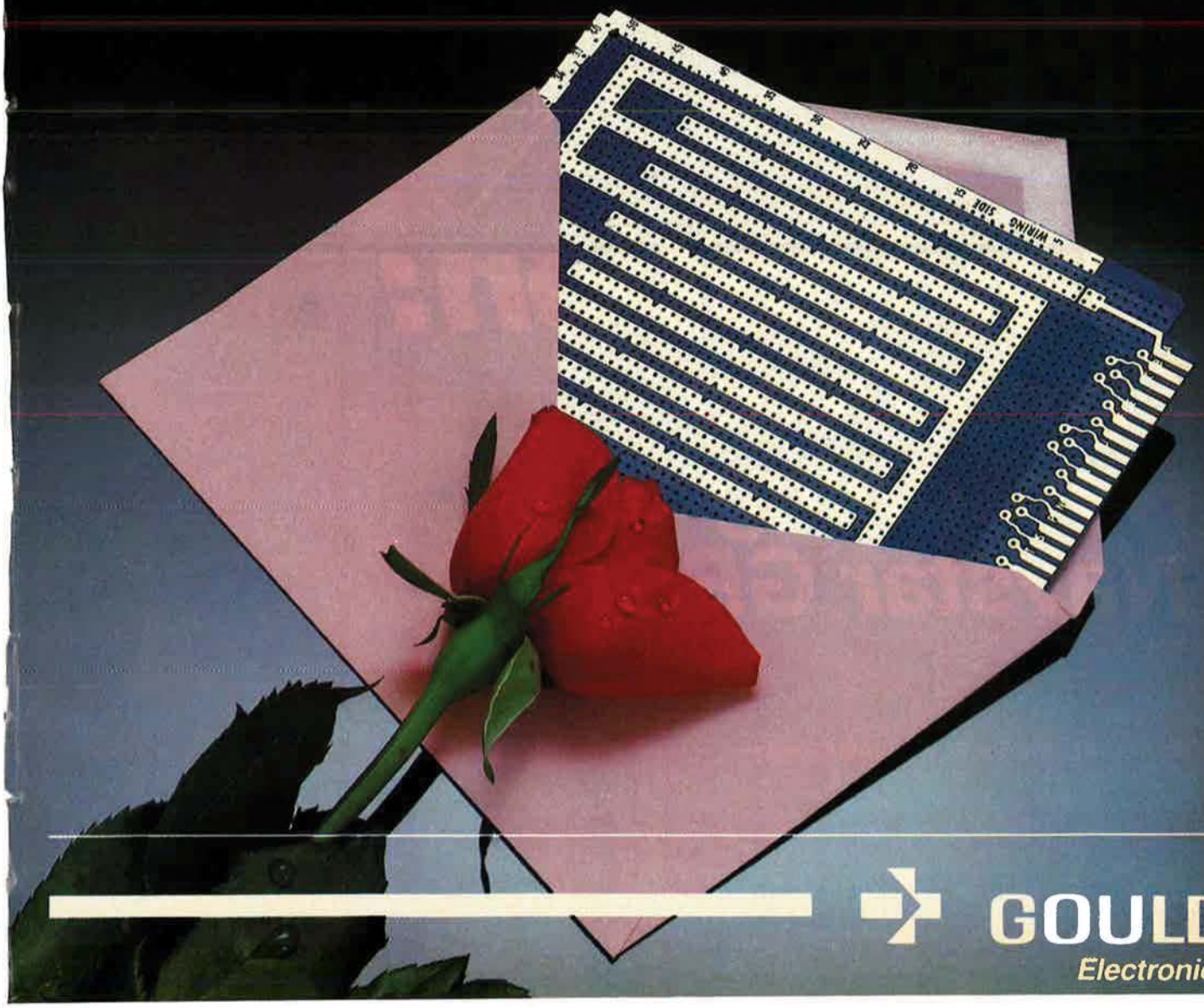
It's a digital, 0 to 50,000 feet instrument measuring *both* high and low altitudes on a frequency modulated continuous wave. Low probability of intercept and anti-jam characteristics are key features. In fact, CARA is designated to be the U.S. Air Force standard altimeter.

CARA is one more example of how Gould is committed to supplying the military with the best there is in electronic defense systems. We understand the importance of keeping life-cycle costs in line while increasing operational readiness and performance.

CARA. Just what the doctor ordered.

Gould Inc., NavCom Systems Division, 4323 Arden Drive, El Monte, California 91731, (213) 442-0123 ext. 304

When your altimeter gets sick, we'll send a card.



GOULD
Electronics

Flying at night is no different from flying in the daytime, except that you can't see . . .



Special-effects rendering of a Navstar Global Positioning System (GPS) satellite orbiting earth.

Navigation: From Dead Reckoning to Navstar GPS

BY LT. COL. RALPH R. WILLIAMS, USAF

It was late in the day to be starting a race—but there was going to be one. It would be a race of fabric-covered, open-cockpit biplanes, with undertones of national pride: the British vs. the French. It would be another in a lengthening line of aviation firsts in the seven short years since Kitty Hawk. Man had flown the English Channel. There were heralded flights to Paris and other world-class cities. Now the world would see who would be the first person to fly the 185 miles between London and Manchester. A London newspaper, *The Daily Mail*, was offering £10,000 to the one who could do it in less than twenty-four hours.

For the Englishman, Claude Grahame-White, the challenge was great. The newspapers had made this flying daredevil a local hero. He had tried the flight before and failed, landing because of engine trouble sixty-eight miles short of Manchester. Now, in this race, there was a chance that the Frenchman, Louis Paulham, would win. The honor of England was at stake. Since the race started late, night closed in all too quickly, forcing both pilots to land rather than face one of the greatest terrors of aviation in those days: darkness. For Grahame-White it was particularly disturbing; he was fifty-seven miles behind the Frenchman. He had to do something, so he decided to try flying at night—something that had never been done before! He was hoping the moon would provide enough light to navigate by.

Cars with lights ablaze lined up to form a runway, an encouraging sight for Grahame-White. He started his engine and began to roll. As soon as he was off the ground, he was in serious trouble. A cloud passed in front of the moon, and Grahame-White found himself in total darkness. In his excitement, he caught his sleeve on the ignition switch, flipping it off. Groping in the silent darkness, he found the switch, turned it on, and the engine sprang back to life.

Grahame-White managed somehow to maintain altitude throughout the night and navigate to Manchester. It was a difficult task. In those days, there were few lights on the ground and only darkness in the cockpit. By the time he landed, at 5:30 in the morning, he was cold and visibly shaken. Climbing out of the cockpit, he said, "I would not do that again for ten times £10,000." Grahame-White didn't get lost, but he was probably one of the first aviators to use the term "temporarily disoriented."

Days of Contact Flying

Early pilots depended on contact flying—the use of lighthouses, roads, and other landmarks as navigational aids (navaids). A cockpit full of instruments would be years in coming. So, for more than a decade, aviators relied on their compasses, crude maps (charts), and dead reckoning (the determining of position by using direction and speed data) for navigation. Dead reckoning in the air, however, was quite different from navigating on the earth's surface.

Early airplanes reached speeds of forty to 100 knots, but could easily be blown off course when hit by crosswinds, which commonly peaked at forty knots. That situation led to the famous word that every pilot and navigator knows quite well: drift—the difference between the true heading of the aircraft and its ground track. Some early aircraft had drift sights, allowing the pilot or nav-pilot conveniently to align a grid with the ground moving below him.

Often, when early pilots did get "disoriented," they would swoop down and read road signs. It also became common for people to write the names of towns on barn roofs, allowing pilots ease of navigation as well as the lucrative opportunity to give joyrides to adventurous passengers. Slowly, aviators were learning how to navigate a course through the air.

By World War I, navigation hadn't really improved much. In fact, there weren't many American military pilots, and even fewer aircraft—fewer than twenty. (Of the twenty-four machines originally purchased from Orville Wright beginning in 1903, almost half had been destroyed by 1913.) Nevertheless, operating British- and French-built aircraft, American pilots flew bombing missions and observation flights for distances of 150–200 miles, encountering major navigational problems. If they hoped ever to accomplish their combat missions and return safely from enemy territory, they had to be very familiar with the terrain and its landmarks. Flying at night still posed a monumental problem. As the saying of the time went, "Flying at night is no different from flying in the daytime, except that you can't see."

After the war, Lt. Col. William C. Sherman, the first Chief of Staff of the Army Air Service, published an aviation manual reflecting the lessons the Signal Corps had learned during World War I. According to Sherman, aviators of "ordinary intelligence" could in a short time learn to fly at night, helped greatly by "increasing the number of lighthouses, mortar signals, and cooperation between the units of the air service. . . . " Pilots, he continued, must also be instructed in cloud flying but should be warned never to attempt it unless compelled to do so. "If overtaken by mist of clouds, [pilots] must never let the ground out of their sight. If necessary, [the pilot] should make a forced landing rather than attempt to get home at night by flying through the mist."

Three months after the Armistice was signed, commercial aviation started in Germany when *Deutsche Luftreederei* began passenger service. That year also saw the first daily commercial air service between London and Paris. Obviously, with air traffic expanding rapidly, the "first-class" navigational aids of the World War I era—searchlights, lighthouses, and mortars fired as signals—needed improving to constitute a worthwhile en route navigational system, especially for night flying.

The First Navaids

South of the United States Air Force Academy, there are the remnants of what used to be a fairly good-sized hill. Some old-timers call it Beacon Hill because of the rotating light beacon placed upon it in the 1920s. That beacon, which operated for several decades, was part of a cross-country navigation system of lighting aids and emergency fields. The lights were placed at short intervals so that pilots could fly from one to another at night. By 1926, these light beacons covered approximately 2,000 miles and, by 1929, 10,000 miles. Despite the relatively vast coverage of this navigational system, it was effective at night only when visibility was good.

As early as 1925, aviators could make use of the first electronic navigational aid—a simple radio beacon. The

pilot could navigate between the two stations by listening to and interpreting radio signals. Two years later, the first US Army flight was made from San Francisco to Hawaii using a newly developed "radio range" system. A range was built at two installations, one on either end of the proposed flight. Although similar to the low-frequency radio beacons still used in many parts of the world, this system used a single pattern, producing four courses for navigation. Even though not completely successful (the transmitters proved reliable, but the aircraft's receiver worked intermittently), this twenty-four-hour, fifty-minute flight showed the possibilities of radio navigation. By the end of the 1920s, technology had progressed, and reliable radios were introduced.

With the development of larger aircraft and more reliable air and ground navigational equipment, aviation expanded faster and further. When Charles Lindbergh made his solo Atlantic hop between New York and Paris on May 20, 1927, he was, in fact, the 114th person to fly across the Atlantic. Such commercial companies as Transcontinental and Western Air inaugurated coast-to-coast service between New York and Los Angeles in 1930. Boeing produced an aircraft called the 247, and Douglas, the DC-1. In 1934, Pan American Airways started survey flights across the Pacific with its flying boats. Two years later, the company started carrying passengers on its new transpacific route. Pan American's experience in pioneering overseas navigation and in developing airline routes would end up serving America's war effort well during World War II.

Up the Learning Curve

Despite all these advances, the largest factors limiting expansion of commercial and military aviation remained bad weather and dependable navigation through it. Aircrews had learned to navigate across extensive distances by using such "old-time" seafarer techniques as navigating celestially to one side of a destination on purpose. This technique compensated for the large dead-reckoning errors common on ocean crossings by allowing the crews to determine which way they needed to turn to find their destination.

For example, if a navigator were aiming directly for a small island, chances were he could miss seeing it if he were off course. But by deliberately setting a course to one side of the island, at a calculated point he knew which way to turn to find the island.

Bad weather also complicated and hindered navigation. A number of disastrous air crashes occurred during this period simply because pilots lacked adequate instruments and knowledge of all-weather navigation. Improvements were being made, however. It wasn't long before the primary means for navigation, dead reckoning and celestial navigation (by hitchhiking on mariner experience), were joined by the direction finder and its associated radio beacon and the low-frequency radio range station. World War II promoted more advances in radio aids for navigation—and in instruction in the art.

Before 1933, navigational instruction was given only as part of pilot training, as the Army Air Corps had few long-range aircraft requiring specialized navigators. In 1939, when Germany invaded Poland, Army Air Corps plans still called for only about 500 officers to be trained in navigation. These plans also assumed all individual training of navigators would be conducted in a specialized Air Corps flying school, even though no such organization was in operation until 1941. In the meantime, besides continuing training in combat units, the Air Corps had some students receiving navigational instruction with Pan American Airways. After September 1944, the contract with Pan American was discontinued.

However, by 1943, an eighteen-week specialized Air



Forces navigation course had been introduced. Navigators were no longer being drawn from those cadets eliminated from pilot training; rather, men were being assigned directly to navigator school. Their training qualified them in precision dead reckoning, with basic proficiency in pilotage (contact flying) and radio and celestial navigation. Theory was kept to a minimum. Every effort was made just to show cadets how to do their jobs. In all, 45,000 bombardiers and 50,000 navigators were graduated during the war from an aircrew program that started with a small number of qualified instructors.

The Demands of War

At the beginning of World War II, navigation posed great problems. British bombers in the early days of the war had great difficulty in finding and hitting their targets.

The bombers were attempting to fly long-range night missions using navigational techniques better suited for daylight. Directional finding, using low-frequency radio signals broadcast from England, provided positive navigational fixes only within the first 200 miles. After that, the navigator was forced to rely on his dead-reckoning skills, using chart and compass. If weather permitted, he could occasionally use celestial navigation (if he knew how to do it)—but the aircraft gave bumpy rides, often making the sextant shots inaccurate. Likewise, landmarks were virtually invisible in all but the brightest moonlight. Obviously, it was a difficult feat.

For the Americans, the problems were generally the

same. After the United States entered the war, the Army Air Forces bombing effort was based on pinpoint daylight bombing. But both the Americans and the British dearly needed a more accurate method of navigation to find their targets.

Despite all the advances made between the two world wars in flight instrumentation, radio aids, and other communications, many pilots were still reluctant to fly when they couldn't see the ground. During the early 1930s, the Army developed a system of aircraft control called "needle, ball, and airspeed system." By the mid-1930s, a flight instrument that was destined to revolutionize the art of instrument flying and navigation began to appear in the cockpit: the artificial horizon, which utilized the gyroscope. Although the instrument had several limitations, including an infamous tendency to tumble, it was very effective for controlling an aircraft during instrument flight conditions.

Another technological breakthrough—the gyrocompass—also resulted from the invention of the gyro. Even though the two main drawbacks of the gyrocompass—rigidity and precession—have concerned most pilots and navigators during their careers, navigation indeed took a leap forward with its invention. The invention of radar during World War II also marked a turning point.



Early flying cadets had to master the art of piloting a plane by instruments alone without sight of the ground. Note the front cockpit of the airplane and the canvas hood covering the cadet. An instructor pilot in the back seat keeps an eye peeled for other aircraft. Randolph Field, Tex., is in the background.

The Wartime Navigational Systems

Two famous navigational systems were developed during World War II: "Gee," the first hyperbolic system (so called because the constant time difference between synchronized signals received from two ground stations appeared as hyperbolas when plotted on a map), and "Oboe," a radar system. They were not self-contained systems; rather, they used beams transmitted from ground stations. This limited their range to 200 miles for aircraft traveling at about 20,000 feet. Gee proved to be an extremely valuable navigation aid, but it was not very good as a blind-bombing device. Oboe, which the British had developed for short-range precision bombing, turned out to be more promising.





A Rockwell Sabreliner 65, the Navstar 1 Aircraft, carries the Global Positioning System (GPS) console. In the photo on the right, a mission management control display unit on the left is flanked by two single-channel Collins GPS control display units originally designed for ground control use.

Frustrated by the inaccuracy of the Gee, the lack of Oboe equipment, and the serious limitations of this new equipment, the Army Air Forces—in particular, Lt. Gen. Ira Eaker's Eighth Air Force—turned its attention to another British radar invention. Known as the H_2S, it was an airborne, self-contained radar that scanned the ground below and produced a map-like picture of the territory on a cathode ray (television-like) tube. The American version of this system was called the H_2SX.

On July 24, 1943, a British operation, code-named Gomorrah, successfully attacked Hamburg using an of-

fensive strategy built around Gee and H_2S. Navigators used Gee to maintain their route of flight, and later the "bomb-aimers" (bombardiers) used their H_2S to paint the target with radar and to reveal it with detailed clarity on their screens. In November 1943, the first twelve American navigators trained to use this system flew their first combat mission with it. Even though not completely successful, this initial use of radar bombing proved most encouraging. The circular error of the bombings was reasonably small—only one to two miles, a massive improvement over the error commonly accepted at the beginning of the war.

Loran and Decca

Long-range navigation (Loran) and Decca were also developed by the Americans and the British, respectively, during World War II. Basically, Loran is also a hyperbolic system of electronic navigation, except that it uses longer wavelengths than its predecessor, Gee. Loran's radio waves, unlike celestial lines of position, are stationary with respect to the earth's surface. The radio pulses sent from the widely separated stations are synchronized.

Loran offered many pluses to navigation: It was quicker; it required less skill than celestial; it worked in all weather, except during very severe electrical disturbances; and it was more accurate over greater distances. (The original Loran-A had an accuracy of a fraction of a mile to several miles, depending on ionospheric conditions. Modern-day Loran-C and -D have far-improved accuracies. Loran-D has a relatively short-range capability and is designed for tactical uses, such as close air support and interdiction, reconnaissance, and airdrops.)

The British-designed Decca navigation system, similar in principle to Loran, used one "master" and two "slave" ground stations to furnish continuous position information. The equipment in the cockpit gave the navigator pen-and-ink tracings across a terrain chart.

Decca equipment would stay around for a long time. Two decades after World War II, as the United States was entering the Vietnam War, eighteen C-123s, as well as a small number of C-47s, B-26s, and helicopters, were equipped with Decca equipment—but by then the results were disappointing. Aircrews had trouble receiving the signal, and malfunctions were frequent; readings were sometimes grossly erroneous.

Nevertheless, during World War II, these innovations—Loran, Decca, and, most importantly, radar—led to the defeat of Germany. They improved navigation, target location, and weapons delivery. This equipment, the men who invented it, and the navigators who operated it earned well their places in history.

New Ways to Navigate

By 1946, the AN/APS-10 radar, developed by the MIT Radiation Laboratory and manufactured by General Electric, was the radar whose time had come. At Morrison Field, Fla., a key staging point for aircraft belonging to the Air Transport Command of World War II, eighteen student navigators and an instructor boarded a C-54 Skymaster. A radome under its fuselage housed the AN/APS-10 radar. This was a first-of-its-kind training mission for navigators belonging to the Air Transport Command. Radar was now the new way to navigate—to be used with sextants, radio compasses, driftmeters, and the old standby, dead reckoning.

Two years later, the newly formed United States Air Force entered into a contract with Convair to begin the military conversion of the Convair Liner 240, designated the T-29, to serve as a navigator trainer. The T-29 first flew in 1949, and each nav student had his own map table, Loranscope, altimeter, and radio compass. The aircraft's roof had four astrodomes, while later versions added a periscope sextant and other innovations in navigation. In 1973, the piston-engined T-29s would be replaced with Boeing T-43 jets.

As the flying classroom evolved, so did the navigator's ground school. Back during World War II, various types of navigational trainers were tried. None proved completely successful. One, the G-2 dead-reckoning trainer, was mounted on rollers, and the student navigated it across the floor of the training room.

By the 1970s, computer-driven flight simulators came on the scene, allowing students to view a wide range of missions accurately: low-level flights over sea and land, night flights, airway navigation, high-altitude operations, and navigation at high speed. The greatest boon, however, was the instructor's ability to "freeze" the action, talk out mistakes, back up the simulator, and do it again. Nav students of the 1940s—as well as those of the Korean era—didn't have the benefit of such quiet, controlled situations. They earned their wings shouting over the din of the props.

Bombs in the Barrel

As did pilots in previous wars, F-51 Mustang pilots of the Korean War attempted night harassing missions but met with almost no success because often they could not identify their targets. Some of the B-26s flown during the Korean War had radar altimeters and short-range navigation radar (Shoran), the AN/APQ-13 blind-bombing radar. But in the short interval between World War II and Korea, much of the technique learned about supporting ground forces under all weather conditions had been forgotten. Initial efforts to use the Shoran, which had demonstrated its effectiveness in World War II over Italy, were disappointing.

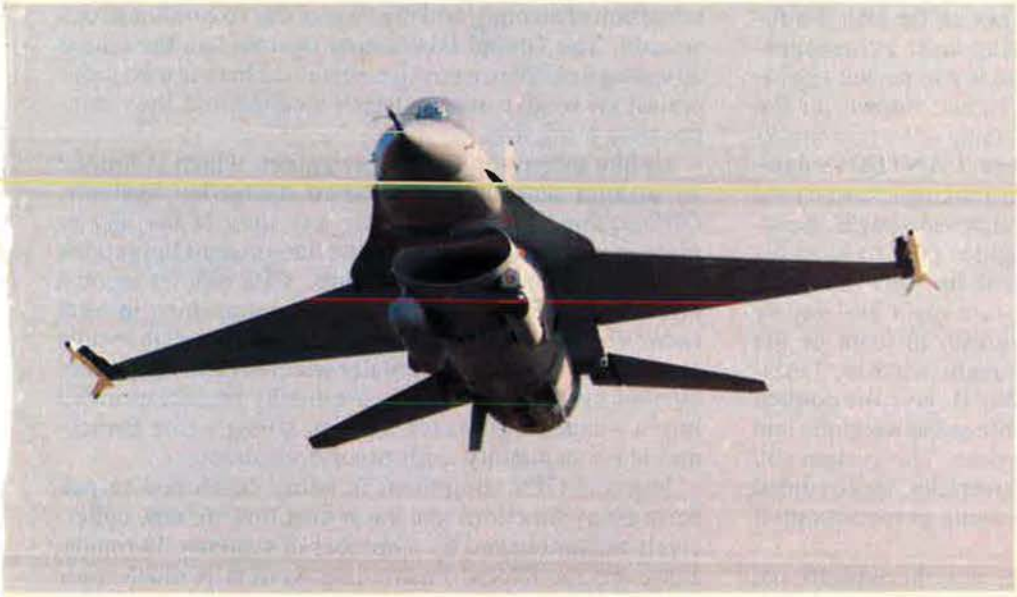
In 1951, Shoran finally became a success story with the B-26 crews. Shoran bombers frequently served as lead ships for daylight formation attacks and later were dispatched with B-29s for night raids. The bombing runs conducted under this navigation system gave a circular error of only about 485 feet, so its reliability and accuracy were good. The B-29s bettered the peak records of World War II for both sorties flown and tonnage of bombs delivered per plane on targets. The Strategic Air Command groups proved very skillful at radar bombing, despite weather, and it was a tradition they carried on to Vietnam.

In Southeast Asia, aircrews—as might be expected—had to cope with navigating through bad weather. This time, the monsoon weather provided the perfect setting for proving the B-52s' all-weather radar-bombing capability. *None of the radar navigators on the 740 Linebacker II sorties that flew in 1972 could say he had seen his target firsthand.* All bomb releases were a result of radar and computer-derived data. Subsequent bomb-

damage assessment photography proved unquestionably the accuracy of this bombing system.

There were, in fact, many technologies used during the Vietnam War to improve navigation, weapons delivery, and recovery. For instance, Loran-equipped F-4s led other aircraft not so equipped to targets at night or day or in bad weather. In fact, in 1971, 196 tactical aircraft hit petroleum storage areas north of the demilitarized zone in the first all-instrument strike employing the Loran position-fixing bomb system exclusively. Also, the Tactical Air Navigation system (TACAN is an ultrahigh frequency electronic navaid giving 360 degrees of continuous bearing and distance to the station) was widely used by transport and strike aircraft. Unfortunately, the accuracy was inadequate for blind airdrops. However, the C-130, which proved to be an enormous asset in Southeast Asia, proved what navigational radar could do. The C-130 airdrops there demonstrated the considerable proficiency of the navigators and their equipment.

The Vietnam War also saw the deft use of another prime navaid, so to speak. Whoever first thought to use airborne tactical controllers to direct fighters and bombers to their targets is not known. But in World War II, in the Korean War, and again in Vietnam, the airborne controller repeatedly demonstrated his great value. Often using nothing more than an aeronautical chart and a radio, these controllers located small, high-value targets and talked combat pilots to successful attacks.



F-16 fighter with Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) dummy pods attached. LANTIRN will permit operations at night and in marginal weather using a terrain-avoidance radar. LANTIRN is a two-pod system with navigational and targeting capability to enhance the aircraft's strike potential.

Navigation Today

It's surprising how many navigational devices used today are nothing more than spinoffs from the scientific achievements of World War II and, to a certain extent, the Korean era. Even before World War II had ended, the Army Air Forces had begun work on guided missiles. The unique feature of a missile is its guidance system. In order to navigate ballistic missiles to fixed targets, the Inertial Navigational System (INS) was developed and refined. INS uses an intricate arrangement of gyroscopes, built-in computers, and other complex equipment to guide the missile. Enemy electronic devices could not jam such a system, since it did not depend on radar emissions. As early as 1953, researchers from MIT's Instrumentation Laboratory had successfully tested an INS on a twelve-hour flight from Hanscom AFB, Mass., to Los Angeles, Calif. The INS weighed "2,800 pounds" and had a ten-mile error. In another test four years later, the prototype INS weighed 1,400 pounds and had an error of only half a mile!

Another type of system developed in conjunction with an INS was the automatic star tracker (called astrotracker today). This used the stars to figure the position of the missile—much like the early aviators used celestial navigation. The technology that gave the Air Force potentially its most powerful weapon also gave aviation very accurate, reliable, and worldwide navigational tools.

The extreme accuracy and reliability of INS and Doppler navigation systems (a computer-driven system that provides latitude, longitude, ground speed, and drift) have changed the work load and have caused the role of the navigator to change in some ways. Pan Am, the first to school military navigators formally, was the last American carrier to use navigators. Today, modern commercial aircraft usually use triple INS mixing as their primary means of navigation. While highly accurate, INS is not infallible, probably more because of human factors than mechanical (INS is only as good as the information programmed into it). The ill-fated Korean Air Lines Flight 007 that wandered over Soviet territory last year was depending on its probably misprogrammed triple INS for precise navigation over the Pacific.

Navigation today is paramount to Air Force battle management. It involves more than accurate en route navigation and target location. It also involves rendezvous for such critical tasks as air-to-air refueling, it involves very accurate weapons delivery, and it involves recovery and redeployment. MAC, TAC, and SAC all depend on accurate navigation to accomplish their missions.

And despite the great advances that have been made in navigational equipment, there are some missions that require professionals who proudly wear navigator

wings. B-52, KC-135, EC-135, FB-111, C-130, F-4, F-111, EF-111, EC-130, E-3, and E-4 aircraft all have such crew members. C-141s carry navigators on SOLL (Special Operations, Low Level) missions, and the new F-15E will carry a navigator. Obviously, the role of the navigator is evolving, and his responsibilities are expanding. Getting from point "A" to point "B" is now the easy part.

On the Deck With LANTIRN

The question is, then, how is navigation going to affect the Air Force of tomorrow?

The Air Force is developing new navigation systems, and two innovations are especially exciting: the Low-Altitude Navigation and Targeting Infrared for Night (LANTIRN) pods and the receiver and data links for the Navstar Global Positioning System (GPS). Also being developed are new generations of radar altimeters, radar warning receivers, and, perhaps not so far into the future, navigation systems employing laser gyroscopes.

LANTIRN is important because it will permit operations at night and in marginal weather, "down on the deck" where pilots can take advantage of terrain-masking to enter and leave the target area. LANTIRN's navigational system includes a forward-looking infrared sensor, a terrain-avoidance radar, and a wide-angle, head-up display (HUD) enabling the fighter pilot to keep his eyes out of the cockpit, just as if he were flying in daylight. LANTIRN will, in fact, turn night into day by displaying clear images of the terrain in front of the aircraft. By opening the tactical night window, LANTIRN will, unlike during World War II, give the combat commander the flexibility to use the same weapons and tactics as he would use in the daytime. The system will enable the pilot to deliver IR Mavericks, laser-guided bombs, or conventional weapons using proven standoff tactics.

LANTIRN is a two-pod system, with the navigational capability in one pod and the targeting capability in the second. When integrated with other aircraft avionics, LANTIRN will be a complete and effective strike system.

Throughout the decades, navigation affected the deployment of forces, location of targets, weapons delivery, and recovery and redeployment. Today's navigational equipment is good, but it's not perfect. Inertial navigation sets lose their accuracy over time, take time to warm up, and are very costly. Ground-based navigation aids, such as TACAN, Loran, and Omega (a very-low-frequency navigation system that improved on Loran, automatically giving latitude and longitude), are good but have limited accuracy. These navaids are also susceptible to enemy jamming and to meaconing (receiving and instantly rebroadcasting radio-beacon signals from false positions), and they can lose accuracy under adverse weather conditions. Radar is detectable by an enemy. Thus, if it is used in low-level navigation and target location, the mission may be endangered. In weapons delivery, tactics are often limited by the navigation equipment. For example, if pilots have to pop up sooner than they should simply to make sure they have acquired the target, the exposure could obviously be disastrous. Altogether, these problems limit the Air Force's flexibility and effectiveness.

The Navstar Solution

Navstar GPS is a solution to all these serious combat concerns. It will be an integrated system, providing a significantly higher probability for mission success. A passive, three-dimensional all-weather global system, it will establish total time synchronization and a common grid for dependable navigation and weapons delivery. It will markedly improve the effectiveness of tactical and strategic bombing, land and sea rescue, and air refueling operations—where rendezvous and timing are critical. GPS is not just a dream; it is a reality. The system has already passed its field tests, and eight R&D Navstar satellites are now in orbit. Eventually, the GPS constellation will have eighteen operational satellites.

When completely operational, the satellites, which circle the globe every twelve hours, will beam continuous navigation signals to earth. With the proper equipment, a user can determine his position, his speed within a fraction of an mph, and the time of day to a billionth of a second. The Global Positioning System has the added advantage of being a passive system. There are no radio emissions to give away a user's location and thus compromise a mission.

Unlike present en route navigation, which is limited by ground navaids and onboard navigation systems, GPS-equipped aircraft can fly any time of the day or night in any weather without the line-of-sight limitations of current ground-based systems. GPS will let tactical aircraft take full advantage of terrain-masking in total radar silence. The accuracy of GPS velocity data results in weapons release with greater accuracy than any other current system. GPS could eventually be incorporated into a weapon's guidance system, giving a true launch-and-leave capability with precise accuracy.

Navstar GPS equipment is being developed to perform many functions at a lower cost that are now collectively accomplished by a number of systems. In reality, however, the Global Positioning System is much more than just a new, accurate, low-cost navigation system. It is an added resource significantly enhancing the total military capability of this nation. It means greater survivability and higher probability of mission success.

If an Air Force crew member were to have the chance to look into the cockpit of Claude Grahame-White's 1910 biplane, he would probably be astonished by the sparseness and crudeness of it. Future aviators might react in the same way to cockpits we have today, since tomorrow's aircraft will probably have data links, collision-avoidance systems, wind shear detectors, microwave landing systems, LANTIRN, Navstar GPS, and highly integrated, computer-driven displays that enlarge aircrew capabilities. The revolution in computers, semiconductors, and software is rapidly changing the nature of navigation, and, indeed, the days are gone when pilots swooped from the skies to read road signs.

Tomorrow's flyers might wonder what all the navigation fuss was about. But we'll probably never reach the day when you can't hear that famous line echoing through the cockpit: "Nav, where are we?" ■

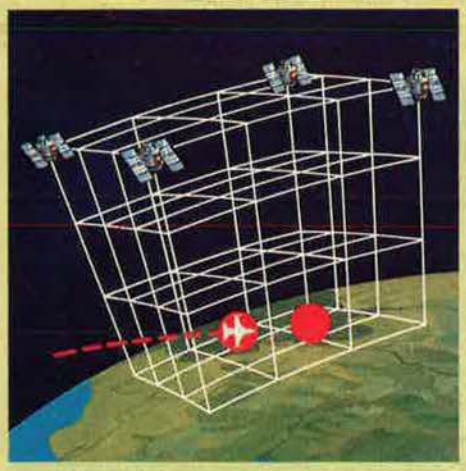
Lt. Col. Ralph R. Williams, USAF, is the Director of Public Affairs for AFSC's Electronic Systems Division, Hanscom AFB, Mass. He has authored several books, including The Language of Aviation.



Smart bomb accuracy with conventional bombs.

Anytime Anywhere Any weather

NAVSTAR GPS Global Positioning System



When it comes to increasing force effectiveness, Navstar GPS is right on target. How? Navstar GPS provides three-dimensional accuracies to 16 meters, velocity to 0.1 ft/sec, and time to billionths of a second. Weapons delivery and navigation accuracy are enhanced dramatically; GPS demonstration blind bombing tests proved it. Six deliveries were made at altitudes of 10,000, 5,000, and 2,000 ft and at 300 kts IAS. Five impacted within 10 meters of the target, one within 30 meters.

These impressive results were recently verified with GPS equipment integrated into the weapon delivery systems on Air Force F-16 and B-52 aircraft. The procedure was simple: an operator entered target coordinates into a Navstar computer. The computer generated steering and weapons release data based on information from an inertial unit and Navstar receiver. The pilot's steering display provided azimuth steering corrections and "time to go." The computer generated an automatic release pulse when the correct solution was reached.

When fully deployed, GPS will provide advantages of better target acquisition, search and rescue, and close air support. Important too: U.S. and NATO commanders will be linked into a common worldwide reference grid. Results? Increased force effectiveness. Navstar delivers.

DOD's Navstar Global Positioning System (GPS). More accurate target acquisition at a lot less cost from Rockwell's Satellite Systems Division, builders of the Navstar GPS satellites.

Rockwell International

...where science gets down to business

© 1982 Rockwell International Corporation

A Glossary Of Navaids

Automatic Direction Finder (ADF): A radio compass that detects the beams of an identified signal and automatically and immediately indicates the direction of the station in terms of compass directions. It is a marked improvement to such navigation systems as the "aural radio range" that required the pilot to interpret an "on course" signal aurally. The ADF was also preceded by the direction-finding (D/F) loop aerial. By rotating the aerial, the navigator could reduce a signal to null, indicating the loop was ninety degrees to the ground station. Two D/F bearings taken quickly from two ground stations and plotted on a map produced a "fix" giving a known position of the aircraft. More modern instrumentation now couples a gyrocompass with the relative bearing of an omnirange (360 degrees of coverage) station to yield a magnetic bearing on a radio magnetic indicator (RMI). ADFs are still used today, but mostly overseas and in remote areas.

Beacon: A station from which a light, an electronic signal, or the like is sent out to guide or orient an airplane.

Bearing: The horizontal direction to or from any point. Bearing is usually measured clockwise from true or magnetic north, or some other reference point, through 360 degrees.

Blind bombing: The bombing of a target that cannot be physically seen from the bombing aircraft.

Blind flying: Flying without being able to see out of the cockpit; flying solely by reference to instruments. During the 1930s, the RAF developed an instrument panel for blind flying. It included a turn-and-slip indicator, artificial horizon, directional gyro, vertical velocity indicator for climbing and descending, airspeed indicator, and altimeter. But it was such Americans as Elmer A. Sperry who actually developed instrumentation, such as the Sperry bombsight, Sperry gyro horizon, and Sperry instrument approach system, to the point where they could be trusted references by which to control and navigate an aircraft.

CRT (Cathode-Ray Tube): A TV-like screen; pulses of energy are amplified and converted for display on a CRT. Radar screens are CRTs, but CRTs are also used today in other ways. In some aircraft, CRTs display in many modes in an easy and readable fashion. The information may be on electronic warfare, navigation, targets, or any other data the CRT is programmed for, since these CRTs are computer-driven. Some, such as the Collins color CRT display, can make software changes updating the system without having to change the computer's hardware.

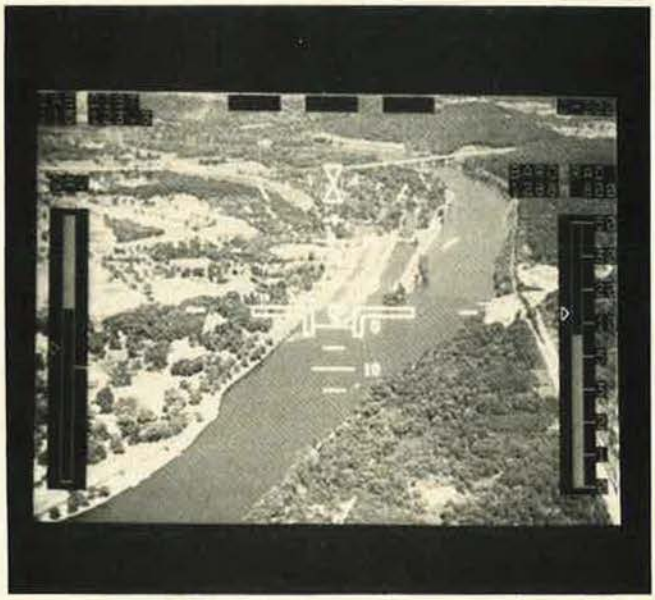
Decca: A hyperbolic system similar to the World War II navigational system "Gee" and Loran. By 1951, aircraft equipped with Decca equipment would automatically have their track plotted on a moving map called "flight log." Decca equipment—even though it failed in Vietnamese operations—created a family of navigational equipment superior to the VOR system used today. Decca equipment was more flexible—but it was also British. In 1958, when the United Nations' International Civil Aviation Organization (ICAO) decided on a universal navaid system, they chose the American VOR/DME as the standard system, making the Decca obsolete.

Directional Gyro (also called Heading Indicator): An instrument that displays magnetic heading information; it uses a gyroscopic magnetic compass.

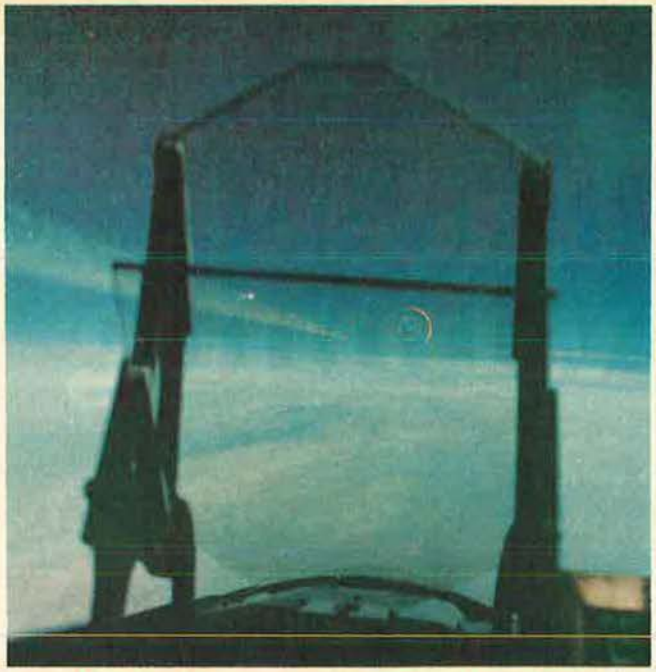
Doppler radar: Two basic Doppler radars are in Air Force use—four-beam and three-beam. They differ somewhat in operation, but both compute groundspeed and drift. The Doppler helps minimize dead-reckoning error, providing a means to solve many complex navigation problems. C-130s, for example, fly around the globe, assisted by an A. Marconi Doppler. More important, however, Dopplers and INS made it possible to navigate anywhere in the world without the assistance of outside navaids.

Fix: A known geographic position, free of any errors due to dead reckoning. Usually established by use of navigational aids.

Head-up display (HUD): Common in modern-day fighter aircraft, HUD systems display instrument, radar, navigation, etc., information in a clear-view presentation in front of the pilot—as if it were on the windscreen. By combining a bright cathode-ray tube, optics, and a computer, head-up displays can be tuned to many different modes. The system sounds new, but the first HUD system was actually used in 1944.



Military electronic display console by Rockwell's Collins Div. provides pilots with a color video image overlaid by symbols. The target reticle and information in green represent stroke-written symbology. Color blocks with messages are examples of raster writing.



F-15 Head-up Display (HUD) gives the pilot a clear, radar-centered view of his air-combat adversary as he looks through his windscreen, undistracted, while closing. Modern HUDs embody many different information modes.

Inertial Navigation System (INS): In 1945, the Air Force asked Dr. Charles S. Draper to devise a suitable INS. An INS makes use of gyros and accelerometers. The accelerometers, basically, are mounted at right angles to each other on a gyroscopically stabilized platform. Working with incredibly high precision, the accelerometers send signals to a computer that interprets the readings into speed and distance traveled. Modern-day commercial aircraft commonly use triple-mixing INSs made by such companies as Litton Industries. Three units are used because each INS has a fifty percent chance of failing after 2,500 flight hours, which means the chance of all three failing simultaneously is practically zero.

Landfall: The first point of land over which an aircraft crosses when flying from seaward; also as used in celestial navigation, the procedure in which an aircraft is flown along a celestial line of position which passes through the destination.

Line of Position: A series of possible positions or fixes. It can be a straight or curved line, but in either case it gives the navigator a clue as to his position.

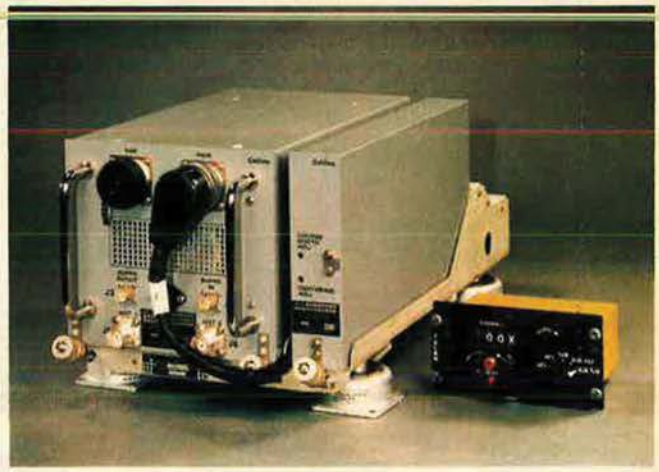
Master station: The primary or control transmitter station, the signal of which triggers the transmitter of one or more other stations. Also a transmitter station whose signals are used by other stations as a basis for synchronizing transmissions. In 1940, when British engineers developed Gee, an aircraft was able to determine its position by measuring the difference in time between the arrival of synchronized pulses broadcast by a master and two slave stations.

Microwave Landing System (MLS): MLS is a great improvement on the Instrument Landing System (ILS) commonly used today for making precision final approaches in good or bad weather. MLS is not significantly affected by weather, terrain, or structures around an airport. It will provide all types of aircraft a number of approach paths, rather than the one given by ILS. Developed by the Hazeltine Corp., MLS will also allow aircraft to make curving approaches and thus navigate around congested population areas.

Navigation aid (navaid): Any visual or electronic device—either airborne or on the surface of the earth—that provides point-to-point guidance information or position data to aircraft in flight.

TACAN (Tactical Air Navigation): Developed by the Navy and adopted by the Air Force for precise positioning within a radius of 200 nautical miles. As with VORs, TACANs beam an infinite number of radials outward from the station. Distance-measuring equipment (DME) is an integral part of TACAN, providing continuous slant-range distance information. The Civil Aeronautic Administration (predecessor to the FAA) wanted to build an airway system using VORs and DMEs, not TACANs. A compromise was struck in 1956 under the name VORTAC, which retained the VOR of civil directional use but replaced the DME with TACAN's distance-measuring component. This created the first civil-military common system.

VOR (VHF omnidirection radio-range): VORs combine two radio signals precisely so that an indicator in the aircraft can tell pilots their relative position from the transmitting facility. Most VORs are collocated with military tactical air navigation (TACAN) systems or distance-measuring equipment (DME) that provide pilots with slant mileage from the station. There are more than 950 VORTAC and VOR/DME stations in the United States, forming the federal transcontinental airway system. But the modern airway system we have today grew out of yesterday's tragedy: In 1956, two large airliners collided in midair, killing all aboard. Within a week of the recovery of the last body, the Senate Appropriations Committee voted enough money to double the number of VORs to more than 900 and to purchase eighty-two advanced long-range surveillance radars.



This Collins AN/ARN-118 (V) Tactical Air Navigation (TACAN) equipment is standard for USAF aircraft and is used on aircraft of thirty-five other nations. More than 20,000 such systems have been built.



VORTAC very-high-frequency omnidirectional radio-range station equipped with UHF tactical air navigation aid gives pilots position and direction information.

Litton introduces innovative, winning technology.





LN-12 INS Family

1954---

With vision and courage Litton Industries invested heavily in adapting the then unwieldy inertial technology to navigation systems for manned aircraft.

Innovative all-attitude, no-gimbal-lock platforms combined with two-degree-of-freedom gyros and simple floated-pendulum accelerometers reduced dramatically the number and size of sensors used by single-degree-of-freedom gyro-based systems.

Using analog computers, these pioneering systems performed in the 2-3 nm/hr category as early as 1957 in operational military aircraft.



LN-15 INS Family

1964---

The key to next-generation navigation was the gas-spin bearing gyro which was less than half the weight of its predecessors. Litton's new gyro permitted longer life, better long term stability, and reduced mass shift problems. New digital computers replaced analog, pancake synchros were developed, and Kalman filter techniques were implemented within the inertial systems.

Aircraft-type navigators were introduced to the U.S. Navy and also to surface ship gyrocompasses to replace 1800 pound gyrocompass assemblies.

This platform operated in the 1 nm/hr category.



LN-30 INS Family

1974---

Our 3rd generation navigation system was designed for higher performance with low-life-cycle costs.

A cantilevered gimbal assembly resulted in reduced volume and assembly time permitting sensor element preassembly for later installation. Servo electronics mounted directly onto the gimbals permitted fewer slip rings. A 2-degree-of-freedom dry, tuned-rotor gyro reduced costs and improved performance. A low-cost dry flexure, supported, torque-to-balance accelerometer replaced the floated type.

Overall weight reductions brought the platform to under 8 pounds.



LN-90 RLG Family

1984---

Litton's 4th generation navigation systems represent state-of-the-art advances in two important areas; computer evolution and ring laser technology.

New, small, high-powered computers permit the elimination of all gimbals from INS systems. Similarly, advances in Ring Laser science replace spinning wheel gyros, increasing both producibility *and* reliability simultaneously.

In designing its RLG, Litton avoided the early industry triangle mindset and selected the square laser "ring" because of its superior backscatter characteristic, reducing gyro volume.



1990---

Looking beyond ring laser technology, Litton is leading the way in fiber-optic sensor development by sponsoring significant research at leading universities and by making heavy internal R&D commitments in fiber-optic sensor technology.

Litton sponsored research has already demonstrated the capability of fiber-optic gyros to meet performances of a typical RLG. We anticipate that fiber-optic gyros will provide performance to meet the most demanding requirements of both accuracy and environment for earth-based and space-based inertial systems.



Litton RLG IMU wins Strategic ICBM
Litton's LN-95 RLG AINS wins Strategic ICBM Guidance Inertial Measurement Unit for the AINS Program in open industry-wide competition.

Litton LN-93 RLG INU for Standard Navigation
The advanced technology LN-93 will meet the latest USAF Standard Inertial Navigation Unit requirement.

Generation after generation, through one competition after another.

For more than a quarter century Litton has supported the Air Force with advanced, inertial navigation systems. Our Ring Laser Technology will continue that tradition by being onboard the Strategic ICBM Guidance IMU for the AINS program. Looking forward, our new LN-93 RLG INU will meet the latest USAF Standard INU requirement.

Through four generations of improvement, Litton has learned that while performance is vital, **reliability is the key**. We know there's a benign world of commercial and transport aircraft reliability, but we live in the harsh, unforgiving operational world of military high-performance. **Here, reliability takes on dramatically different meaning. We know the difference. We build for it. Generation after generation.**

Litton **Guidance & Control Systems**





LEFT: Col. Arnald D. Gabriel conducts the USAF Band during one of many outdoor performances. RIGHT: Colonel Gabriel with the forty-three-piece USAF Band on the steps of the US Capitol building in Washington, D. C. During his twenty-year tenure as conductor, the USAF Band, the Orchestra, the Singing Sergeants, and numerous ensembles have transformed the Band into a musical organization dedicated to improving morale, helping recruiting, and performing for the public.

From Valley Forge To Gabriel

These Christmas holidays are special for the USAF Band.

BY CAPT. NAPOLEON B. BYARS, USAF
CONTRIBUTING EDITOR

IT WAS almost Christmas in France in 1944, just before the Battle of the Bulge, when he heard about the loss of Glenn Miller, conductor of the Army Air Forces Band. It was a loss felt by all the troops—indeed, by the entire Western world—to whom Miller and his music had meant so much. To Private First Class Arnald D. Gabriel, the loss was especially poignant because of his love for music and his separation from it as a combat machine gunner with the 29th Infantry Division in Europe during World War II.

Ever since Valley Forge, American troops have regularly had to spend Christmas away from home, loved ones, and holiday celebrations. Private Gabriel, far from home during those cold, damp De-



cember nights leading up to one of the pivotal battles of the war, was no different.

Forty Christmases later, Colonel Gabriel, conductor and commander of the USAF Band in Washington, D. C., is retiring. He is only the fourth conductor that the USAF Band, which is a direct descendant of Miller's AAF Band, has ever had. Colonel Gabriel will pass the baton to Maj. James M. Bankhead, currently the Band's deputy conductor, as the Band prepares to play on for many more Christmases.

The USAF Band always puts on a special show at Christmastime. As part of this year's celebration, the Band's official chorus, the Singing Sergeants, videotaped a television show at Valley Forge and other historic sites. Called "An American Christmas," their performance traces, through music, the early traditions that have become so much a part of the American Christmas celebration. The program was scheduled to be shown regionally.

Meanwhile, Colonel Gabriel makes his final appearance with the USAF Band when the Band plays its annual Christmas concert in Constitution Hall, Washington, D. C., this month. *(See also "The Bulletin Board" elsewhere in this issue for more about Colonel Gabriel's retirement.)*

It was at Valley Forge that the first generation of American GIs spent the holidays away from home. Led by General George Washington, they were molded into a coherent fighting unit that would go on from Valley Forge to eventual victory in the fight for independence.

Generations of American GIs have since then spent holidays away from home—as would Private Gabriel at the Bulge, as did airmen at Cam Ranh Bay, as do blue-suiters today at Thule in Greenland and at other remote sites around the world. One of their common comforts has always been music, either made by themselves or played by military bands made up of brave men and women who share in the defense of freedom. Colonel Gabriel, decorated for heroism in World War II, is one of those men.

Blue-Suit Bandleader

In 1946, then-Staff Sergeant



LEFT: Maj. James M. Bankhead (standing), tapped to become the fifth USAF Band conductor, reviews concert program with Colonel Gabriel. BELOW: The Airmen of Note, the USAF Band's jazz ensemble, dress up on nostalgic occasions in the old Army Air Forces uniform.





Colonel Gabriel accepts Special Citation from Sen. Barry M. Goldwater (R-Ariz.) and General Jimmy Doolittle (far left), AFA's first President. Colonel Gabriel was also invested as an AEF Eaker Fellow at the 1984 AFA Convention.

Gabriel left the service and, after considerable urging by his high school band director, enrolled at Ithaca College, N. Y., to study music. After graduation, he reentered the service, this time in the Air Force, as a warrant officer bandleader assigned to Sampson AFB, N. Y.

During his career, Colonel Gabriel has commanded and conducted the Tactical Air Command Band at Langley AFB, Va., the United States Air Forces in Europe Band, the Air Force Academy Band at Colorado Springs, Colo., and has guest-conducted several bands and orchestras in the US and abroad.

Colonel Gabriel began his tour as conductor of the USAF Band in 1964 and started new programs that expanded the Band's appeal to audiences. He created the Guest Artist Series, instituted a free-admission policy for the semiannual US Concert Tours, and resumed the Miller AAF Band tradition of overseas concert tours.

The Guest Artist Series, which began in 1966, has been presented each year on Sunday afternoons during February and March in Washington, D. C. Over the years, capacity crowds have watched 124 guest artists perform with the Band. The Series has featured such stars as Aaron Copland, Doc Severinsen, Jerry Lewis, and Barbara Mandrell. In fact, the Guest Artist Series was so successful that it had to move from Washington's Departmental Auditorium to nearby DAR Constitution Hall to accommodate larger audiences. The semiannual US Concert Tours also attract overflow audiences.

Colonel Gabriel revitalized the Band's overseas concert tour program. Touring throughout Latin America, Europe, and the Far East, the Band has performed in forty-seven countries. Colonel Gabriel was awarded a Special Citation by the Air Force Association and was invested as an Aerospace Education Foundation Ira Eaker Fellow at the 1984 AFA National Convention

for his contributions to Air Force spirit and morale. He has also been recognized for his work at improving international relations.

"When we're performing a concert in a country that is not pro-American," Colonel Gabriel said, "and, after fifteen minutes of playing, 60,000 people are applauding you, then you begin to realize the impact of music on international relations."

Professional Performers

The Colonel attributes all the credit for his success to the people who make up the USAF Band organization. "In all my encounters with people throughout the world, never have I found people so talented and dedicated as they are here," he said.

Appearances on TV's Mike Douglas show and a nationally televised Fourth of July concert have also brought recognition to Colonel Gabriel and the professionals of the USAF Band. During his twenty-year tenure as conductor, the USAF Band, the Orchestra, the Singing Sergeants, and numerous ensembles have transformed the Band into a musical organization dedicated to improving morale, helping recruiting, and performing for the public.

"It takes a dual personality to do this job," Colonel Gabriel said. "One has to be businesslike so that cost-consciousness remains a part of every decision that is made. The other has to be humanistic to allow for the creativity involved."

Following his appearance on the Guest Artist Series, Doc Severinsen commented: "Colonel Gabriel brings to the world of music qualities of integrity and courage that we usually associate only with battlefield heroes, which he was. I feel that these qualities add a character to his music that gives it a dimension found only once in a great while."

Perhaps it is in the very nature of their service—playing to entertain, inspire, and comfort the troops—that USAF Band conductors measure up to greatness. Perhaps it also has something to do with Valley Forge and the holiday season, because even after Glenn Miller's baton is passed from Colonel Gabriel to Major Bankhead, you will still hear that character resounding. ■

Glenn Miller and the USAF Band Tradition

Exactly forty years ago this month, the Army Air Forces Band lost its early great leader—Maj. Alton Glenn Miller. Glenn Miller, as he is more popularly known, in only two years set standards of excellence for military band performances that are the benchmark for performances today.

As early as 1939, Glenn Miller was America's jukebox king. With hit songs like "Chattanooga Choo Choo," "Moonlight Serenade," and "In the Mood," his record sales regularly topped the 1,000,000 mark.

Even though he hit it big with his civilian band prior to joining the service, Miller found that getting into uniform was no easy task. He first applied in June 1942 for a Navy commission but was turned down. After making application to the Army, and with some influence from a brigadier general, he received an appointment and orders to report to the Army Specialist Corps.

He completed officer training at Fort Meade, Md., and was commissioned a captain on November 23, 1942. During training, Miller had shed the trappings of notoriety so successfully that at times he wondered if joining the Army had been a good move. Weary from the long hours of marching, physical conditioning, and lessons on the military way of doing things, Miller wrote to a friend: "How is the band business? I vaguely remember being in it at one time."

Miller's major accomplishment while in the service was to reshape the conservative rhythm of military music to more contemporary tunes. This came about after his transfer to the Army Air Forces in early 1943. Once in the Air Force, Miller did not find superiors eager to help him acquire the talent he needed to staff the AAF Band. With the war going on in Europe and the Pacific, convincing commanders to release men for band duty when they were hard pressed to find replacements for combat units took some fast talking.

But despite the difficulties of finding enough men who could qualify as musicians, by June 1943 Miller managed to assemble what is now referred to as "The Great Miller AAF Band." Their first radio broadcast performance was at CBS Playhouse No. 4, and they played a medley of tunes. Among them were "American Patrol," "The Caissons Go Rolling Along," "Moonlight Becomes You," and "I Sustain the Wings." The thirty-eight-piece orchestra included musicians like Ray McKinley on drums, Herman "Trigger" Alpert on bass, Peanuts Hucko on sax and clarinet, Mel Powell on piano, and others from "big" bands led by such figures as Benny Goodman, Artie Shaw, and Tommy Dorsey.

Miller used his talent for creating music that appealed to American youth to help in recruiting for Training Command. However, he was not content to stay Stateside with his band, and in the summer of 1944 he asked the War Department if he could play for the troops in Europe. Gen. Dwight Eisenhower had heard about the AAF Band and thought its appearance would cheer the thousands of young American troops in his command. At General Eisenhower's urging, the War Department okayed Miller's request, and the Band began its tour of Europe. The Band succeeded instantly in lifting the spirits of battle-weary and homesick GIs.

"Next to a letter from home, Captain Miller, your organization is the greatest morale builder in the European Theater of Operations," Lt. Gen. Jimmy Doolittle commented to Miller after a concert stop in England. Miller and the AAF Band went on to tour throughout Europe, logging more than 500 flying hours and performing before more than 2,000,000 troops, often within earshot of the front lines.

On December 15, 1944, Miller boarded a Norseman C-64 en route from London to Paris in order to make some advance arrangements for the Band, which was to join him a few days later. The weather was cold and foggy. During a break in the weather, the little airplane taxied out and took off. The C-64, its two-man crew, and Miller were never seen again. The flight was assumed to have ended in the English Channel.

After Miller's death, Capt. Don Haynes took over the administrative reins of the Band, which continued to play for the GIs in Europe. In November of 1945, with the war then over, the AAF Band gave its final concert at a banquet at Washington's National Press Club. President Harry Truman and Generals Eisenhower and H. H. "Hap" Arnold were in the audience.

The unit that had performed so well for so many was disbanded a month later, and almost all of the musicians joined other bands. A new AAF Band, which later, in 1947, became the United States Air Force Band, was formed six months after the explosive demobilization that followed World War II.

Today, the USAF Band's jazz ensemble, the Airmen of Note, carries on the Miller Band tradition. The Airmen of Note portrayed the Miller Band in the movie "The Glenn Miller Story," starring Jimmy Stewart. On nostalgic occasions, the Airmen of Note dress up in the old AAF uniforms during evening performances dedicated to the Miller sound.

Maj. Alton Glenn Miller and the AAF Band began a new era of contemporary military band music and lifted the spirits of young Americans fighting abroad. The tradition of great Air Force bands and their maestros is alive today.

Unrivalled accuracy and lower operating costs. Available now with Smiths Industries digital fuel gauges.



2100 Series for OEM or retrofit.

Part Number 20-120, standard gauge for Boeing 757/767.

Part Number 20-215, with numeric totalizer and graphic display of fuselage tank quantity.

- ***One part number for all tanks.***
- ***Fast, easy retro-fit; compatibility with existing wiring, tank probes, and compensators.***
- ***In service, FAA certified.***
- ***Automatic calibration, both zero and full.***
- ***Comprehensive system diagnosis with built-in fault code display including faulty wiring and connections, tank contamination, sensor failures and more.***
- ***Unrivalled accuracy.***
- ***Immediate, off-the-shelf availability.***

With over 4 decades of experience, including installation on over 100 types of aircraft, Smiths Industries can bring the latest technology, including high contrast dichroic LCDs, to your aircraft. Smiths Industries digital fuel gauging assures you of virtual immunity to tank contamination and fuel system aging errors.

Available now, from our two production facilities (Clearwater, FL and Malvern, PA). Call Larry Ulman at (813) 531-7781 to learn more about on-time deliveries, lower maintenance costs, and the unequalled accuracy of Smiths Industries digital fuel gauging.

SMITHS INDUSTRIES
AEROSPACE & DEFENSE
SYSTEMS INC.

Clearwater Division, 14180 Roosevelt Boulevard, Clearwater, FL 33518 U.S.A.

DALLAS (817) 540-4777 • LOS ANGELES (213) 823-5497 • SEATTLE (206) 451-9099 • MALVERN, PA (215) 296-5000 • CHELTENHAM, UK (024267) 3333

VIEWPOINT

Vas You Dere, Salisbury?

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

Gross errors and strange conclusions in Harrison Salisbury's autobiography lead one to wonder if he experienced the same World War II and the same strategic bombing campaign as the rest of us.



Back in the 1930s, there was a comedian who went by the name of Baron Munchausen. After spinning a wholly improbable yarn, which was promptly challenged by an incredulous straight man, the baron, full of guile, would ask, "Vas you dere, Charlie?"

The phony baron's tales were harmless good fun, just as were those of the real Baron Munchausen, an eighteenth-century German cavalry officer whose accounts of his adventures in Russia became classics. We have all known a baron or two. So long as the tales don't hurt anyone, they are harmless entertainment, which brings me to the point of this little essay.

Recently, I came across a book by Harrison Salisbury called *A Journey For Our Times: A Memoir.* Harrison Salisbury is the same fellow who went to Hanoi at Christmastime in 1966 and produced, for the New York *Times,* a series of articles that read like Viet Minh propaganda. These pieces became, in fact, compulsory listening for those exposed to the infamous Hanoi Hilton's loudspeaker system. According to Admiral Jim Stockdale, the Salisbury articles were "very uncomplimentary to the United States and loaded with what we [the POWs] had all been getting for months as the official Central Committee propaganda line."

With that observation on Salisbury, the objective reporter, we can return to *A Journey For Our Times: A Memoir.* It is an autobiography, always a suspect form of literature but often an entertaining one. This book is no exception. Written in an easy style with almost embarrassingly intimate glimpses into Salisbury's eclectic love life, it is a disarming story of a journalistic career. And so, when the journey reaches London in February 1943, thus disarmed, we are unprepared for what follows.

That February was still a long sixteen months from D-Day, and the only war on the western front was the air war. Correspondents, therefore, were familiar visitors that winter at the Midlands air bases, and they were occasionally permitted to go on a mission. One of Salisbury's colleagues, along for the ride, was in a B-17 that went down. This somehow seemed to trigger in Mr. Salisbury's mind a revelation about the theory of American airpower. This revelation came to him on a Sunday venture out of Mayfair to London's East End, an area hard hit in the Blitz. Salisbury suddenly understood what Tooey Spaatz and Ira Eaker were after: total and merciless destruction. What is more, if the RAF had not beaten them to it, the Eighth would have performed this savagery at night. In any event, Salisbury concludes that daylight bombing was in the tradition of Attila the Hun, a campaign of indiscriminate destruction.

Well, there was some of that. World War II was not without its political pressures, but those missions had nothing to do with the strategic theories of men like Spaatz, Eaker, and Doolittle who, instead, saw daylight bombing as a way of knocking out key German industries. Spaatz worried about collateral damage and noncombatant casualties—he had, after all, relatives in Germany—but his objective was to cripple vital defense plants.

The problem in 1943 was how to get at these strategic targets without unacceptable losses. The Schweinfurt missions in August and October of 1943 proved the validity of the strategic concept to an expert, Albert Speer, Hitler's Minister of Armaments. Speer's memoirs tell of the effect these attacks had on ball-bearing production and the concern he had over the future of this industry if there were further attacks before he could disperse the facilities. Because deep penetrations without fighter cover were too costly, strategic targets like Schweinfurt were given a respite until the P-51s came along. After that, attacks on synthetic oil refineries and transportation complexes, along with the decimation of the Luftwaffe, made D-Day possible. This is clear enough, except to Harrison Salisbury who has misread the postwar Strategic Bombing Survey to suit his own conclusions.

Having decided strategic bombing was useless, Salisbury goes on to conclude that only the Soviets used airpower as it should be used, as artillery. When it was appropriate to do so, we not only used air as artillery but as cavalry—witness Patton's use of the Ninth Air Force to serve as his right flank in breaking out of Normandy. The fact that these tactics alone would never have got Patton to Normandy in the first place is something Salisbury chooses to ignore. Beyond that, he says things that are both outrageously in error—the loss of all but one airplane at Regensburg, for example—and malicious—things that at least make us wonder about the rest of his life story.

World War II strategic bombing had its inconclusive aspects, but these stem mostly from the diversion of Spaatz's Eighth and Fifteenth Air Forces away from his target philosophy. When we look at the overall results, there can be no doubt that daylight bombing played a key role in the war. No doubt, that is, except in the minds of people like Harrison Salisbury.

Salisbury is an old man now, and so are those of us who were in the Eighth. He may have been in England during those tough days, but, to turn the tables on this baron, so were we, Charlie. ■

C-17: THE START-TO-FINISH



The C-17 can carry a full range of Army and Marine Corps equipment from the U.S. directly into small, austere fields in a combat zone.

Currently, large airlifters deploy equipment from *major* bases in the U.S. to *major* overseas airfields. Once there, smaller planes take the shipment to small, remote airfields close to the forward battle area. Outsize combat equipment too large and heavy for the small airlifter is driven or transported forward by truck or barge.

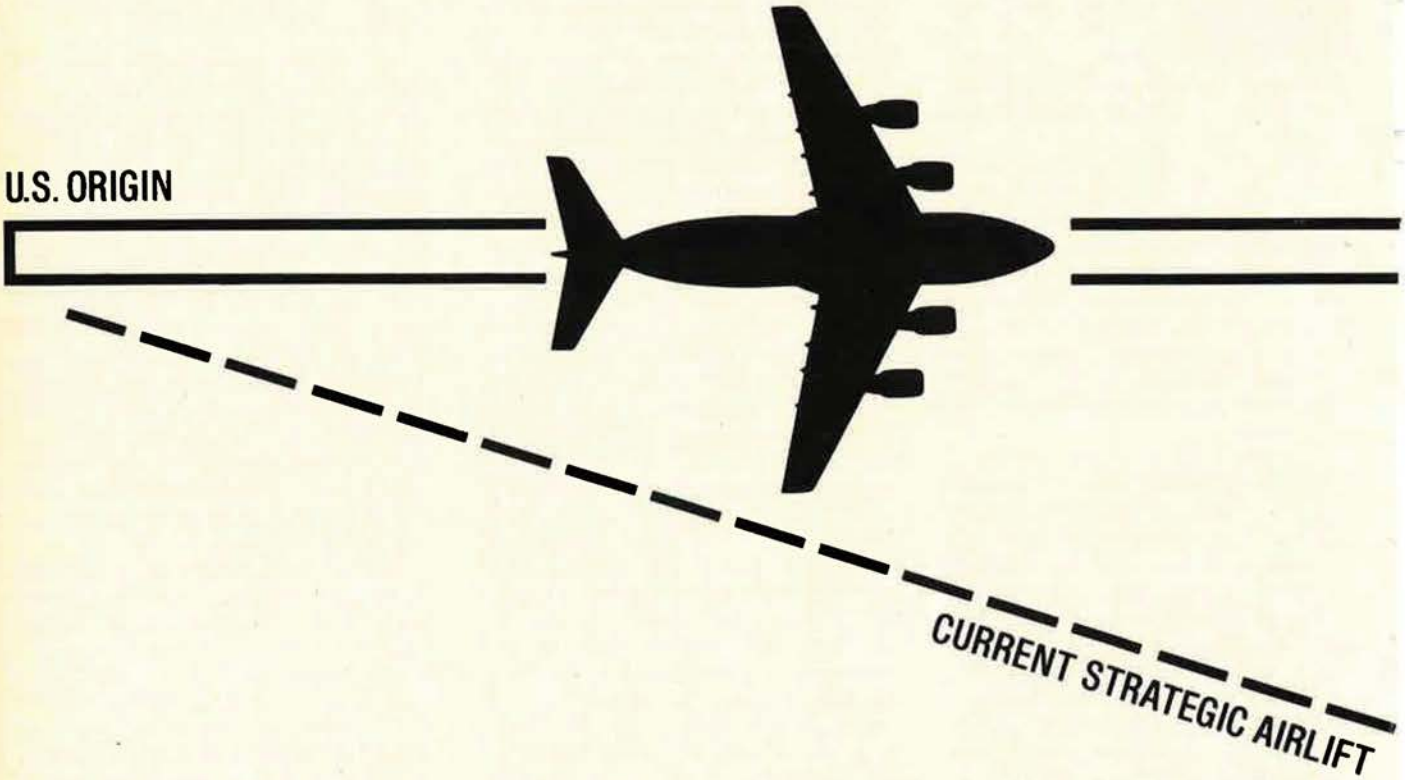
The C-17 combines these two airlifter jobs.

In addition to direct delivery from the U.S., the C-17 augments the existing force of intratheater airlifters. The C-17 can fly short routes, deploying troops and cargo from small or major airports into forward areas. In this role, the C-17 provides theater commanders with capacity, speed, and operational flexibility unavailable before the C-17.

Equally important, the C-17 is designed to keep operations and maintenance costs low. According to the U.S. Air Force Airlift Master Plan, the C-17 force option costs $16 billion (FY '82 dollars) less over the next 30 years than the next best option, including 14,800 fewer people for operations, maintenance and support. It will add 35% more intertheater and 78% more intratheater airlift to the existing capability.

The C-17 can carry more than four times the load carried by existing intratheater transports but operate into the same small airfields.

The equipment of the Army's new Light Infantry Division can be



© 1984, McDonnell Douglas Corporation

AIRLIFTER.

carried efficiently by the versatile C-17. In fact, major weapons systems, vehicles and equipment of all Army units fit aboard. With the C-17, they aren't left behind for time-consuming overland shipment.

The commander can move fast with the flow of battle. The C-17 swells the ranks of airlifters available to the commander. He can "mix and match" loads to deliver exactly what's needed to forward battle areas. And, what's most important for troops in combat, the C-17 lets the commander deliver outsize cargo when and where it's needed.

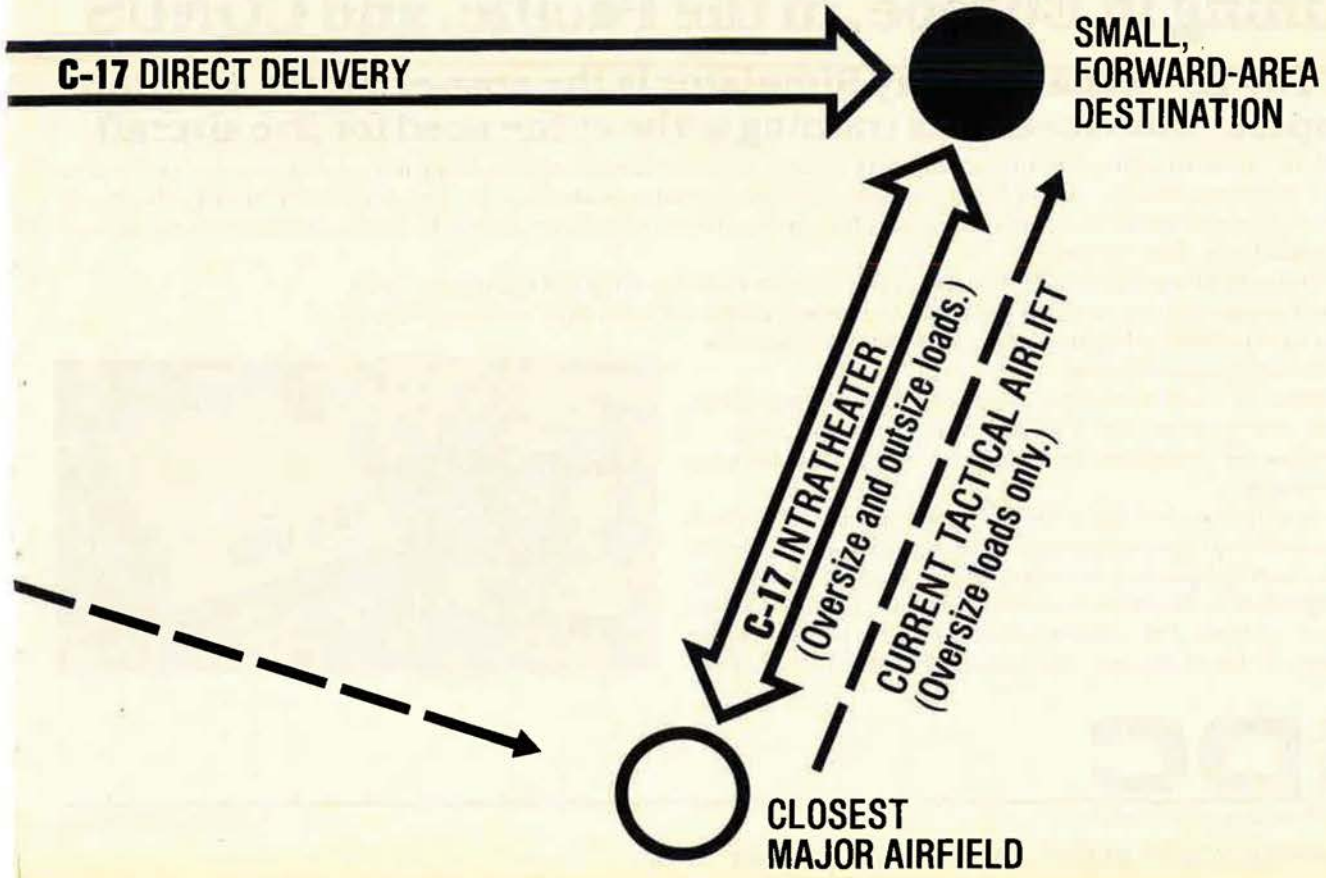
Modern, proven technology is used in the new C-17 airlifter. The key elements of the C-17 design are based on modern technology already proven in commercial and military operations or in extensive prototype test programs.

McDonnell Douglas backs its belief in the C-17 with a three-part warranty. Specified structural life, aircraft performance, maintainability, reliability, and availability levels will be met or corrections will be made at no increase in price to the Air Force.

The C-17 long and short airlifter. If mission reliability, capability and low cost of ownership are essential, the C-17 is the one that's all in one.

These results warranted:	
Reliability	93% system mission completion success probability.
Maintainability	18.6 aircraft maintenance manhours per flight hour.
Availability	74.7% full mission-capable rate. 82.5% partial mission-capable rate.

MCDONNELL DOUGLAS



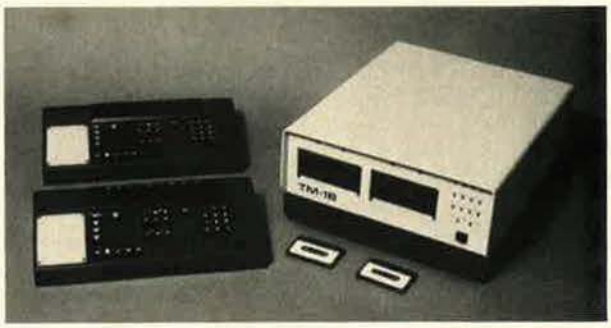


Now supporting U.S. Air Force air controller training in Europe, in the Pacific, and CONUS

The TM-1B™ Radar Display Simulator is the cost-effective solution for operational readiness training without the need for live aircraft.

The TM-1B™ Radar Display Simulator supports training of individual weapons controllers and entire air operations crews. It is an inexpensive, portable simulation system that creates realistic, safe, and controlled training situations. The TM-1B Radar Display Simulator is suitable for use in schools, mobile air control facilities, and comparable permanent installations. The system:

- generates realistic radar and IFF displays on standard PPIs (for up to 124 flights at a time)
- allows for control of simulated flights and exercise parameters via simple keyboard actions
- supports realistic pilot simulation, including interactions with operations personnel
- provides for totally simulated situations without operational radar and "sim over live" training with operational radar
- provides for recording and playback of training/exercise situations.



Proven in field use, the TM-1B Radar Display Simulator is a true exercise and management system with real-time flight control and monitoring capability for both prerecorded and operator defined flights. It is the most versatile, efficient, and economical system of its kind. For additional information, please contact Joe Wingard, TM-1B Project Office, Telephone (213) 453-6113.

SDC

System Development Corporation

A Burroughs Company

5151 Camino Ruiz, Camarillo, CA 93011-6004, Telephone (805) 987-6811

THE MILITARY BALANCE 1984/85

As Compiled by The International Institute for Strategic Studies, London

ONCE again, AIR FORCE Magazine presents to its readers the exclusive US presentation of the annual international standard reference, "The Military Balance 1984/85." "The Military Balance" has appeared in AIR FORCE Magazine each year since 1971.

This comprehensive reference provides a detailed, unclassified, quantitative assessment of the elements of military power and defense expenditures worldwide. As such, it is a handy and authoritative unclassified reference accepted as the leader in the field.

Something the compilation is not: It is not an assessment of the balance of power in the world, either globally or regionally. The document has been prepared by the Director of the London-based International Institute for Strategic Studies and his staff, who accept full responsibility for its contents. The contents cannot represent a consensus of the views of the IISS's worldwide membership, nor could they.

For this publication, AIR FORCE Magazine has added photos and captions, and we assume responsibility for them. As in the past, minor tabular material has been excluded from this reprint because of space limitations. Readers wishing the original volume may order it from The International Institute for Strategic Studies, 23 Tavistock St., London WC2E 7NQ, England.

The IISS outlook on defense spending trends in the Western Alliance is a dour one. The report forecasts a slowdown in the rates of growth of such spending across the board, notwithstanding US pressure on its NATO allies and the recent history of solidly upward US defense spending.

Noting that US defense spending increases have averaged about nine percent a year in real terms since 1980 and that the Reagan Administration asked Congress for an inflation-discounted growth of thirteen percent in the current fiscal year, the IISS report goes on to say:

"Whether the US Congress will continue to support the Administration in this may be doubted, and a levelling off of the rate of increase can be anticipated. However, the money committed forward . . . for long-lead items is considerable, and it seems fairly certain that the US [defense] budget will not decline in real terms."

Western Europe is quite another matter. The report declares that the NATO allies' social and economic difficulties, together with "rising public resistance to defence expenditure increases," will make it harder for them to raise defense spending at all, let alone meet the goal of three percent annual increases in real terms that they agreed to, at the behest of the US, in 1978.

Belgium, Denmark, the Netherlands, and Portugal are particularly hard-pressed, and "even West Germany will not be able" to meet the goal, the IISS asserts. In fact, says its report, West Germany has already fallen back to a commitment of only 3.8 percent in the nominal annual growth of its defense spending, "and if inflation approaches that figure real growth will be close to zero."

Britain is committed to meeting the goal, on an annual average, until 1986, "but thereafter little or no real growth is foreseen," says the IISS. As for France, the IISS reports that only 2.1 percent of real growth has been budgeted for defense in each of the next five years, and "in any case almost a third of the funding is allocated to the nuclear programmes."

The IISS concludes: "The rest of NATO Europe has fallen short of the [spending goal] and will certainly fall short of the 1983–88 NATO force goals agreed [to] in 1982."

In the material that appears on the next seventy-one pages, AIR FORCE Magazine has retained the IISS's system of abbreviating military units and weapons and its British spelling and usage (as in "programme"). A list of the various abbreviations used in the text appears on p. 84.

Where a $ sign is used, it refers to US dollars, unless otherwise stated. Defense expenditures are expressed in US dollars. For the USSR and China, defense expenditures are estimates. Explanatory notes are provided in the sections on those countries.

—THE EDITORS

ABBREVIATIONS

(	under 100 tons
–	part of unit is detached
+	unit reinforced
AA	anti-aircraft
AAM	air-to-air missile(s)
AB	airborne
ABM	anti-ballistic missile(s)
ac	aircraft
AD	air defence
adj.	adjusted
AEW	airborne early warning
AFV	armoured fighting vehicle(s)
ALCM	air-launched cruise missiles(s)
amph	amphibious
APC	armoured personnel carrier(s)
Arg	Argentinian
armd	armoured
arty	artillery
ASM	air-to-surface missile(s)
ASW	anti-submarine warfare
ATGW	anti-tank guided weapon(s)
ATK	anti-tank
Aus	Australian
avn	aviation
AWACS	airborne warning and control system
bbr	bomber
bde	brigade
bn	battalion *or* billion(s)
Br	British
bty	battery
Cdn	Canadian
cav	cavalry
cdo	commando
Ch	Chinese (PRC)
comd	command
COIN	counter-insurgency
comms	communications
coy	company
CW	chemical warfare
CY	current year
def	defence
defn	definition
det	detachment
div	division
ECM	electronic counter-measures
ELINT	electronic intelligence
elm(s)	element(s)
engr	engineer
eqpt	equipment
est	estimate(d)
EW	early warning
excl	excludes/excluding
exp	expenditure
FAC	fast attack craft (gun)
FAC(G)	fast attack craft (missile)
FAC(P)	fast attack craft (patrol)
FAC(T)	fast attack craft (torpedo)
fd	field
FGA	fighter(s), ground-attack
flt	flight
FMA	foreign military assistance
Fr	French
FRG	Federal Republic of Germany
ftr	fighter (aircraft)
FY	fiscal year
GDP	gross domestic product
GDR	German Democratic Republic
GLCM	ground-launched cruise missile(s)
GNP	gross national product
GP	general-purpose
gp	group
GW	guided weapon(s)
hel	helicopter(s)
how	howitzer(s)
hy	heavy
ICBM	inter-continental ballistic missile(s)
incl	includes/including
indep	independent
inf	infantry
IRBM	intermediate-range ballistic missile(s)
km	kilometres
KT	kiloton (1,000 tons TNT equivalent)
LCA	landing craft, assault
LCG	landing craft, gun
LCM	landing craft, medium/mechanized
LCT	landing craft, tank
LCU	landing craft, utility
LCVP	landing craft, vehicles and personnel
LHA	amphibious general assault ship(s)
log	logistic
LPD	landing platform(s), dock
LPH	landing platform(s), hel
LSD	landing ship(s), dock
LSM	landing ship(s), medium
LST	landing ship(s), tank
lt	light
m	million(s)
MBT	main battle tank
MCM	mine counter-measures
mech	mechanized
med	medium
MICV	mechanized infantry combat vehicle(s)
MIRV	multiple independently-targetable re-entry vehicle(s)
misc	miscellaneous
Mk	mark (model number)
mod	modified/modification
mor	mortar(s)
mot	motorized
MR	maritime reconnaissance
MRBM	medium-range ballistic missile(s)
MRL	multiple rocket launcher(s)
MRV	multiple re-entry vehicle(s)
msl	missile
MT	megaton (1 million tons TNT equivalent)
n.a.	not available
Neth	Netherlands
NMP	net material product
nuc	nuclear
OCU	operational conversion unit(s)
off.	official
org	organized/organization
para	parachute
pdr	pounder
Pol	Polish
Port	Portuguese
RCL	recoilless launcher(s)
recce	reconnaissance
regt	regiment
RL	rocket launcher(s)
RV	re-entry vehicle(s)
SAM	surface-to-air missile(s)
SAR	search and rescue
sigs	signals
SLBM	submarine-launched ballistic missile(s)
SLCM	sea-launched cruise missile(s)
Sov	Soviet
SP	self-propelled
spt	support
sqn	squadron
SRAM	short-range attack missile(s)
SRBM	short-range ballistic missile(s)
SS	diesel submarine(s)
SSBN	ballistic-missile nuclear submarine(s)
SSM	surface-to-surface missile(s)
SSN	submarine(s), nuclear
sub	submarine
TA	Territorial Army
tac	tactical
tk	tank
tp	troop
tpt	transport
trg	training
UNDOF	United Nations Disengagement Observation Force
UNFICYP	United Nations Force in Cyprus
UNIFIL	United Nations Interim Force in Lebanon
UNTSO	United Nations Truce Supervisory Organization
veh	vehicle(s)
VIP	very important person
V(/S)TOL	vertical (/short) take-off and landing
WP	Warsaw Pact
Yug	Yugoslav

The United States and The Soviet Union

The United States

Strategic Forces

The slow retirement of the *Titan* ICBM continues. On 1 July the inventory was 37, and the ICBM total 1,037. This withdrawal reduces the ICBM warhead total to 2,129, and the potential deliverable megatonnage by 27 (to between 1.292.4 and 1.315.5 MT, depending upon payload).

Four *Ohio*-class SSBN are now at sea, bringing the total of *Trident* C-4 missiles in the inventory to 288. This increases the SLBM total by 24 (to 592), the SLBM warhead total by 192 to 5,344, and raises the estimated potential seaborne megatonnage by 19.2 to between 352 and 382.4 MT.

Within the strategic bomber force the B-52D has been withdrawn. Of the 151 operational B-52G, 61 have a non-nuclear role, and there is one training squadron. Some 84 B-52G aircraft have been fitted with the AGM-86B Air-Launched Cruise Missile. The most recent data suggest that the 90 B-52H, 84 B-52G and 56 FB-111A, at nominal average loadings, could carry a total of 1,020 ALCM, 924 AGM-69A SRAM and 812 bombs. On the basis of these loadings, air-deliverable megatonnage would be 204 for ALCM, between 157.1 and 184.8 for SRAM, and 2,030 MT for bombs (bomb yields are likely to average 2 MT each). Total aircraft-delivered megatonnage would thus be perhaps of the order of 2,400 MT (see Table 1).

Replacement programmes for existing strategic equipment have been receiving mixed support from within the government. The *Ohio/Trident* programme continues, as does development of the D-5 SLBM, due to replace C-4 in 1988/9. The MX ICBM purchase has been both limited and controlled, although the MX test programme continues on schedule. Feasibility studies are proceeding on a single-warhead mobile ICBM. Only 18 of the 100 B-1B bombers planned are so far on order; the Advanced Technology Bomber (ATB) design—the so-called 'stealth' bomber—is still in its early stages. Deployment of ALCM to the B-52H fleet is beginning, but, although these stand-off weapons are assumed to be capable of penetrating defences, the carrier aircraft may be approaching the end of their useful life, and replacements are still a long way from being operational.

On 10 June 1984 one *Minuteman* ICBM RV was intercepted in a test over the North Pacific. This event, the product of an earlier R&D programme but now subsumed under the President's 'Strategic Defense Initiative (SDI)', has tended to obscure the continuing organizational and technical changes to the US strategic defensive programmes. The reorganization of NORAD, intended to rationalize peacetime civil/military airspace control functions, has reduced the North American air defence regions from eight to six (two of them in Canada). It has also placed control of the surveillance and warning system at a higher command level, more capable of exercising the necessary direction and co-ordination. The Defense Department is proposing to enhance its nuclear detection capability by adding nuclear detection systems to its existing *Navstar*/Global Positioning System (GPS) satellites. Tests of the Over-the-Horizon-Backscatter (OTH-B) radar systems continue to demonstrate weaknesses in the system; nevertheless, it is still the intention to develop and enlarge the facility. Finally, action has been taken to upgrade the detection and control capabilities of the DEW Line, the northernmost of the NORAD aircraft attack warning systems. Plans have been laid to close the CADIN/Pinetree Line to the south of it.

Theatre Forces

During 1983–4, the first new US long-range theatre nuclear forces (or 'intermediate-range' nuclear forces) were deployed to Europe, with 9 *Pershing* II missiles in West Germany and 16 Ground-Launched Cruise Missiles (GLCM) in both Britain and Italy. Further deliveries are anticipated to a possible total of 108 *Pershing* II and 464 GLCM, as agreed with NATO in December 1979.

General-Purpose Forces

There is still a good deal of evidence to demonstrate that the US desires to increase the overall flexibility of her forces for global deployment. This is most clearly seen in the general enhancement of US Central Command (CENTCOM) and in the pool of forces on which CENTCOM can draw. Upgrading lift capabilities (C-5B and 'stretched' C-141 aircraft), together with a greater capacity for in-flight refuelling and more forward stocking, tends to suggest a considerable improvement in speed of deployment to distant areas. The reorganization of logistic support units for the RDJTF should give greater confidence that operations could be sustained. Apart from the use of US forces in the Lebanon and Grenada, the most visible signs of US commitment have tended to be US AWACS (airborne warning and control system) aircraft or naval deployments.

Modernization and some reorganization of the Army

continue, especially of forces assigned or earmarked for CENTCOM (the Rapid Deployment Joint Task Force), following a serious re-examination of the organization and roles of the infantry divisions. Considerable variation also exists in the other major formation structures, and this tends to add to the administrative burdens of planning movement and re-supply for them. Numbers of *Abrams* MBT have modestly increased, as have those of the *Bradley* MICV and the AH-1 and UH-60 helicopters.

The US Navy has received five more *Los Angeles*-class SSN, while the one remaining *Darter* diesel boat has been retired. A second *Iowa*-class battleship has returned to service to join the *New Jersey*, and a third is being refitted. There are four more *Perry*-class guided weapons frigates. Deployment of the BGM-109 submarine-launched nuclear cruise missile (TLAM-N) has begun, with four SSN now so equipped. The Marines have received more M-60 tanks, LVT, F/A-18 fighters and the first of their AV-8B V/STOL attack aircraft.

The Air Force has replaced the F-106 with the F-15 in its Reserve interceptor squadrons. Some F-106 remain in the Air National Guard interceptor squadrons, but these are being replaced by F-4. Introduction of the F-16 into the tactical wings and the ANG continues.

Efforts continue to bolster all components of the Reserves by increasing strengths and equipment holdings. While volume deliveries are difficult to quantify, reports continue to suggest that greater attention is being paid generally to the provision and distribution of spare parts, ancillary equipment and munitions, thereby achieving greater utilization of equipment and better combat capability.

THE UNITED STATES

Population: 236,700,000.
Military service: voluntary.
Total armed forces: 2,135,900 (198,000 women).
GDP 1982: $3,025.7 bn. 1983: 3,264.8 bn.
Def exp outlays FY 1982: $213.75 bn; NATO definition $196.345 bn. Def budget authority FY 1983: $239.40 bn; FY 1984: 273.40 bn; FY 1985: 299.00 bn.[1]
GDP growth: −1.9% (1982), 3.3% (1983).
Inflation: 6.0% (1982), 3.2% (1983).
Debt: $252 bn (1982).

Strategic Nuclear Forces:[2]

OFFENSIVE:

(a) *Navy:* 592 SLBM in 35 SSBN.
4 *Ohio* SSBN × 24 *Trident* I/C-4 (96 msls).
31 SSBN: 19 *Lafayette*, 12 *Franklin:* 12 × 16 *Trident* I/C-4 (192 msls); 19 × 16 UGM-73A *Poseidon* C-3 (304 msls).
(On order: 7 *Ohio* SSBN; 168 *Trident* I/C-4 msls.)

(b) *Strategic Air Command* (SAC): 2 Air Forces. 12 divs (1 trg/spt).
ICBM: 1,037. 9 strategic msl wings, 24 sqns:
3 wings (9 sqns) with 450 LGM-30F *Minuteman* II.
3 wings (11 sqns) with 550 LGM-30G *Minuteman* III (3 MIRV).
3 wings (4 sqns) with 37 *Titan* II (phasing out by October 1987).
Aircraft: some 356 combat ac: 18 bomb wings (1 trg).
Long-range bombers: 241.
5 wings (5 sqns) with 90 B-52H; 1 trg sqn with 6 B-52G/H.
7 wings: (8 sqns) with 151 B-52G; 5 sqns (84 ac) with ALCM; 3 sqns (61 ac) in non-nuc role.
Medium-range bombers: 56.
2 wings (5 sqns incl 1 trg) with 56 FB-111A.
Active reserve: a further 6 FB-111A, 23 B-52 (17 G, 6 H).
ASM: perhaps 1,140 AGM-69A SRAM; AGM-86A, AGM-86B ALCM.
Recce:
3 wings:
1 sqn with 9 SR-71A/B, T-38A.
1 sqn with 7 U-2CT/R.
2 sqns with 9 TR-1A (mainly tac role), 2 TR-1B trg.
Comd:
1 sqn with 1 E-4A (converting to B), 3 E-4B.
5 sqns: 16 RC-135, 21 EC-135A/C/G/L.
Tankers: 5 wings, 2 gps: (34 sqns (1 trg)): 32 with 615 KC-135A/Q (incl 13 Air National Guard with 104 ac, 3 Air Force Reserve with 24 ac), 2 with 24 KC-10A.
(On order: MX ICBM, 18 B-1B bbrs (100 planned), 1 E-4B comd, 5 E-3A AWACS, 5 TR-1A recce ac (2 -1B trg), 36 KC-10A tankers, 240 AGM-86B ALCM.)

DEFENSIVE:

Space Command: HQ, Colorado Springs; comds incl North American Aerospace Defense Command (NORAD), a joint US-Cdn organization (HQ: Cheyenne Mountain, USA).
Warning Systems
1. ICBM, SLBM, Satellites:
(a) Space Detection and Tracking System (SPADATS):
(i) *Space Defense Operations Center* (SPADOC). NORAD Combat Operation HQ, Cheyenne Mountain. Tracking, identification and cataloguing of all space objects; command, control and communications to all space-associated commands and agencies. Surveillance, protection and countering of satellites.
(ii) *Satellites:* Satellite Early Warning System (Defense Support Program), Defense Meteorological Satellites. TRW Block 647: 1 over Indian Ocean (eastern hemisphere); 2 in western hemisphere: infrared surveillance and warning system. Control and tracking stations at Guam, Pine Gap and Nurrungar (Australia).
(iii) *Ballistic Missile Early Warning System* (BMEWS). USAF 474N system: 3 stations: Clear, Alaska (AN/FPS-50, AN/FPS-92); Thule, Greenland (AN/FPS-50, FPS-49); Fylingdales Moor, England (AN/FPS-49 + other). 12 radars detect and track satellites, ICBM and IRBM. 4,800-km range.
(iv) *Spacetrack:* USAF 496L system. FPS-17 detection, FPS-79 tracking radars at Pirinclik (Turkey); *Cobra Dane*, Shemya; FPS-85, BMEWS at Clear, Thule and Fylingdales; optical tracking systems in New Mexico, California, at St Margarets (NB, Canada), Pulmosan (S. Korea), San Vito (Italy), Maui (Hawaii), Mount John (New Zealand).
(v) *Cobra Dane* phased-array radar system at Shemya, Aleutians: 120° arc, range to 46,000 km, augments BMEWS in Alaska. (*Cobra Judy*, a Pacific-based, shipborne phased-array radar (AN/SPQ-11), supplements Shemya and research programmes, but is not part of SPADATS and has no early-warning function. *Cobra Ball*, a RC-135 airborne system, supports both.)
(vi) Pacific Radar Barrier (PACBAR). Detection and tracking radars. 1 site at San Miguel, Philippines, 1 at Kwajalein Atoll, third to be determined.
(vii) 1 FPS-85 and 1 AN/FSS-7 station in Florida. Alternate Space Defense Center. Linked to *Spacetrack* and NAVSPASUR through NORAD HQ. Also to identify and track fractional-orbit bombardment systems (FOBS) (to be retired when *Pave Paws* completed).
(b) USN Space Surveillance System (NAVSPASUR). 9 field stations in south-east US (3 transmitting, 6 receiving sites and civilian agencies).
(c) Perimeter Acquisition Radar Attack Characterization System (PARCS). 1 north-facing phased-array, 130° arc, 2,800-km range system at Grand Forks ND. Identifies and tracks individual re-entry vehicles, incl SLBM, in Central US, Arctic Ocean areas. (Was Army *Safeguard* system support; to be enhanced.)
(d) Miscellanous radars. US Army: Kwajalein Atoll (Pacific). USAF: Ascension Island (Atlantic), Antigua (Caribbean), Kaena Point (Hawaii); MIT Lincoln Laboratory, Westford, Mass.
(e) Under development: Ground-based Electro-Optical Deep Space Surveillance system (GEODSS): White Sands NM, Taegu (S. Korea) and Maui (Hawaii); 2 more planned, 1 in Portugal, one in Indian Ocean (Diego Garcia).
2. SLBM:
(a) Pave Paws system: 1 phased-array radar (AN/FPS-115) each in Massachusetts and California; 5,500-km range. 1 building in Georgia and 1 more planned in Texas.
(b) Sound Surveillance Underscan (SOSUS): submarine detection systems deployed in the Atlantic, Arctic and Pacific oceans.
3. Intermittent programmed recce and ELINT satellites, incl:
(a) USAF: KH-8, KH-9 low-altitude, film return.
(b) Big Bird, Hitch Hiker med-altitude.
(c) USN: Ocean Surveillence (OSUS). 4 satellites to detect ships by infra-red and radar.
(d) CIA: KH-11 digital imagery.
(e) Rhyolite/Chalet.
4. Anti-air (aircraft, cruise missile):
(a) Over-the-Horizon-Backscatter (OTH-B). 414L system, 3,900-km + range. 2 sites in Maine (2 transmitters, 5 receivers), arcs and range still under development; 1 in Oregon/N. California planned; another in southern US under consideration.
(b) Distant Early Warning (DEW) Line (under comd TAC). 31 AN/FPS-19/-30 radars (21 in Canada, 4 in Greenland, 1 in Scotland; 2 in Iceland being reopened), roughly along the 70°N parallel from Point Lay, Alaska to Greenland, Iceland and Scotland; range to 12,000 m at 320 km. (*Seek Igloo* FPS-117 automated system (minimally attended radar (MAR)) replacing 13 older radars; 7 to be operational by Oct 1984.)
(c) CADIN/Pinetree Line:
24 stations in southern Canada.
(d) Tactical Air Command:
(i) US-Cdn Joint Surveillance System (JSS). 7 Region Operations Control Centers (ROCC): 5 in US (1 in Alaska), 2 in Canada; 3 completing in 1984. 5 E-3A AWACS ac assigned (1 to each US ROCC).
(ii) Back-up Interceptor Control (BUIC). All stations but 1 semi-active (AD comd and tac control of interceptor forces): 84 radars (60 in US (14 in Alaska), 24 in Canada) for co-ordination/control of military and civil air traffic, surveillance and tracking of objects in high- and medium-altitude trans-polar flight.
(iii) Aircraft: (Tactical Air Comd: air defence): 42 air divs. Interceptors: 252 (does not incl 54 Cdn CF-101).
(a) Regular: Alaskan Air Command (30 alert locations): 5 sqns with 90 F-15 (8 AAM), T-33 (trg).
(b) Air National Guard (ANG): 10 sqns (to be 11); 7 with 126 F-4C/D (8 AAM), 3 with 36 F-106, T-33 (trg) (to get 144 F-15).
(c) Tactical Air Force augmentation: ac on call from naval, marine and air forces.
(d) Iceland: 1 sqn: See *Forces Abroad.*
AAM: *Genie, Falcon, Super Falcon, Sidewinder, Sparrow.*

Army: 780,800 (75,500 women).
4 Army HQ: 6 Corps HQ (1 AB).
4 armd divs (5–6 tk, 4–5 mech inf bns).
6 mech divs (4 tk, 5–6 mech inf, 3–4 arty, 1 hel, 1 SAM bns, 1 armd cav sqn, spt units).[3]
3 inf divs (1 trials).[3]
1 lt inf div (10,220 men).
1 air assault div (9 bns with integral hel).
1 AB div: 3 bdes (each 3 para bns, 1 arty bn), 1 armed hel bn, 1 armd cav sqn.
9 arty bdes.
5 AA arty bdes.
1 indep armd bde.
4 indep inf bdes.
1 indep air cav combat bde (hel-borne ATK).
3 armd cav regts.
4 *Pershing* (I/II) SSM bns (1 trg); 8 *Lance* SSM bns (in corps arty).
1 *Patriot* SAM bn forming (5 launchers, 60 msls); planned total 13½ bns.
1 Special Operations Comd: (7,000): 4 Special Forces Groups, 2 Ranger bns, misc units.
Army Avn: 1 air assault bde, indep bns and dets, mixed types of eqpt, assigned to HQ for tac, tpt and medical duties.

1 See p. 93 for footnotes.

Tanks: 12,023, incl 1,703 M-48A5, 1,535 M-60, 4,207 M-60A1 (to be mod to A3), some 550 M-60A2, 2,695 M-60A3, 1,483 M-1 *Abrams* MBT; 400 M-551 *Sheridan* lt tks with *Shillelagh* (330 trg).

AFV: some 19,000, incl 1,100 M-2/-3 *Bradley* MICV; 3,100 M-577, 2,100 M-901 with *TOW*, 12,300 M-113 (some with *TOW*), 134 Lt AFV *(LAV)* APC.

Arty and Msls: about 2,000 105mm and 155mm towed guns/how; 3,140 155mm and 203mm SP how; 63 MLRS 227mm MRL; 3,200 81mm, 4,200 107mm mor; 1,000 90mm and 106mm RCL; some 600 *Hellfire* ATGW, 6,000 *TOW/TOW-2*, 10,400 *Dragon* ATGW launchers; 140 *Pershing* I, 48 -II, 72 *Lance* SSM launchers.

AD: 220 *Vulcan* towed, 380 M-163 20mm, 80 *Sgt York* DIVAD 40mm SP AA guns; *Redeye*, FIM-92A *Stinger*, 400 *Chaparral*, 27 *Roland*, *Nike Hercules*, *Improved HAWK* SAM (some being replaced by *Patriot* (9 launchers, 280 msls)).

Avn: some 625 ac, incl 98 OV-1D, 9 RU-21, 19 C-7, 92 C-12D, 37 U-3, 50 U-8, 10 UV-18A (DHC-6), 129 U-21A; 2 T-41, 54 T-42. Some 9,000 hel, incl some 900 AH-1G/Q, 900 AH-1S, 9 AH-64A *Apache*, 3,600 UH-1 (being replaced), 500 UH-60A, 453 CH-47A/B/C/D, 63 CH-54, 369 OH-6A, 1,784 OH-58A.

AAM: MIM-92A *Stinger*.

Trainers incl about 50 T-42 ac; 250 TH-55A hel.

(On order: 2,695 M-60A3, 840 M-1 MBT; 350 M-901 *Improved TOW/TOW-2* AFV; 600 M-2, 2,200 M-3 *Bradley* MICV; 340 M-198 155mm towed, 232 M-109A2/A3 155mm, M-110A2 203mm SP how; 2,500 81mm mor; 77 MLRS MRL; 95 *Pershing* II SSM; 66 *Sgt York* DIVAD 40mm SP AA guns; 3,000 *Stinger*, 32 *Rapier*, 17 *Roland* (595 msls), 300 *Chaparral*, 795 *Improved HAWK*, 129 *Patriot* SAM launchers (440 msls); 6 RC-12D ac; 11 AH-1S, 11 CH/MH-53, 50 AH-64A, 56 UH-60A, 43 CH-47D, 11 EH-60D *Quickfix* hel; 3,971 *Hellfire* ATGW (ASM).)

DEPLOYMENT: *Continental United States* (incl Alaska, Hawaii and Canal Zone):

Strategic Reserve:

(i) US Readiness Command: 2 corps HQ, 1 mech, 1 AB, 1 air assault divs, 1 air cav bde.

(ii) Initial reinforcement, Europe: 2 armd, 3 mech, 2 inf divs, 1 inf bde, 1 armd cav regt.[4]

(iii) US Central Command (USCENTCOM): (1,100): forces, incl naval and air, apportioned for planning purposes. Full deployment could involve 290,600 (assigned from existing units and spt elms on mobilization).

HQ: 1 Army; 1 Army Corps (131,000): 1 mech (–), 1 lt inf, 1 AB, 1 air assault divs, 1 air cav bde, special forces, Rangers.

1 Naval Force (112,300 incl 70,000 Marines): 3 carrier battle gps; 1 surface action gp; 5 ASW patrol sqns; 17 prepositioned spt ships; 1⅓ Marine Amph Forces (MAF) (1 div (+), 1 air wing, 1 Force service spt gp), 1 Marine Amph Bde (MAB: 1 regt landing team, 1 air gp, 1 bde service spt gp).

1 Air Force (33,000): 1 wing (2 sqns) B-52H, 7 tac fighter wings (11 sqns), 4 tac fighter gps, 1 airborne warning and control wing, tac airlift, recce, electronic combat sqns, 1 refuelling sqn (KC-135A/KC-10A).

(iv) Alaska: (7,700): 1 inf bde (plus 1 res bde).

(v) Panama: (9,170): 1 inf bde (6,560); Naval sqn (490): patrol boats; Marines (150); 1 air div (1,970): A-7, C-130 ac.

(vi) Hawaii: (19,200): 1 inf div less 1 bde.

(See also *Forces Abroad*, below.)

RESERVES: 929,766 (99,500 women).

(i) Army National Guard: 417,178 (21,500 women); 3,285 units; capable after mobilization of manning 2 armd, 2 mech, 5 inf divs, 19 indep bdes (3 armd, 6 mech, 10 inf), 4 bdes to complete regular army divs; 1 lt div to form 1985; 4 armd cav regts; 1 inf gp (Arctic recce; 5 bns); 2 Special Forces gps (6 bns). Indep bns: 5 tk, 2 mech, 50 arty, 4 ATK *(TOW)*, 9 AD (1 *Roland* SAM, 8 40mm SP AA arty), 62 engr, 23 sigs, 115 other spt bns, 768 minor units. HQ to fill regular formations. 105 air units, 150 sections; 2,580 ac.

(ii) Army Reserve: 266,188 (42,500 women); 3,410 units; 12 trg divs, 2 trg bdes; 1 mech, 2 inf indep combat bdes; 67 indep bns, incl 1 tk, 2 inf, 15 arty, 33 engr. 2 Special Forces gps (6 bns); 3,225 coys and dets; 130 indep air units and sections with 566 ac.

(iii) Individual Ready Reserve: 246,400 (35,500 women); 49,000 a year do short active duty.

Navy: 564,800 (40,500 women): 4 cruise-missile, 95 attack subs, 206 principal surface combatants. A further 35 major surface combat ships are in active reserve and storage. Four Fleets.

Subs, cruise-missile (SSGN): 4.

3 *Los Angeles* with *Harpoon* SSM, 1 *Sturgeon*. All have *Tomahawk* SSM.

Subs, Attack: 95:

91 nuclear (SSN), 77 with *SUBROC*, to be fitted with *Harpoon* and *Tomahawk*: 26 *Los Angeles* with *Harpoon*; 1 *Lipscomb*, 1 *Narwhal*, 36 *Sturgeon*, 13 *Thresher*; 3 *Allen*, 2 *Washington* (converted SSBN); 5 *Skipjack*, 3 *Skate*, 1 *Tullibee*.

4 diesel (SS): 3 *Barbel*, 1 *Tang*.

Aircraft carriers: 14 (1 trg).

4 nuclear (CVN): 3 *Nimitz* (91,400 tons) (1 on refit), 1 *Enterprise* (89,600 tons).

10 conventional (CV): 2 *Kitty Hawk* (78/80,800 tons), 1 *America* (79,000 tons), 1 *Kennedy* (82,000 tons), 3 *Forrestal* (76/79,000 tons) (1 on refit), 2 *Midway* (51/62,000 tons), 1 *(Lexington)* trg, no ac assigned.

12 normally carry 1 air wing (70–95 ac) of 2 fighter sqns (with 24 F-14A (incl 3 RF-14 recce) or 24 F-4N/S), 3 attack (2 lt with 24 A-7E or F/A-18, 1 med with 10 A-6E), 2 ASW (1 with 10 S-3A ac, 1 with 6 SH-3/D/H hel), 1 ECM with 4 EA-6B, 1 AEW with 4 E-2B/C; 4 KA-6D tankers, 1 lt tpt ac. (New wing will have 2 more sqns, each 18 ac.)

Other surface ships:

192 principal surface combatants:

2 *Iowa* battleships (BBG) with 4 × 4 *Harpoon*, 8 × 4 *Tomahawk* SSM.

9 nuclear-powered GW cruisers (CGN) with 2 × 4 *Harpoon* SSM; 4 *Virginia* with 2 × 2 *Standard/ASROC* SAM/ASW, 1 SH-2F hel (SA-60B *Seahawk* to replace); 2 *California* with 2 × 1 *Standard* SAM, 1 × 8 *ASROC* ASW; 1 *Truxtun* with 1 × 2 *Standard/ASROC*, 1 SH-2F hel; 1 *Long Beach* with 2 × 2 *Standard/Terrier* SAM, 1 × 8 *ASROC*; 1 Bainbridge with *2* × *2 Standard*, 1 × 8 *ASROC*.

19 GW cruisers (CG): 1 *Ticonderoga* (CG-47) with 2 × 8 *Harpoon* SSM (to get *Tomahawk* SSM), 2 × 2 *Standard/ASROC*, 2 SH-2F hel (second CG-47 July 1984); 18 with 2 × 4 *Harpoon*, 1 × 8 *ASROC*, 1 SH-2F hel; (9 *Leahy* also have 2 × 2 *Standard/Terrier*, 9 *Belknap* have 1 × 2 *Standard/Terrier*).

37 GW destroyers (DDG): 23 with 2 × 4 *Harpoon* (4 *Kidd* with 2 × 2 *Standard/Tartar/ASROC*, 2 SH-2F hel; 8 *Farragut*, 11 *Adams*); 2 *Farragut*, 12 *Adams*.

31 *Spruance* (DD-963) gun/ASW destroyers (DD): with 2 × 4 *Harpoon*, 1 × 8 *Sea Sparrow*, 1 × 8 *ASROC*, 1 SH-3 or 2 SH-2F hel; (to get *Tomahawk* SSM).

41 GW frigates (FFG): 35 *Perry* with 1 *Harpoon/Standard*, 2 SH-2/-60 hel; 6 *Brooke* with 1 *Tartar/Standard*, 1 × 8 *ASROC*, 1 SH-2F hel.

53 gun frigates (FF) with 1 × 8 *ASROC*: 40 *Knox* (FF-1052) with 2 × 4 *Harpoon* SSM (30 with *Sea Sparrow* Mk 5 BPDMS, 1 with *Sea Sparrow* Mk 29 SAM, 2 SH-2F hel), 10 *Garcia*, 1 *Glover*, 2 *Bronstein*.

Some 89 minor surface combatants:

6 *Pegasus* GW hydrofoils with 2 × 4 *Harpoon*.

Some 80 inshore and river patrol craft (most in reserve).

MCM: 3 *Aggressive* ocean minesweepers.

61 amph warfare ships: 2 *Blue Ridge* comd (LCC); 5 *Tarawa* LHA with 4 LCU and mix of AV-8A ac or 12 CH-46, 4 CH-53, 3 UH-1N, 4 AH-1T hel; 7 *Iwo Jima* LPH (mix of 6 AV-8A, 4 OV-10 ac or 2 CH-46, 10 CH-53, 1 UH-1N hel); 12 *Austin*, 2 *Raleigh* LPD: 5 *Anchorage*, 5 *Thomaston* LSD (retiring), 18 *Newport* LST; 5 *Charleston* amph cargo ships (LKA).

54 LCU: 51 Type 1610, 3 Type 1466; many smaller amph craft; others with US Army.

85 principal auxiliary ships: 12 ammunition, 7 stores, 4 fast sealift, 14 oilers, 9 destroyer tenders, 12 sub tenders, 4 repair, 9 salvage/rescue, 1 fleet flagship, 1 hospital, 1 spt, 2 tpt, 9 tugs.

Military Sealift Command ships: 1 ammunition, 13 stores, 30 oil, 3 gasoline, 2 ocean surveillance, 5 oceanographic, 5 missile instrumentation, 9 survey. Chartered: 17 cargo, 3 tanker, 4 research, 1 fleet service ships.

Anti-sub msls, nuclear: *ASROC, SUBROC*.

SSM: *Standard* (SM-1), *Harpoon*, BGM-109B SLCM *Tomahawk* (trials).

SAM: *Standard* (SA-1), *Aegis* (SM-2) (some nuclear), *Talos, Sea Sparrow, Tartar, Terrier*.

Ships in active reserve and storage: 2 SSN, 5 CV, 2 battleships (1 being reactivated (1984), 1 being studied), 4 cruisers, 4 DDG, 10 DD, 2 FFG, 6 FF, 3 LST, 46 log spt, 41 tp ships. National Defense Reserve Fleet: Ready Reserve Force, 30 dry cargo ships, 164 other vessels (579 govt-owned cargo ships and tankers could be used for auxiliary sea-lift).

Ships on refit (incl Service Life Extension Program (SLEP)) incl 6 SSBN (5 more planned to 1987), 11 SSN (3 *Los Angeles*, 4 *Sturgeon*, 2 *Thresher*, 2 *Allen*), 3 CVN/CV, 3 CGN, 5 DDG, 5 DD, 1 FFG, 8 FF, 1 LPH, 1 LPD, 3 LST.

(Authorized and funded: 6 SSBN, 3 SSN, 3 CVN, 9 *Ticonderoga* CG-47, 11 FFG, 5 MCM, 1 landing helicopter dock ship (LHD), 3 LSD, 13 landing craft (3 standard, 10 air cushion (hovercraft)), 2 fleet oilers, 5 supply ships; 51 BGM-109 *Tomahawk*, 222 *Harpoon* SSM, 1,100 *Standard* SAM, 37 *Phalanx* AD systems.)

Aircraft: 12 attack carrier air wings (1 more to form); some 1,450 combat ac, some 160 combat hel.

24 ftr sqns: 20 with 240 F-14A (30 ac configured for photo/infra-red recce); 4 with 48 F-4A/N/S.

38 attack sqns: 12 med with 120 A-6E, 48 KA-6D tankers; 24 lt with 288 A-7E; 2 with 25 F-18A.

1 trg sqn with 15 TF-18A.

2 ELINT sqns with 12 EA-3, 12 EP-3.

26 land-based MR sqns with 45 P-3B, 173 P-3C/-3C III.

11 ASW sqns with 110 S-3A *Viking*.

9 EW sqns with 35 EA-6B *Prowler*.

12 AEW sqns with 48 E-2C *Hawkeye*.

2 comms sqns with 14 C-130 TACAMO (= Take Charge And Move Out).

17 LAMPS/ASW hel sqns:[5] 2 with 22 SH-60B *Seahawk* (LAMPS Mk 3), 6 lt with 63 SH-2F *Sea Sprite* (LAMPS Mk 1), 9 with 66 SH-3D/H *Sea King* (ASW).

2 MCM hel sqns with 14 RH-53D, some 3 MH-53E.

2 aggressor trg sqns with 28 F-5E/F, A-4, T-38.

22 OCU: 5 fighter/strike trg (2 with 60 F-14, 1 with 18 TA-4F/J; 1 with 25 F-18, 1 with 20 F-4); 6 attack with 103 TA-7C, A-7E, A-6; 2 EW with EA-3; 2 MR with 40 P-3B/C; 2 AEW with 34 E-2B/C; 1 ASW with S-3A; 4 hel with 30 SH-2/-3.

17 misc spt sqns with 13 C-130F/LC-130F/R, 14 EC-130G/Q, 34 C-1A, 10 C-2A, 9 CT-39, 11 C-131, 4 C-117, 39 UC-12B ac; SH-3, CH/HH-46 hel.

16 trg sqns with T-2B/C/-28/-39D/-44, 210 T-34C ac; 112 TH-57A, TH/UH-1E hel.

(Other ac incl 35 F/A-18.)

AAM: *Sparrow*, AIM-54A/C *Phoenix*, *Sidewinder*.

ASM: *Standard ARM*, *Shrike*, AGM-88A *HARM* (anti-radiation); *Walleye*, *Harpoon*.

(On order: 24 F-14C ftrs, 38 A-6E attack, 6 E-2C AEW, 6 P-3C MR, 8 EA-6B ECM, 39 C-2A tpt, 15 *Citation* T-47A, 12 *Hawk* trg, 8 KA-6D tanker conversion ac; 44 SH-2F, some 8 MH-53 MCM, some 20 SH-60B, 108 TH-57C trg hel; 108 AIM-54C AAM, 190 AGM-65F *Maverick*, 230 *HARM*, 108 *Harpoon* SSM.)

DEPLOYMENT AND BASES (average strengths of major combat ships):

Atlantic (Second Fleet): 31 SSBN, 53 attack subs, 7 carriers, 104 surface combatants, 27 amph. Norfolk (HQ), Mayport, Roosevelt Roads (Puerto Rico), Charleston, Jacksonville, Brunswick, New London, Newport, New York (Staten Island), Boston, New Orleans, Bangor, Kings Bay.

Eastern Pacific (Third Fleet): 3 SSBN, some 31 SSN, 9 carriers (5 hel), 71 other major surface combatants, 26 amph, 32 spt. Pearl Harbor (HQ), San Francisco, Whidbey Island, San Diego, Long Beach, Adak (Alaska), Everett (planned).

(See also *Forces Abroad*, below.)

RESERVES: 115,000.

35 ships: 1 DD, 2 *Perry* FFG, 6 *Knox* FF, 18 ocean minesweepers, 2 LST, 4 fleet tugs, 2 salvage ships. (13 more FFG, 2 FF authorized.)

2 carrier wings: 18 sqns: 5 attack with 60 A-7B; 1 with 12 F/A-18; 4 fighter with 48 F-4N/S; 2 recce with 18 RF-8G; 2 AEW with 8 E-2C; 2 ECM with EA-6A; 2 tanker with KA-3B.

2 MR wings: 13 sqns with 110 P-3A/B.

1 tac spt wing: 13 sqns (2 composite with TA-4J); 11 spt with C-9, C-118, C-130H.

1 hel wing: 7 sqns (4 ASW with 23 SH-3F/D, 2 lt attack with 16 HH-1K, 1 SAR with HH-3).

Naval Construction Bde: 9 regts, 17 bns.

2 Special Warfare Gps; 18 units.

2,100 specialist and spt units incl 16 undersea warfare units; 62 boats/patrol craft.

Marine Corps: 196,600 (8,900 women).

3 divs, each of 9 inf, 1 recce, 1 tk, 1 engr, 1 amph bns, 1 arty regt.

550 M-60A1 MBT; 984 LVT-7/-7A1 APC; 175mm SP guns; 84 105mm (being replaced), 126 M-198/M-14 155mm towed, 100 155mm, 203mm SP how; 216 81mm mor; *TOW, Dragon* ATGW; *Redeye, Stinger* SAM.

3 air wings: (27,000); some 436 combat ac, some 102 combat hel:

12 ftr sqns: 8 with 96 F-4N/S (being replaced), 4 with 48 F-18.

12 FGA sqns: 3 lt with 45 AV-8A/C *Harrier* V/STOL; 4 lt with 95 A-4M; 5 med with 50 A-6E.

1 recce sqn with 21 RF-4B.

1 ECM sqn with 15 EA-6B.

2 observation sqns with 36 OV-10A.

2 command sqns with 30 OA-4M/TA-4F.

3 tanker sqns with 36 KC-130F/R.

28 hel sqns: 3 attack with 72 AH-1J/T *(TOW)*; 3 lt with 72 UH-1E/N; 14 med with 180 CH-46F; 8 hy with 96 CH-53A/D; 68 CH-53E.

Other ac incl 8 AV-8B trg, 20 F/A-18; 167 CH-53D/E, 30 AH-1T/J hel.

7 trg sqns.

2 SAM bns with *Improved HAWK*.

AAM: *Sparrow, Sidewinder*.

ASM: *Maverick*.

(On order: 329 LVT-7A1, 289 LAV-25 *Piranha* APC, 180 Mk-19 40mm grenade launchers, *SMAW* 83mm RL; *Stinger* SAM, 3 hovercraft (LCAC), 80 F/A-18, 33 AV-8B ftrs, 3 KC-130T tanker ac, 11 CH-53E hel; 263 AGM-65E ASM.)

RESERVES: 43,900 (1,265 women).
1 Marine div: 3 inf, 1 arty regts; 21 combat and spt bns.
1 Fleet Marine Force Gp; 1 Fleet Service regt (7 bns).
1 air wing: 106 combat ac, 8 combat hel.
4 aviation, 1 service, 1 air control gps, 19 sqns.
11 ac sqns (2 ftr with 24 F-4N, 6 attack with 60 A-4E/M, 1 EW with 4 EA-6A, 1 observation with 18 OV-10A, 1 tpt/tanker with 11 KC-130).
8 hel sqns (1 attack with 8 AH-1J, 4 lt with 40 UH-1N, 2 med with 24 CH-46C/D, 1 hy with 16 CH-53).
1 SAM bn with *HAWK*.
32 spt units.

DEPLOYMENT:
Continental United States: 2 Marine Amphibious Forces (MAF), (1 East, 1 West coast) each with 1 div, 1 air wing, 1 spt gp, 1 amph bde (MAB) (12,000).
Hawaii: 1 bde (from MAF in Japan (Okinawa)).
(See also *Forces Abroad*, below.)

Air Force: 594,500 (65,500 women); some 3,700 combat ac.[6]
26 combat wings, comprising 78 sqns: 16 with 440 F-4 (8 being replaced with F-16); 16 with 384 F-15; 19 with 456 F-16; 10 with 230 F-111A/D/E/F; 12 with 288 A-10A; 5 *Wild Weasel* (1 trg) with F-4G.
8 tac recce sqns with 126 RF-4C.
1 Airborne Warning and Control div:
4 AWACS sqns (1 trg) with 34 E-3A/B *Sentry*.
3 electronic warfare sqns: 7 EC-130E/H; 11 EC-135K; 16 EF-111.
9 tac air control sqns: 6 with 96 OV-10/O-2A ac; 3 with 27 CH-3 hel.
6 special operations sqns: 3 with 14 MC-130E ac; 1 with 10 AC-130H ac; 1 with 6 CH-3E; 1 with 8 HH-53H, 5 UH-1N; 1 det with 4 UH-1H hel.
4 aggressor trg sqns with 77 F-5E, T-38.
OCU: 1 with 20 F-111A; 1 with 29 F-16; 7 with 130 F-4; 1 with 20 F-5; 2 with 40 F-15; 2 with 40 F-106; 3 with 60 A-10; 1 with 16 RF-4C.
14 tac airlift sqns with 218 C-130.
17 hy (strategic) tpt sqns: 4 with 70 C-5A, 13 with 252 C-141B.
Other tpts: 8 C-135, 5 C-137, 11 C-140A/B, 1 C-6A, 5 C-12, 3 C-20A, 9 CT-39; 80 C-35A *Learjet* (leased).
8 SAR sqns (incl SAC msl spt): 23 HC-130H/N/P ac, 32 C/HH-3, 13 C/HH-53, 76 H/T/UH-1, 9 UH-60A hel.
3 medical tpt sqns with 23 C-9A/C.
3 weather recce sqns with 13 WC-130E/H, 5 WC-135B.
Trials/weapon trg units: 65 F-16, 4 C-141A.
30 trg sqns: 8 F-16B, 118 T-33A, 619 T-37B, 620 T-38, 112 T-39, 40 C-12F *Super King Air* (leased), 50 T-41A/C, 15 T-43A, 7 C-5A, 27 C-130, 12 C-141B, 5 HC-130, 2 UV-18A (DHC-6), 8 Schweizer Z-37 ac; 8 UH-60A, 8 C/HH-3, 8 HH-53, 19 U/TH-1F/N/P hel.
AAM: *Sidewinder, Sparrow.*
ASM: *Maverick; Standard ARM, Shrike, HARM*, GBU-15 glide bomb.
GLCM: 4 sqns, 1 trg unit.
(On order: 120 F-16, 392 F-15 ftrs, 5 F-5 FGA, 7 E-3C, 26 EF-111A, 13 C-5B, 3 C-17 hy tpt, 8 C-130H, EC-130H, 8 C-20A *Gulfstream*, 18 C-23 *Sherpa* lt tpt; 8–10 Ch F-7 (MiG-21), 16 C-12F *Super King Air* trg ac; 22 Bell AH-1T *Super Cobra*, 243 UH-60A/D, 69 HH-60D *Night Hawk*, 86 HH-60E hel; 108 launchers, 400 BGM-109 GLCM; 40 ALCM, *HARM*, 200 AGM-65D *Maverick* ASM, *Stinger*, 12 *Rapier* SAM.)

DEPLOYMENT:
(i) *Continental United States:*
(a) Tactical Air Command (TAC; incl NORAD, Iceland-assigned AD ac); (104,412); 2 Air Forces; 12 air divs; 28 wings: 36 combat sqns (30 fighter, 3 tac recce (converting to ftr/recce), 3 tac air control); 6 tac trg sqns.
(b) *Alaskan Air Command:* (7,650): incl 1 ftr wing (1 sqn with F-15, 1 with T-33), 1 composite wing (1 sqn with A-10, 1 with O-2A), 1 control (warning) gp, 13 radars (being modernized), 2 combat spt gps, 1 strategic recce wing; air base: 1 gp, 2 sqns.
(c) *Military Airlift Command* (MAC): (78,055): 2 Air Forces; 3 airlift divs, 24 wings (7 tac, 7 strategic, 1 special operations, 1 trg); 18 gps (2 tac, 1 strategic, 9 air base, 6 combat/airlift/trg spt). Ac deployed as required, world-wide.
(d) Spt elm comds: (171,500). Comms, Log, Systems, Trg, Electronic Security.
(ii) *Pacific Air Forces* (26,926); 2 Air Force HQ: 3 air divs; 4 tac ftr wings and 2 indep ftr sqns; 1 tac control gp; 3 air base wings and 1 indep sqn. 1 weather wing (attached from MAC). Hawaii Air National Guard: 1 div, 2 AD sqns F-4 (8 AAM).
(See also *Forces Abroad*, below.)

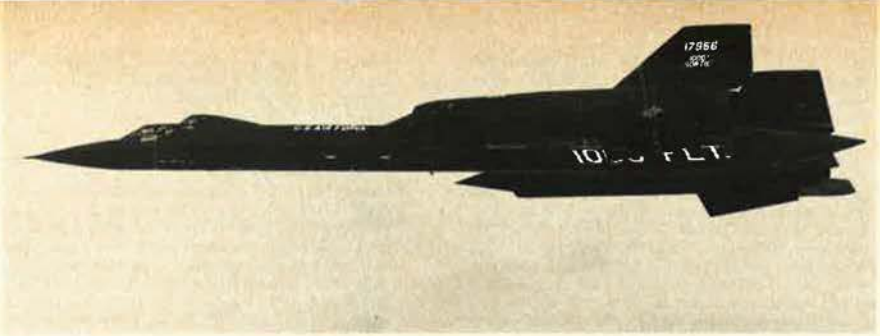
RESERVES: 182,700, 41 wing equivalents.
(i) Air National Guard (ANG); (107,900); 24 wings (12 tactical), 67 gps, 91 sqns: some 1,090 combat ac.
10 interceptor sqns; 162 ac (NORAD-assigned).
34 fighter/FGA sqns (1 with 15 F-16, 1 with 20 F-4D, 12 (1 OCU) with 208 F-4C, 1 *Wild Weasel* with 12 F-4G, 14 (1 OCU) with 360 A-7D/K (11 getting F-16), 5 with 107 A-10A).
8 recce sqns with 107 RF-4C.
4 tac air control sqns (3 with 75 OA-37B, 1 with 20 O-2A).
19 tac tpt sqns with 174 C-130A/B/E, 3 C-19A (Boeing 747 freight).
13 tanker sqns (SAC) with 103 KC-135A/Q.
1 electronic combat sqn with 8 EC-130.
2 SAR sqns with 8 HC-130 ac, 11 HH-3E hel.
Trg ac incl 43 T-33, 4 T-43A, 4 T-39 ac.
(ii) Air Force Reserve: (74,800); 17 wings, 56 sqns; some 233 combat ac, 5 combat hel.
11 ftr sqns (TAC; 1 with 10 F-16, 5 with 113 F-4C/D, 5 with 100 A-10, more forming).
15 tac tpt sqns (MAC; (1 trg) with 140 C-130A/B/E/H, 4 C-123K).
3 tanker sqns (SAC) with 24 KC-135.
2 special operations sqns (MAC: 1 with 10 AC-130 ac, 1 with 5 CH-3 hel).
1 weather recce sqn with 7 WC-130H.
4 SAR sqns with 15 HC-130H/N ac, 8 HH-3E, 10 UH-1N hel.
20 Reserve Associate sqns (personnel only).
MAC: 4 for C-5A, 13 for C-141, 1 aero medical for C-9A.
SAC: 2 for KC-10A.
137 non-flying spt units.
(iii) Civil Reserve Air Fleet: 321 long-range commercial ac (numbers fluctuate): 200 passenger (Boeing 747, L-1011, DC-8/-10), 121 cargo (80 Boeing 707, 30 747 (C-19A), DC-8/-10); 16 short-range commercial (Boeing 727, DC-9).

Forces Abroad (510,300):
GENERAL:
Caribbean/Latin America: 20,200 (incl Bermuda (1,500), Guantánamo (2,500), Honduras garrison (1,700), Puerto Rico (3,500), Panama (9,170)); Europe: 349,200; Pacific/Far East: 138,900; other areas 2,000.

ARMY: (256,000).
Europe: 216,700.
(i) Germany: (204,200). 1 Army, 2 corps HQ; 2 armd, 2 mech divs; 1 armd, 1 mech, 1 cav bdes; 2 armd cav regts; 30 AD btys with *HAWK*; 5,000 MBT.[7]
(ii) West Berlin: (4,300). HQ elms, 1 inf bde.
(iii) Greece: (480).
(iv) Italy: (3,800).
(v) Netherlands: (880).
(vi) Turkey: (1,200).
(vii) Other: (1,840).
Pacific (31,500):
(i) South Korea: 29,200. 1 inf div (13,900).
(ii) Japan: 2,100; base and spt personnel.
Caribbean/Latin America: 8,800.

NAVY: (89,000).
Atlantic (Second Fleet): Guantánamo Bay (Cuba 2,100), Bermuda, Keflavik (Iceland, 1,900), Holy Loch and other (Britain, 2,200). NATO-assigned (14,800).
Mediterranean (26,600). Sixth Fleet: 41 vessels, typically incl 1–2 SSN, 1–2 carriers and carrier gps of surface combatants, spt ships; Mid-Term Prepositioning Force: 3 stores ships. Italy (5,200): Gaeta (HQ), Naples, Sigonella, La Maddalena. Spain (3,700): Rota.
Western Pacific (40,700), Seventh Fleet: some 20 SSN and SS: 3 carriers (1 hel), 22 surface combatants, 6 amph, 8 spt ships. Japan (7,200): Yokosuka (HQ). Philippines (5,300): Subic Bay. Guam (4,900 incl Marine det): Midway.
Indian Ocean Dets (from 7th Fleet): 1 carrier battle gp (some 6 surface combatants). Near Term Prepositioning Force: (Diego Garcia) (1,600): 3 ammunition, 7 cargo ships, 3 barges, 3 oilers, 1 water tanker. Middle East Force (Persian Gulf-Bahrain): 1 comd ship, 4 destroyers/frigates.

MARINES: (36,500).
Caribbean: Cuba (Guantánamo) 455: 1 reinforced marine coy.



Fastest, highest-flying production aircraft yet built is the SR-71A Blackbird.

Europe/Middle East: 3,000; Mediterranean 1 MAU (1,900).[8]
Pacific: (Japan/Okinawa, 25,100); 1 MAF, (1 div (–), 1 air wing, 1 log spt gp), MAU, 1 bn landing team.[8] (Philippines, 700).
Indian Ocean: (1,800); 1 MAU deployed intermittently.

AIR FORCE: (127,300).
Europe: (89,800): US Air Force, Europe (USAFE); some 729 combat ac; 32 GLCM.
(i) *Britain* (27,000); 1 Air Force HQ: 4 combat air wings: 306 combat ac; 16 GLCM. 16 sqns (7 with 150 F-111E/F, 6 with 108 A-10; 1 recce wing with 2 sqns: 1 with 18 RF-4C, 1 with 5 EF-111 *Raven*, 2 TR-1; 1 combat trg sqn with 18 F-5E); 1 tpt wing with 16 C-130 (MAC); 29 KC-135, 4 EC-135H (SAC); 1 tactical missile wing, 16 GLCM.
(ii) *Germany* (40,200): 1 Air Force HQ: 6 combat air wings: 327 combat ac, 7 armed hel. 12 sqns (3 with 72 F-16A/B, 4 with 96 F-4E, 1 with 24 F-4G; 3 with 72 F-15C/D; 1 recce sqn with 18 RF-4C); 1 air control wing of 3 sqns (2 with 42 OV-10A ac, 1 with 7 CH-53C hel); 1 tpt wing (MAC) of 4 sqns (1 with 18 C-130E); 1 special operations sqn with 3 MC-130E.
(iii) *Netherlands* (1,900): 1 sqn with 24 F-15C/D.
(iv) *Spain* (5,400): 1 Air Force HQ: 1 tac wing of 3 sqns with 72 F-16A/B, 1 ftr trg wing (no ac assigned), 1 strategic recce unit (SAC). (1 TAC fighter wing (F-4E) in US; on call as reinforcements.)
Italy (5,100): 1 tac, 1 air base gps, 1 tac msl wing (16 GLCM).
Greece (2,600): 2 air base gps.
Turkey (3,800): HQ, 1 tac, 2 air base gps.
(v) Other areas: (3,800).
Iceland: (TAC, 1,100); 1 AD sqn with 24 F-4E, 4 T-33, 1–3 E-3A AWACS.
Pacific: Pacific Air Forces (PACAF): (38,950).
(i) *Guam* (3,900): Dets from SAC: 1 strategic bbr wing with 1 B-52 sqn; 1 refuelling wing with KC-135.
(ii) *Japan* (15,100): 1 Air Force HQ: 1 div: 1 wing (3 sqns) with 72 F-15C/D, 18 RF-4C, T-39A ac, UH-1E/F hel; det (TAC) with 3 E-3A AWACS. See *Korea*, below.
(iii) *Korea* (10,400): 1 div: 2 wings: 5 sqns (2 with 36 F-4E, 2 with 48 F-16, 1 with 18 A-10), 1 tac control gp with 18 OA-37).
(iv) *Philippines* (9,100): 1 Air Force HQ: 1 wing, 2 ftr sqns (1 with F-4E, 1 with F-4E/G); 1 special operations sqn with 4 MC-130E; 1 tac airlift wing (MAC) with 32 C-130 ac, 8 HH-3 hel; 1 trg gp with 15 F-5E, T-33, T-39A).
(v) *Australia* (450).
Middle East (all services): Sinai (MFO) 1,110; Egypt 1,500; Saudi Arabia 540.

RESERVES (individuals, all services): Standby 49,000; Retired 384,000 of which 120,000 are still eligible for active duty.

Para-Military Forces:
Coast Guard (by law a branch of the Armed Forces; in peacetime under the Department of Transportation): 38,791 (2,342 women); 45 cutters (17 high-endurance (2,600–3,000 tons), 28 med-endurance (1,000 tons)), 6 icebreakers, 76 patrol craft, 2 hovercraft, 28 tugs, 88 other vessels: some 2,250 small craft; 611 shore installations; 64 ac (41 HU-25A, 21 HC-130B/E/H, 1 VC-4A, 1 VC-11A); 108 hel (37 HH-3F, 71 HH-52A (to be replaced by 90 HH-65A (AS-365G *Dauphin* 2)). (In reserve/storage: 4 C-130, 3 HU-25.)
Coast Guard Reserve: 11,800; 6,500 selected 2nd ready reserves; 167 port security units in 40 ports, 59 general spt units, 63 reserve gps, cutter, 150 small vessels.
Coast Guard Auxiliary: 36,000 civilian volunteer force; augment regular force in emergencies.
Civil Air Patrol (CAP): 68,021 (26,215 cadets); HQ, 8 geographical regions, 52 wings, 1,936 units, 553 CAP ac plus 8,890 private ac. Roles: (a) emergency services, SAR, disaster relief, civil defence and comms, (b) aerospace education, (c) cadet training and motivation.

The Soviet Union

Strategic Forces

The Soviet strategic inventory continues to be modernized. The SS-11 total has been reduced by 30; the SS-19 total shows a corresponding increase. We can assume that the earlier SS-19 single warhead has been replaced by the 6 MIRV of its Modification 3. Because the silos are outwardly similar, figures must be used with caution. Modification 4 to the SS-18 ICBM, introduced in 1982, may now affect some 170 launchers. The SLBM inventory shows one less *Y-I* submarine and one less *H-II* (with its SALT-accountable SS-N-5 SLBM), but one more *Typhoon*-class submarine (20 tubes) is now in service. Three or four more *Typhoon* boats are reported under construction. SS-20 IRBM deployment has continued; the total is now some 378 launchers. The SS-5 IRBM has been withdrawn; the SS-4 IRBM total remains at 224.

The ICBM launcher total remains at 1,398. With the introduction of smaller (and more accurate) warheads, total potential deliverable megatonnage is somewhat lower.

At sea, the retirement of more SS-N-5, and some SS-N-6 missiles and the introduction of the SS-N-20 missile, which last year at this time was not believed to be operational, has resulted in a net increase of launchers by one to 981. The total of SALT-accountable submarines remains the same. Newer SLBM warheads are almost all MIRV, and are believed to have greater accuracy than their predecessors. SLBM megatonnage has increased significantly.

IRBM changes increase the total number of IRBM launchers by 2, to 578. The number of warheads also increases by 38, to some 1,358, while the megatonnage decreases by 7.9, to 394.1. The overall missile total (long- and intermediate-range) is therefore 2,757 (excluding possible reloads). We have not here attempted to segregate missiles with a European role from the total but would observe that the 880 remaining SS-11 and the SS-19 ICBM have a variable-range capability, enabling them to target Europe and its approaches.

In the long-range bomber force the only change noted has been the modest increase of 20 in the Tu-26 *Backfire* inventory. The new *Blackjack* A bomber has not yet entered service. Some ten of the Tu-16 withdrawn last year may have been modified for the ECM role.

The strategic defensive forces also show some changes. Although the ABM launcher force still remains at 32, reports suggest that new missiles are being deployed. A little more information on radar deployments has become available; it is not clear whether this represents new deployments or merely new data.

General-Purpose Forces

Details of organizational changes within the Soviet defence structure remain scanty. The forces have been grouped into three main 'Theatres'—Western, Southern and Far Eastern—with a Central Strategic Reserve Area comprising the Moscow, Volga and Ural Military Districts (MD). The Western Theatre, which includes the non-Soviet Warsaw Pact nations, is further subdivided into three Theatres of Military Operations (TVD) which provide strategic planning and operational control for continental, oceanic and intercontinental forces (missile forces, SSBN and bombers) assigned to them. The Western Theatre is the strongest, with the most modern equipment. The Far Eastern Theatre is not known to be divided into TVD, but, given its importance and the size and operational diversity of the area, some measure of local control would appear to be necessary.

In wartime, the East European Warsaw Pact divisions would be incorporated within the Soviet Army structure, thus providing integrated commands for the North-Western, Western and South-Western TVD. The basic operational command is the Front. A typical Front comprises a tank army and two all-arms armies plus supporting elements, a total of six tank and eight motor rifle divisions. Variations in this 'typical' organization are governed by operational conditions.

On the basis of present East European and Soviet army deployments, the Western TVD could have four Fronts: two in East Germany, one in Czechoslovakia, and one in Poland. The two Fronts in East Germany total 12 tank and 13 motor rifle divisions; three motor rifle divisions less than two typical Fronts. In Czechoslovakia and Poland the total would be 14 tank and 16 motor rifle divisions; two tank divisions above the 'normal' level. Reinforcements could be quickly available from the Byelorussian MD, which contains 10 tank and 4 motor rifle divisions.

The North-Western TVD would comprise the Baltic MD, which, by incorporating the Polish marine division, could operate as an independent (i.e., Moscow-controlled) front against the Baltic Coast including Denmark. The Leningrad MD can field a Front of two all-arms armies against the northern Scandinavian regions. It, too, might come directly under Moscow. In the South (the South-Western TVD), though no Soviet troops are deployed in the countries concerned, national forces in Bulgaria and Romania can mobilize two all-arms armies, each 4 tank and 16 motor rifle divisions. Hungary can mobilize 1 tank and 5 motor rifle divisions or one all-arms army and 3 extra motor rifle divisions. Soviet forces in the Carpathian and Odessa MD would add 4 tank and 15 motor rifle divisions. The Kiev MD, with its 6 tank and 4 motor rifle divisions, could reinforce either the Western or South-Western TVD.

The Southern Theatre, opposite Turkey's eastern frontier, would comprise forces from the Trans-Caucasus MD, 12 motor rifle divisions, supported by forces from the North Caucasus MD (1 tank, 7 motor rifle divisions), plus perhaps a proportion of the 7 motor rifle divisions in the Odessa MD, or the 3 motor rifle divisions in the Volga MD.

The Soviet Air Force has also been reorganized and now comprises twenty Regional Commands and five Air Armies. This reorganization has had the effect of changing considerably the categorization of Soviet fighter aircraft, and a number of questions still remain. Three of

these Armies have taken over the strategic and strategic/tactical roles of the Long-range Air Force. The *Voyska-PVO* (National Air Defence Troops) has taken over some of the former Frontal Aviation interceptor inventory, as well as that of the Air Defence Forces of the former *PVO-Strany* and the Army air defence troops. The ten air defence districts have now been reduced to five. The *Voyska-PVO* and the Air Armies are now co-ordinated at the Theatre HQ. In wartime, the control of air and ground forces and air defence would be integrated at the TVD level, giving greater operational flexibility.

Tank regiments now have an integral artillery battalion. Some artillery regiments at the Army level are being equipped with the (nuclear-capable) 240mm SP mortar. The towed 122mm gun/howitzer is in many cases being replaced by an amphibious SP version. Two new versions of the BM-27 240mm MRL are in service. The divisional reconnaissance battalion is now a formidable and highly mobile force with a platoon of medium tanks and a mix of light combat vehicles, many with light guns or anti-tank missiles. Air support, in East Germany, at least, includes a helicopter brigade integral to each Army, giving a total deployment of some 400 helicopters, about half of which are armed Mi-24 *Hind,* some with AS-14 ATGW. Battlefield support SSM—*Frog, Scud* and *Scaleboard*—are being replaced by SS-21, SS-23, and SS-22 respectively. The SS-22, which some sources suggest is an up-rated SS-12, has a range of about 950 km—somewhat less than that of the *Pershing* II—but its 500-KT warhead has about twice the yield of its US counterpart.

The Navy continues to develop its submarine fleet, and modernization of the surface fleet also continues. A second *O*-class cruise missile submarine and two more *V-III* attack submarines are in service. Some older *C-I, W,* and *E* boats have been withdrawn, and new *M* and *S* boats are on trials. Doubt remains over the new role for the 10 *Y-I* SSN whose SLBM were removed under SALT constraints. More *O, M, S, K* and *T* boats appear to be under construction.

A 75,000-ton nuclear aircraft carrier is under construction; a third *Kiev*-class carrier is now in service, and a fourth is on trials. Two more *Slava*-class cruisers are under construction. A third *Sovremennyy* and two more *Udaloy* GW destroyers have also joined the fleet. Five more of each are reported to be building, as are a number of smaller combat vessels.

New Equipment

There has been little new information regarding the two Soviet ICBM reported last year as being under development. One was reported as the PL-4 (believed to be a development of the SS-17), first test-launched in October 1982. The other was the PL-5 (originally reported as a modified SS-13 mobile ICBM), first launched in December 1982. (The PL designator stands for the test area, Plesetsk, where these missiles were first observed.) Both are reported to use solid fuel. They have been assigned the numbers SS-X-24 and -25 respectively. Controversy continues to surround the question of which is a 'new type' ICBM as defined in SALT II (or whether both are). A new SLBM—SS-NX-23—is reported in development and may be a replacement for the SS-N-18.

Three new long-range cruise missiles are reported to be in development. Designated SS-NX-21, AS-X-15 and SSC-X-4 (sea-, air- and ground-launched respectively), their ranges are estimated at 3,000 km. The AS-X-15 is said to be capable of being launched from *Bear, Backfire* and the new *Blackjack* A bombers. *Bear* H bombers are reported back in production to carry ALCM. The SSC-X-4 is believed to be carried in a four-tube mobile launcher.

Finally two new anti-ballistic missile systems—the SH-04 (exo-atmospheric) and the SH-08 (endo-atmospheric)—have been reported. New aircraft types in service include the MiG-29 *Fulcrum,* equipped with a new air-to-air missile (the AA-X-10), and the Su-25 *Frogfoot.* The MiG-25 *Foxhound* has been redesignated the MiG-31. The Su-27 *Flanker* air superiority aircraft is being evaluated. Airborne command and control is being upgraded, and the Il-76 *Mainstay,* which is to replace the present *Moss,* is reported to be in production. A modest increase in aircraft inventory is reported compared with 1983.

Defence Expenditure

No single figure for Soviet expenditure can be given, since precision is not possible on the basis of present knowledge. The declared Soviet defence budget excludes 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 current budgetary figure was discussed in previous editions of *The Military Balance.* The official defence budget of 17.05 bn roubles each for 1983 and 1984 equals about 4.8% of total government expenditure for 1983 and 4.66% of that for 1984, or about 3.2% of 1983 NMP, according to Soviet data on the latter. Some Western estimates of the burden of military expenditures on the GNP range from 10–20%. Moreover, Western experts and defence agencies are not agreed on the real change in Soviet defence spending. For instance, whereas the US Central Intelligence Agency had been maintaining that such expenditure was increasing by 2% annually, in the summer of 1984 the US Defense Department argued that the increase had risen to 3–4% for 1982 and 1983. The British Ministry of Defence has concurred with the former view.

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

If rouble costs are converted into dollars to facilitate international comparisons, the difficulties are compounded. Ideally, the exchange rate should relate the purchasing power of a rouble in the USSR to that of a dollar in the USA. The official exchange rate—$1 = 0.7410 (1983), 0.8000 (1984)—is considered inadequate for this purpose, and there is no consensus on an alternative methodology.

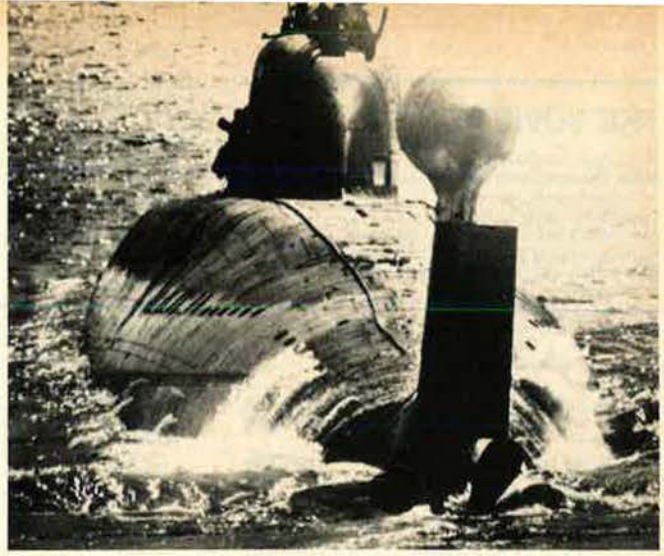
One alternative approach (estimating how much it would cost to produce and man the equivalent of the

Soviet defence effort in the USA, and by so doing to establish a common price base on which to make total cost comparisons) is also not entirely satisfactory. Incomplete and inaccurate data make such indexes unreliable. In practice this particular method is considered to overstate the USSR defence effort relative to that of the USA.

That the USSR, like other countries, faces mounting economic problems (e.g. falling NMP/GDP growth rates, inflation and ever-increasing military establishment costs) is indicated in an article by Prof. Maj.-Gen. Gurov (*Krasnaya Yvezda,* 9 December 1982) which is worth quoting at length:

> Under present-day conditions the interrelationship between military matters and the economy has become unusually close, and demands on material provision for troops and naval forces have increased sharply. First, there has been an unprecedented increase in the volume and a substantial alteration in the structure of the military consumption of material facilities and resources. Second, armies and navies are now equipped with the most complex systems of weapons and military hardware, which, furthermore, are virtually renewed every 10–12 years, which requires a highly developed and dynamic economy and advanced scientific and technical potential. Third, there has been an increase in manpower costs and the cost of means of armed struggle. Fourth, substantially greater demands have been made on the moral-political qualities and general educational, technical and professional training both of workers engaged in the military production sphere and of Armed Forces' personnel.

A sample of different estimates of Soviet defence expenditure, both in roubles and dollars, is given in the table, together with official figures for the defence budget published by the USSR. For a critique of the CIA estimates of Soviet defence expenditure, see Franklyn D. Holzmann, 'Soviet Military Spending: Assessing the Numbers Game', *International Security,* Spring 1982, pp. 78–101. For a critique of Steven Rosefielde, see D. F. Burton, 'Estimating Soviet Defense Spending', *Problems of Communism,* March–April 1983, pp. 85–93. A convenient overview of the problems of the debate can be found in Subcommittee on International Trade, Finance and Security Economics, Joint Economic Committee, *Soviet Military Economic Relations,* proceedings of a workshop, July 7 and 8, 1982 (Washington, DC: USGPO, 1983).



One class of Soviet attack submarines is the* Victor-III. *Nuclear-powered, it is 104 meters in length and displaces 6,300 metric tons when submerged.

Soviet Defence Expenditure

Source	Price base	1970	1979	1981	1982	% Annual growth rate 1970–80	1982–3
Billions of Roubles							
USSR[a]	Current	17.90	17.20	17.054	17.05	–0.4%	—
CIA[b]	1970	44–53	59–75	70.75	—	3.7%	—
Britain[c]	Current	—	76–81	84–92	—	4.0%	2.0%
Rosefielde[d]	1970	43.5	91	—	—	8.5%	—
DoD	—	—	—	—	—	—	3–4%
Billions of Dollars							
USSR[e]	Current	—	—	—	23	—	—
Joint Chiefs of Staff[f]	1983	188	241	267	—	2.8%	—
Rosefielde[g]	1978	104.5	160.9	—	—	4.9%	—

[a] Official declared budget.
[b] For 1970–1980: Joint Economic Committee, Congress of the USA: *USSR: Measures of Economic Growth and Development, 1950–1980* (Washington DC: USGPO, 1982) p. 123; for 1981: Joint Economic Committee, *Allocation of Resources in the Soviet Union and China – 1982* (Washington DC: USGPO, 1983) p. 79.
[c] *Statement of Defence Estimates 1984* (London: HMSO, Cmnd. 9227–I).
[d] Steven Rosefielde: *False Science, Under-estimating the Soviet Arms Build-up* (New Brunswick NJ: Transnational Books, 1982) pp. 186–8.
[e] British Broadcasting Corporation, *Summary of World Broadcasts* (SU/7156/A1/4), 14 Oct. 1982.
[f] Organization of the Joint Chiefs of Staff, *Military Posture for FY 1983* (Washington DC: USGPO, 1982) p. 16 (figures taken from diagram).
[g] Rosefielde, *op. cit.*, pp. 184–5, note 3.

THE SOVIET UNION

Population: 274,300,000.
Military service: Army and Air Force 2 years, Navy and Border Guards 2–3 years.
Total armed forces: 5,115,000.[9]
NMP 1982: r 523.4 bn. Est 1983: 544.0 bn.
Est GNP range 1983: $1,378.5–1,752.0 bn.
NMP growth: 4% (1982), 4% (1983).
Inflation: 1.0% (1982).
Debt: $20.1 bn (1982).
Est def exp and exchange rate: see text above.

Strategic Nuclear Forces:

OFFENSIVE:

(a) *Navy:* 981 SLBM in 79 subs (942 SLBM and 62 subs within SALT Agreement, plus 39 SLBM and 17 subs outside it).
- 2 Typhoon SSBN × 20 SS-N-20 (40 msls).
- 14 *D-III* SSBN × 16 SS-N-18 (224 msls).
- 4 *D-II* SSBN × 16 SS-N-8 (64 msls).
- 18 *D-I* SSBN × 12 SS-N-8 (216 msls).
- 1 *Y-II* SSBN × 12 SS-N-17 (12 msls).
- 23 *Y-I* SSBN × 16 SS-N-6 (368 msls).
- 1 *H-III* SSBN × 6 SS-N-8 (6 msls) } [msls (18) but not subs within SALT]
- 2 *H-II* SSBN × 3 SS-N-5 (6 msls) }
- 1 *G-III* SSB × 6 SS-N-8 (6 msls) }
- 13 *G-II* SSB × 3 SS-N-5 (39 msls non-SALT).

(b) *Strategic Rocket Forces* (SRF): 415,000.[10] 6 operational rocket armies, org in divs, regts, bns and btys; 1 msl launcher per bty; 300 launch control HQ, 3 msl test centres.

ICBM: 1,398.[11]
- 520 SS-11 *Sego* (at 9 fields, some in SS-19 silos; may be converted to SS-19).[12]
- 60 SS-13 *Savage* (at 1 field).
- 150 SS-17 (at 2 fields; mod 1, 4 MIRV; mod 3, 4 MRV, being deployed; in mod SS-11 silos).
- 308 SS-18 (at 6 fields, upgrading to mod 4, 10 MIRV, in progress).
- 360 SS-19 (at 4 fields; mostly mod 3, 6 MIRV; replacing some SS-11).

IRBM/MRBM: some 596 deployed (371 in western rest in central and eastern USSR).
- 378 SS-20 mobile IRBM; (6 fields: 135 launchers in Far East (being increased), 81 in Central Asia, 162 west of Urals (being increased)). 2 more sites, 18 launchers may be operational shortly.[13]
- 224 SS-4 *Sandal* MRBM in western USSR (being retired).

(c) Strategic elms, *Air Armies of the Soviet Union* (Naval, tactical elms see below): 100,000. Some 752 combat ac; some 500 to 550 in western USSR.
- 5 Armies.
- Long-range bombers: 143.
  - 100 Tu-95 *Bear* B/C, 43 Mya-4 *Bison* (some 70 *Bear* B have AS-3 or AS-4 ASM). (*Bear* H for ALCM reported in production.)
- Medium-range bombers: 475.[14]
  - 220 Tu-16 *Badger* G, 125 Tu-22 *Blinder* A/B, 130 Tu-26 *Backfire* B (AS-4 ASM).
- Recce: 34.
  - 4 Tu-95 *Bear* E, 15 Tu-16 *Badger* F, 15 Tu-22 *Blinder* C. (A long-range high-altitude ac, 'Ram-M', reported under development.)
- ECM: 100 Tu-16 *Badger* H/J/K.
- Tankers: 30 Mya-4 *Bison* A, 20 Tu-16 *Badger.*
- ASM: AS-3 *Kangaroo*, AS-4 *Kitchen*, AS-5 *Kelt*, AS-6 *Kingfish.*

DEFENSIVE:

National Air Defence Troops (*Voyska-PVO)* (incl Air Defence Troops of the Ground Forces (AA arty), but not their SAM and radar tps): 370,000:[10]
- 5 Air Defence District Commands, numerous AD regts; 14 specialist schools.

ABM: 32 ABM-1B *Galosh;* range over 320 km, warheads nuclear, presumably MT range. 8 sites in 4 complexes around Moscow. New ABM being emplaced.

Aircraft: Some 4,000; in regts and indep sqns.
- Interceptors (some will be assigned as air superiority fighters in spt of ground tps): 480 MiG-21 *Fishbed* J/K/L; some 2,100 MiG-23 *Flogger* B/G (6 AAM); 380 MiG-25 *Foxbat* A/E (A uprating to E) (4 AAM); some 12 MiG-29 *Fulcrum* (6 AA-X-10); 50 + MiG-31 *Foxhound* A (8 AA-9 AAM); 680 Su-15 *Flagon* E/F (2 AAM); 120 Tu-28P *Fiddler* B (4 AAM); 160 Yak-28P *Firebar* (2 AAM).
- Airborne Warning and Control Aircraft: 10 modified Tu-126 *Moss.* (4 Il-76 *Mainstay* reported in production to replace *Moss.*)

AAM: AA-2 *Atoll*, AA-3 *Anab*, AA-5 *Ash*, AA-6 *Acrid*, AA-7 *Apex*, AA-8 *Aphid*, AA-9, AA-X-10.

AA artillery: 9,000 23mm, 57mm, 85mm, 100mm, 130mm towed, ZSU-23-4, ZSU-30-6 (trials) and ZSU-57-2 SP guns.

SAM: Some 9,600 launchers (some 13,000 launcher rails) in some 1,000 fixed sites: 3,000 SA-1 *Guild* (in reserve, replaced by SA-10); SA-2 *Guideline* (some 350 sites, SA-10 may be replacing); SA-3 *Goa* (2 or 4 launcher rails, over 300 sites, low- to med-altitude intercept); SA-5 *Gammon* (2,000 launchers, over 100 complexes, long-range intercept); some 35 quad SA-10 in strategic role. Field mobile systems 4,100: 1,400 SA-4 *Ganef* (twin), 900 SA-6 *Gainful* (triple), SA-7 *Grail* (man-portable). 600 SA-8 *Gecko* (2 × twin/2 × triple), 650 SA-9 *Gaskin* (2 × twin), SA-11, SA-X-12, 550 SA-13 (2 × twin replacing SA-9). (Two ABM types—'SH-04' exoatmospheric, 'SH-08' supersonic endoatmospheric—reported.)

Warning Systems: Over 7,000, incl satellites and EW and ground control intercept radars.
- *(a) Satellites:* 9 with highly elliptical semi-synchronous orbits (anti-ICBM/SLBM launch detection capability); 9 EW, 6 ELINT, 2–4 recce, 1 launch detection.
- *(b) Over-The-Horizon (Backscatter) radars:* 3: 2 near Minsk and Nikolayev (Caucasus), targeted on the US and polar areas; 1 near Nikolayev-na-Amur, on China.
- *(c) Long-range early-warning radars:*
  - (i) ABM-associated:
    - (1) 5 phased-array systems located at Lyaki (Europe); Abalakova, Saryshagan, Pechora (Central Asia); Mishelevka (Far East). 2 other sites reported.
    - (2) 11 radars, mostly *House (Hen)*-series; range 6,000 km, 6 locations covering approaches from the west and south-west, north-east and south-east and, partially, south. Linked to intermediate-range *Dog House* (range 2,800 km) and *Cat House* and *Try Add* missile control radar.
  - (ii) AD-associated:
    Flat Twin/Pawn Shop (ABM-3/SH-04/-08); *Tall King*, range 600 km (SA-5); P-12 *Spoon Rest*, 275 km (SA-2).
- *(d) Search, surveillance/target-acquisition radars:* (7,000; 1,200 sites):
  Long Track (SA-4, SA-6); P-15 *Flat Face/Squat Eye*, 200 km (SA-3); P-50 *Back Net*, 320 km (SA-5).
- *(e) Height finder radars:*
  Thin Skin (SA-4, SA-6); *Cake*-series (e.g., *Rock Cake*), 200 km; *Side Net*, 180 km (SA-5).
- *(f) Missile control radars:*
  Yo-Yo (SA-1); *Fan Song* A to E (SA-2); *Low Blow* (SA-3); *Pat Hand* (SA-4); *Square Pair* (SA-5); *Straight Flush* (SA-6); *Land Roll* (SA-8).
- *(g) AA artillery fire control radars:*
  Gun Dish (ZSU-23-4); *Fire Can* (57mm, 85mm); *Whiff; Fire Wheel; Flap Wheel* (57mm, 130mm).

Plus civilian air control equipment.

Civil Defence: (150,000; 16,000,000 on mobilization). Nationwide programme under Defence Ministry down to city/rural/industrial level includes some 75 comd posts within 120 km of Moscow: 1,500 hardened deep shelters, accommodation for at least 175,000 officials, and local urban hardened shelters for essential workforce and some of the general population.

Army: 1,840,000 (perhaps 1,400,000 conscripts). Five Theatre HQ.

50 tk divs (Type: 3 tk, 1 motor rifle, 1 arty, 1 SAM AA regts, 1 SSM, 1 MRL bns, spt units).

136 motor rifle divs (Type: 3 motor rifle, 1 tk, 1 arty, 1 SAM regts, 1 SSM, 1 ATK, 1 MRL bns, spt units).

7 AB divs (each 3 para, 1 arty regts, 1 AA bn).

Some 8 air assault bdes (each 3 rifle bns, mor, SAM, ATK, spt tps).

Front and Army tps:
- 15 arty divs (Type (Army): 4 bdes of 4 bns of 18 guns).
- Tk, arty, SSM, ATK, AD (SAM and arty), engr bdes, sigs, electronic warfare, hy tk tpt, NBC defence, CW regts, bns, spt services.
- Special forces *(Spetsnaz):* 16 bdes, 3 regts.

Tanks: Some 51,000: some 35,000 T-54/-55/-62, some 8,000 T-64, 7,700 T-72/-80 MBT (most fitted for deep fording); PT-76 lt.

AFV: 70,000: 7,500 recce, incl BRDM-2, GT-S, BMP variants, many with ATGW; ACRV-1/-2/-3 comd/recce; 23,000 BMP-1/-2, some 2,800 BMD (AB) MICV; BTR-50P/-60P/-70/-152 (-70, BMP-2 replacing -50/-60), GT-T, MT-LB (with SA-13, -19 SAM) APC.

Arty: some 34,000 guns and how, incl M-1966 76mm, D-74 122mm, M-46 130mm, M-1976 152mm, S-23 180mm towed, M-1981 (2-S5) 152mm, M-1975 203mm SP guns; M-1937/D-20 towed, M-1973 (2-S3) 152mm SP gun/how; M-1938/D-30 122mm, M-1938/D-1 152mm towed, M-1974 (2-S1) 122mm, M-1981 152mm and M-1975 203mm SP how; 14,000 82mm, 120mm, 160mm and 240mm (incl M-1975 SP) mor; 6,000 M-1944 (BM-21)/M-1972 (RM-70) 40-tube, M-1975 12-tube, M-1976 36-tube 122mm, BM-14-16/-17 16/17-tube, RPU-14 16-tube 140mm, M-1977 (BM-27) 16-tube 220mm, BM-24 12-tube and BM-27 16-tube 240mm MRL.

ATK: 40mm RPG-7, 73mm RPG-16/-18 RL; 73mm SPG-9 RCL; 7,000 76mm, D-44/SD-44 85mm, T-12/-12A/M-55 100mm towed and ASU-57/-85 SP ATK guns; AT-2 *Swatter*, AT-3 *Sagger*, AT-4 *Spigot*, AT-5 *Spandrel*, AT-6 *Spiral* ATGW.

AD: 11,500 ZU-23 23mm, 37mm, S-60 57mm, KS-19 100mm towed, ZSU-23-4 23mm, 30mm, ZSU-57-2 57mm SP AA, some 28,000 SA-4/-6/-7/-8/-9/-11/-13 *(Gopher)*/-14 SAM.

SSM (nuclear-capable): about 1,400 launchers (units organic to formations), incl some 700 *FROG*/SS-21, 570 *Scud*/SS-23, 120 SS-12/SS-22.

Hel: some 4,100: 800 Mi-1/-2 *Hare/Hoplite* (lt recce, ATGW, utility), 440 Mi-6 *Hook* (hy tpt), 1,500 Mi-8 *Hip* C, 300 Mi-17 *Hip* H (assault tpt), D, G (comms), E (armed/ATGW), J and K (ECM), 1,100 Mi-24 *Hind* (armed), 15 Mi-26 *Halo* A (hy tpt), 10 Mi-28 *Havoc* (armed). Being org as indep of Tac Air.

DEPLOYMENT:

Western Theatre: 3 main operational subtheatres (TVD); North-western, Western, Southwestern. (See also Arctic and Atlantic Maritime Commands.)
- *Central and Eastern Europe* (565,000): 30 divs (16 tk, 14 motor rifle), plus 1 arty, 10,500 MBT.[15] East Germany (380,000): 1 Gp, 5 Army HQ; 10 tk, 9 motor rifle, plus 1 arty divs; 1 air assault, *Scud*/SS-23 bdes; 19 *FROG*/SS-21 bns; 5 hel regts. Poland (40,000): 1 Gp, 1 Army HQ; 2 tk divs. Hungary (65,000): 1 Gp, 1 Army HQ: 2 tk, 2 motor rifle divs. Czechoslovakia (80,000); 1 Gp, 2 Army HQ; 2 tk, 3 motor rifle divs; 1 air assault bn; 1 SS-12/-22, 2 *Scud*/SS-23, 1 arty bdes. 1 hel regt in each ground army.
- *European USSR Military Districts* (MD): 65 divs (23 tk, 37 motor rifle, 5 AB), plus 8 arty. Baltic: 3 tk, 6 motor rifle, 2 AB, plus 2 arty. Belorussian: 10 tk, 4 motor rifle, 1 AB, plus 1 arty. Carpathian: 4 tk, 8 motor rifle, plus 2 arty. Kiev: 6 tk, 4 motor rifle, plus 1 arty. Leningrad: 8 motor rifle, 1 AB, plus 1 arty. Odessa: 7 motor rifle, 1 AB, plus 1 arty.

Central Strategic Reserve: 16 divs (3 tk, 12 motor rifle, 1 AB). Moscow: 2 tk, 5 motor rifle, 1 AB. Ural: 1 tk, 4 motor rifle. Volga: 3 motor rifle.

Southern Theatre: 30 divs (1 tk, 28 motor rifle, 1 AB), plus 2 arty. N. Caucasus: 1 tk, 7 motor rifle, plus 1 arty. Trans-Caucasus: 12 motor rifle, plus 1 arty. Turkestan: 6 motor rifle. Afghanistan: 3 motor rifle, 1 AB divs (see *Forces Abroad*, below). Some hel regts.

Far Eastern Theatre (see also Pacific Fleet): 52 divs (7 tk, 45 motor rifle), plus 4 arty. Central Asian: 1 tk, 6 motor rifle, plus 1 arty. Under High Command Far East (HQ Irkutsk): Siberian, 6 motor rifle, plus 1 arty; Transbaykal, 2 tk, 8 motor rifle, plus 1 arty; Far Eastern, 2 tk, 22 motor rifle, plus 1 arty; Mongolia, 2 tk, 3 motor rifle (see *Forces Abroad* below).

Soviet divs have 3 categories of combat readiness: Cat. 1, combat ready, 75–100% strength, with complete eqpt; Cat. 2, 50–75% combat strength, complete with fighting vehicles; Cat. 3, below 50% strength, fighting vehicles possibly complete, but older models. The system may now be changing, with some units in a formation being at full strength, others at cadre only.

The 30 divs and 1 arty div in Eastern Europe and all AB divs are Cat 1. About 35% of divs in European USSR and the Far East are in Cat. 1 or 2. Most in Central and Southern USSR are likely to be Cat. 3, Tk divs in Eastern Europe have up to 335 MBT, motor rifle divs up to 266, but elsewhere holdings may be lower.

Navy: 490,000 (some 70% conscripts), incl Naval Air Force, Naval Infantry, and Coastal Artillery and Rocket Troops; 278 cruise-missile and attack subs, (some 123 nuclear (incl 9 mod *Y-I*), 154 diesel), 293 principal, 797 minor surface combatants. There are 15 auxiliary subs, 331 auxiliary ships and AGI. A further 96 attack subs and 30 principal surface combatants are in reserve.

Subs, cruise-missile: 67:
- 49 nuclear (SSGN): 2 *O*-class (× 24 SS-N-19 SLCM); 1 *P* (10 msls; ?SS-N-9 *Siren*); 11 *C-I* (× 8 SS-N-7), 6 *C-II* (× 8 SS-N-9); 29 *E-II* (× 8-SS-N-3a; some 7 may carry 8 SS-N-12). (SS-NX-21 nuclear SLCM under development.)
- 18 diesel (SSG): 16 *J*-class (× 4 SS-N-3a), 2 *W-Long Bin* (× 4 SS-N-3).

Subs, attack: 201 (211 if *all* mod *Y-I* were SSN):
- Some 65 nuclear (SSN); 6 *A*, 12 *N*, 16 *V-I*, 7 *V-II*, 17 *V-III*, 5 *E-I;* 1 *M* and 1 *S* on trials. (10 *Y-I* SSBN have been/are being/may be converted to other roles incl SSN).

Apart from the older *N* and *E*, most SSN probably carry SS-N-16 and/or SS-N-15 nuclear ASW weapons.

136 diesel (SS): 4 *K*, 18 *T*, 50 *F*, 10 *R*, 4 *Z*, 50 *W*.

Subs, other roles: 3 G-*I* comms conversion, 4 *B* trg, 2 *I* rescue; 1 *U* and one other SSN research; 4 *H* (ex-SSBN) role unknown.

Surface Ships:

293 principal surface combatants:

3 *Kiev* carriers (37,000 tons) (1 more trials) with 4 × 2 SS-N-12 *Sandbox* SSM, 2 × 2 SA-N-3 and 2 × 2 SA-N-4 SAM, 1 × 2 SUW-N-1 ASW, 14 Yak-36 *Forger* A/B VTOL ac, 19 Ka-25 *Hormone* A/B hel.

2 *Moskva* ASW hel carriers (17,000 tons) with 2 × 2 SA-N-3 SAM, 1 × 2 SUW-N-1 or FRAS-1 ASW; 18 *Hormone* A hel.

2 *Kirov* nuclear-powered GW cruisers (CGN) with 20 SS-N-19 SSM, 12 SA-N-6, 1 × 2 SA-N-4 SAM, 1 × 2 SS-N-14 *Silex* ASW, 2–4 Ka-25 *Hormone* B or Ka-27 *Helix* B hel.

1 *Slava* (ex-'Black-Com 1', ex-'*Krasina*') GW SSM/ASW cruiser with 8 × 2 SS-N-12 *Sandbox* SSM, 8 SA-N-6 SAM, 1 Ka-27 hel.

17 GW ASW cruisers with KA-25 hel, 7 *Kara* with 2 × 4 SS-N-14 ASW, 2 × 2 SA-N-3, 2 × 2 SA-N-4 SAM (1 trials with 1 × 6 SA-N-6 replacing twin SA-N-3, trials); 10 *Kresta*-II with 2 × 4 SS-N-14, 2 × 2 SA-N-3.

8 GW cruisers: 4 *Kresta*-I with 2 × 2 SS-N-3b SSM, 2 × 2 SA-N-1 SAM, 1 *Hormone* B hel; 4 *Kynda* with 2 × 4 SS-N-3b, 1 × 2 SA-N-1.

8 *Sverdlov* cruisers (2 command with 1 × 2 SA-N-4, 1 Ka-25 hel).

45 GW destroyers (DDG): 9 SSM/SAM (3 *Sovremennyy* with 2 × 4 SS-N-22 SSM, 2 SA-N-7 SAM, 1 *Helix* B hel; 6 mod *Kashin* with 4 SS-N-2C, 2 × 2 SA-N-1); 4 ASW/SAM *Udaloy* with 2 × 4 SS-N-14, 2 Ka-27 *Helix* A hel; 3 mod *Kildin* SSM with 4 SS-N-2C; 29 SAM (13 *Kashin*; 12 with 1 × 2 SA-N-1, 1 with SA-N-7 (trials); 8 *Kanin* with 2 × 2 SA-N-1; 8 SAM *Kotlin* with 1 × 2 SA-N-1).

23 gun destroyers (DD): 12 *Kotlin*, 10 *Skory*, 1 *Kildin*.

32 *Krivak*-I/-II GW frigates (FFG): with 1 × 4 SS-N-14, 2 × 2 SA-N-4.

152 gun frigates (FF): 1 *Koni*, 48 *Grisha*-I/-III, (also with 1 × 2 SA-N-4 SAM), 8 *Grisha*-II (KGB), 18 *Mirka* I/II, 42 *Petya*, 35 *Riga*.

797 minor surface combatants:

30 GW corvettes: 1 *Tarantul* II with 2 × 2 SS-N-22 (trials); 6 *Tarantul* I/II with 2 × 2 SS-N-2c; 23 *Nanuchka* I/III with 2 × 3 SS-N-9 *(Siren)*, 1 × 2 SA-N-4.

117 FAC(G): 17 hydrofoil (1 *Sarancha* with 2 × 2 SS-N-9, 1 × 2 SA-N-4; 16 *Matka* with 2 SS-N-2c); 65 *Osa*-I, 35 *Osa*-II with 4 SS-N-2.

220 FAC(T): 12 *Pauk* also with 1 × 4 SA-N-5, 58 *Poti*, 12 *Shershen*, 32 *Turya*, 4 *Muravey* hydrofoils. 100 *Stenka* (KGB); Trials: 1 *Slepen*, 1 *Babochka*.

73 patrol craft: 8 *Susanin* icebreakers (KGB; 6 armed), 25 SO-1 (some KGB), 14 T-43 (some KGB), 18 T-58 (some KGB), 2 T-58, 6 T-43/PFR radar pickets.

3 *Alesha* minelayers.

115 ocean minesweepers: 35 *Natya* I/II, 45 *Yurka*, 35 T-43.

175 coastal minesweepers: 2 *Andryusha*, 48 *Sonya*, 3 *Zhenya*, 5 *Sasha*, 72 *Vanya*, 45 *Evgenya*(.

64 minesweeping boats(: 10 *Ilyusha*, 4 *Olya*, 20 TR-40, 30 K-8.

78 amph ships:

2 *Ivan Rogov* LPD with 1 × 2 SA-N-4, 4 × 4 SA-N-5, 2–3 *Helix* A hel; 14 *Alligator* (some with 3 × 2, 1 with 2 × 2 SA-N-5), 17 *Ropucha* LST (some with 4 × 4 SA-N-5); 45 *Polnocny* LSM (some with 2 × or 4 × 4 SA-N-5).

109 amph craft:

45 LCU: 20 *Vydra*, 15 SMB-1, 10 *Ondatra*, 64 hovercraft: 15 *Aist*, 2 *Utenok*, 17 *Lebed*(, 30 *Gus*(.

269 principal auxiliary ships:

28 replenishment/tankers, 31 spt tankers, 12 msl spt, 10 supply, 80 cargo, 20 submarine tender, 36 repair, 2 hospital, 20 submarine rescue, 20 salvage/rescue, 10 trg ships. Merchant fleet—1,700 ocean-going, 700 river ships, incl 61 ramp-fitted roll-on/roll-off (RoRo)—could augment these.

62 intelligence collection vessels (AGI). 134 naval, 350 civilian oceanographic, fishery, space-associated and hydrographic research vessels.

Additional ships in reserve:

10 *F*, 6 *Z*, 80 *W* subs; 4 *Sverdlov* cruisers (1 with 1 × 2 SA-N-2 SAM); 6 *Kotlin*, 10 *Skory* destroyers; 10 *Riga* frigates; 10 T-43 MCM; 1 *G-V* SSB in SLBM research role.

(On order: 3–4 *Typhoon*, *D-III* SSBN; *O* SSBN; *M*, *S* SSN: *K*, *T* SS; 1 75,000-ton nuclear, 1 *Kiev* carriers; 2 *Kirov* CGN: 2 *Slava* CG; 5 *Sovremennyy*, 5 *Udaloy* DDG; *Krivak*, *Grisha* III frigates; *Tarantul*, *Nanuchka* GW corvettes; *Muravey*, *Stenka* FAC(T); *Pauk* FAC; *Sonya* coastal MCM; *Ropucha* LST; *Aist*, *Lebed*, *Utenok* hovercraft.)

NAVAL AIR FORCE: (70,000); some 839 combat ac, some 265 combat hel.

Four Fleet Air Forces; org in air divs, each with 2–3 regts, each with HQ elms and 2 sqns of some 10 ac each; recce, ASW, tpt/utility org in indep regts or sqns.

Strike bbrs: some 105 Tu-26 *Backfire* B with AS-4 ASM.

Med bbrs: some 290: 190 Tu-16 *Badger* C, 64 G/G-mod with AS-5 ASM, some 35 Tu-22 *Blinder* B.

FGA: 120: 55 Yak-36 *Forger* A/B VTOL, 65 Su-17 *Fitter* C.

ASW: some 190 ac: some 50 Tu-142 *Bear* F, 50 Il-38 *May*, 90 Be-12 *Mail*. Some 230 hel: 90 Mi-14 *Haze*, 120 Ka-25 *Hormone* A, 20 Ka-27 *Helix* A, Ka-32 *Helix* B.

MR/ECM: some 135 ac: some 80 Tu-16 *Badger* D/E/F/H/J/K, 45 Tu-95 *Bear* D, 10 An-12 *Cub* B ac; 25 Ka-25 *Hormone* B hel.

MCM: some 10 Mi-14 *Haze* B hel.

Tankers: 75 Tu-16 *Badger*.

Tpt/trg ac: 350 ac and hel, incl An-12 *Cub* A, An-26 *Curl*, Il-14 *Crate*, Il-18 *Coot*, An-24 *Coke*, Il-76 *Classic* ac: Mi-6/-8 *Hook*/*Hip* hel.

ASM: AS-2 *Kipper*, AS-4 *Kitchen*, AS-5 *Kelt*, AS-6 *Kingfish*, AS-7 *Kerry*.

NAVAL INFANTRY (Marines): (16,000).

1 div HQ.

5 naval inf bdes/regts (each 2,500; 4 inf, 1 tk bn, SP arty).

4 naval Special Forces (*Spetsnaz)* bdes (one in each Fleet), 20 indep units.

T-54/-55 MBT; PT-76 lt tks; BRDM-2 recce; BTR-60P/PA/PB APC; M-1974 122mm SP how; 82mm, 120mm mor; BM-14 17-tube 140mm MRL; AT-3/-5 ATGW; ZSU-23-4 SP AA guns; SA-7/-9/-13 SAM.

COASTAL ARTILLERY AND ROCKET TROOPS: (14,000).

1 coastal arty div.

Hy coastal guns incl SM-4-1 130mm, perhaps 100 SS-C-1b *Sepal* SSM (similar to SS-N-3) to protect approaches to naval bases and major ports.

DEPLOYMENT AND BASES (average strengths, excluding units in reserve):

Arctic Command:

Northern Fleet: 42 SSB/BN incl 2 *Typhoon*, 21 *D*, 15 *Y*-class. 138 other subs, 80 principal (incl 1 carrier), 120 minor surface combatants, 15 amph, 85 principal auxiliary ships, some 310 combat ac/hel incl 100 bbrs and ftrs, 1 naval inf bde. Severomorsk (HQ), Motovskij Gulf, Gremikha, Polyarny, Archangelsk. Some 10 subs are normally deployed in the Mediterranean (see below).

Atlantic Command:

Baltic Fleet: 32 subs (incl 6 *G-II* SSB), 45 principal, 260 minor surface combatants, 22 amph, 35 principal auxiliaries, some 210 combat ac/hel incl some 130 bbrs and ftrs, 6 SSM bns. 1 naval inf bde. Baltiysk (HQ), Kronshtadt, Paldiski, Liepaja, Klaipeda, Riga.

Black Sea Fleet (incl Caspian Flotilla): 24 subs, 80 principal (incl 2 ASW hel carriers), some 210 minor surface combatants, 23 amph, 55 principal auxiliaries, some 250 combat ac/hel incl 80 bombers, 1 naval inf bde. Sevastopol (HQ), Balaclava, Poti, Odessa.

Mediterranean sqn: with 8–10 subs, 12–14 surface combatants incl 2 amph, 10–12 auxiliaries, 4–6 AGI. (All assigned from other fleets).

Pacific Fleet: 31 SSB/BN (incl 15 *D*, 9 *Y*, 6 *G-II*), 102 other subs, 88 principal (incl 2 carriers), 220 minor combatants, 18 amph incl 2 *Rogov*, 84 principal auxiliaries, 340 combat ac/hel incl 120 bombers. 1 naval inf div (2 regts). Vladivostok (HQ), Petropavlovsk, Sovyetskaya Gavan. Detachments from this fleet (average 2–3 subs, 8 surface combatants, 2 amph, 12 spt ships) are normally deployed in the Indian Ocean and South China Sea; facilities also in Vietnam (Cam Ranh Bay), South Yemen (Aden, Socotra) and Ethiopia (Dahlak Is).

Air Force: 400,000.

Air Armies of the Soviet Union: Strategic, AD, see above. 16 MD Air Forces, 4 Air Armies. Continuing reorganization makes eqpt estimates tentative.

Tactical: (315,000); some 3,260 combat ac.

20 air commands of varying strengths, mostly org in divs of 3 sqns, totalling 45 ac; the regts' roles may differ within the div.

FGA: some 2,600: some 160 MiG-21 *Fishbed* L, 730 MiG-27 *Flogger* D/J, 130 Su-7 *Fitter* A, 850 Su-17 *Fitter* D/H, 630 Su-24 *Fencer*, 75 Su-25 *Frogfoot*.

Fighters: A proportion of the 4,000 interceptors listed in Strategic AD will have a battlefield air superiority role.

Recce: 620: 170 MiG-25 *Foxbat* B/D, 70 MiG-21 *Fishbed* H, 200 Yak-28 *Brewer* D, 180 Su-17 *Fitter* H.

ECM: 40 Yak-28 *Brewer* E.

Trainers: Some 1,000 ac; 700 hel.

AAM: AA-2 *Atoll*, AA-7 *Apex*, AA-8 *Aphid*, AA-9 *ASM:* AS-7 *Kerry*, AS-10; hel-borne: AT-2 *Swatter*, AT-6 *Spiral*.

Military Transport Aviation (VTA): (45,000); some 750 ac. Org in regts. Incl An-2 *Colt*, An-8 *Camp*, 320 An-12 *Cub*, An-24 *Coke*, An-26 *Curl*, Il-14 *Crate*, 225 Il-76 *Candid* M/MD (replacing *Cub*), 55 An-22 *Cock* hy. (An-400 *Condor* under development).

Some 200 *Cub* and *Candid*, and 1,300 med- and long-range passenger ac of the civilian *Aeroflot* fleet and the 1,250 tpts of the other Services could augment VTA airlift.

DEPLOYMENT:

1 HQ, 4 Tactical Forces (2,000 ac) in Eastern Europe, 1 in each of 16 MD in USSR; total Far East perhaps 2,700 ac incl 440 bombers, 1,500 fighters/attack ac.

RESERVES:

Soviet male citizens have a Reserve obligation to 50. Total Reserves could be 25,000,000, of which some 5,300,000 will have served within the last five years: Strategic Rocket Forces, 520,000; Army, 3,500,000; Navy, 840,000; Air Force, 400,000. Reports suggest that the remaining 19,700,000 would provide sufficient forces to mobilize an equivalent to the peacetime force structure which, though equipped with stored obsolete equipment, would at least double the size of the ground forces.

Forces Abroad:

Afghanistan: 115,000 (some 10,000 MVD, KGB).
Army: 1 HQ, 3 motor rifle, 1 AB divs, 1 air assault bde.
Air: equivalent possibly 2 air divs: (4 ac, 6 hel regts: 180 ac, 270 hel); VTA and *Aeroflot* tpt ac from USSR in spt.

Mongolia: 75,000: 2 tank, 3 motor rifle divs.

Vietnam: (7,000) averages: 4 subs, 2–4 combat vessels, 10 auxiliaries, 10 MR or ASW ac, AA SAM, electronic monitoring station.

Other: Algeria 1,000; Angola 500; Congo 100; Cuba 4,600 (1 bde, advisers, technicians, plus 3,000 civilians); Ethiopia 1,700; India 200; Iraq 600; Laos 500; Libya 1,800; Mali 200; Mozambique 300; Nicaragua 100; Peru 100; Syria 7,000; Vietnam 2,500; N. Yemen 500; S. Yemen 1,500; Africa (rest) 900.

Para-Military Forces: 675,000.

KGB 225,000: border tps, with tks, SP guns, AFV, ac and ships (1 *Purga* frigate, 90 *Stenka* FAC(P), 12 *Pchela* hydrofoils, 30 *Zhuk*, some SO-1, T-58, T-43 patrol craft); Kremlin Guard; Special Guard; Special Sigs unit (40,000 tps).

MVD 300,000: security tps; some 30 divs with tks and AFV. By law part of armed forces of USSR.

Civil Defence 150,000 (permanent staff only).

Part-time military training organization (DOSAAF); claimed active membership 80 million (of which 5 million are instructors and activists) in 330,000+ units; flight training, shooting, parachuting and pre-military training of those aged 15 and over in schools, colleges and workers' centres. Para-military training also in Young Pioneers (ages 8–15).

---

1 Excl $4.95 bn (1982), $6.05 bn (1983), $7.1 bn (1984) and $7.9 bn (1985) for atomic energy defence and other defence-related activities. The 1985 figure is as revised in May 1984.

2 Manpower incl in Army, Navy, Air Force totals.

3 National Guard bde is incorporated in each of 2 mech and 2 inf divs.

4 1 armd, 1 mech divs, 1 armd cav regt have hy eqpt stockpiled in FRG. Storage facilities for 2 more divs being built.

5 LAMPS = Light Airborne Multi-purpose System.

6 Excl SAC, NORAD, ac; incl ANG, Air Force Reserve ac and some 900 in active service storage.

7 Incl those stockpiled for the Strategic Reserve formations. The armd and mech bdes are from the divs in the US earmarked to reinforce 7th Army.

8 Marine Amphibious Units (MAU) are embarked in Amphibious Ready Gps (ARG) comprising 4–7 amph ships with a reinforced inf bn gp, incl tks, arty, composite air sqn (incl hel) and log gp (1,800). Only 1 in Mediterranean and 1 in Pacific are regularly constituted. 1 Bn Landing Team (MAU less hel) also deployed in Pacific; 1 occasionally formed for the Atlantic. A Marine Amphibious Force may have up to 50,000 men with air support.

9 Excl Border Guard, internal security, railroad and construction troops, totalling some 1,135,000, but incl some 1,500,000 comd and general spt tps not otherwise listed.

10 The SRF and *Voyska-PVO*, separate services, have their own manpower.

11 Figures may fluctuate slightly during conversion.

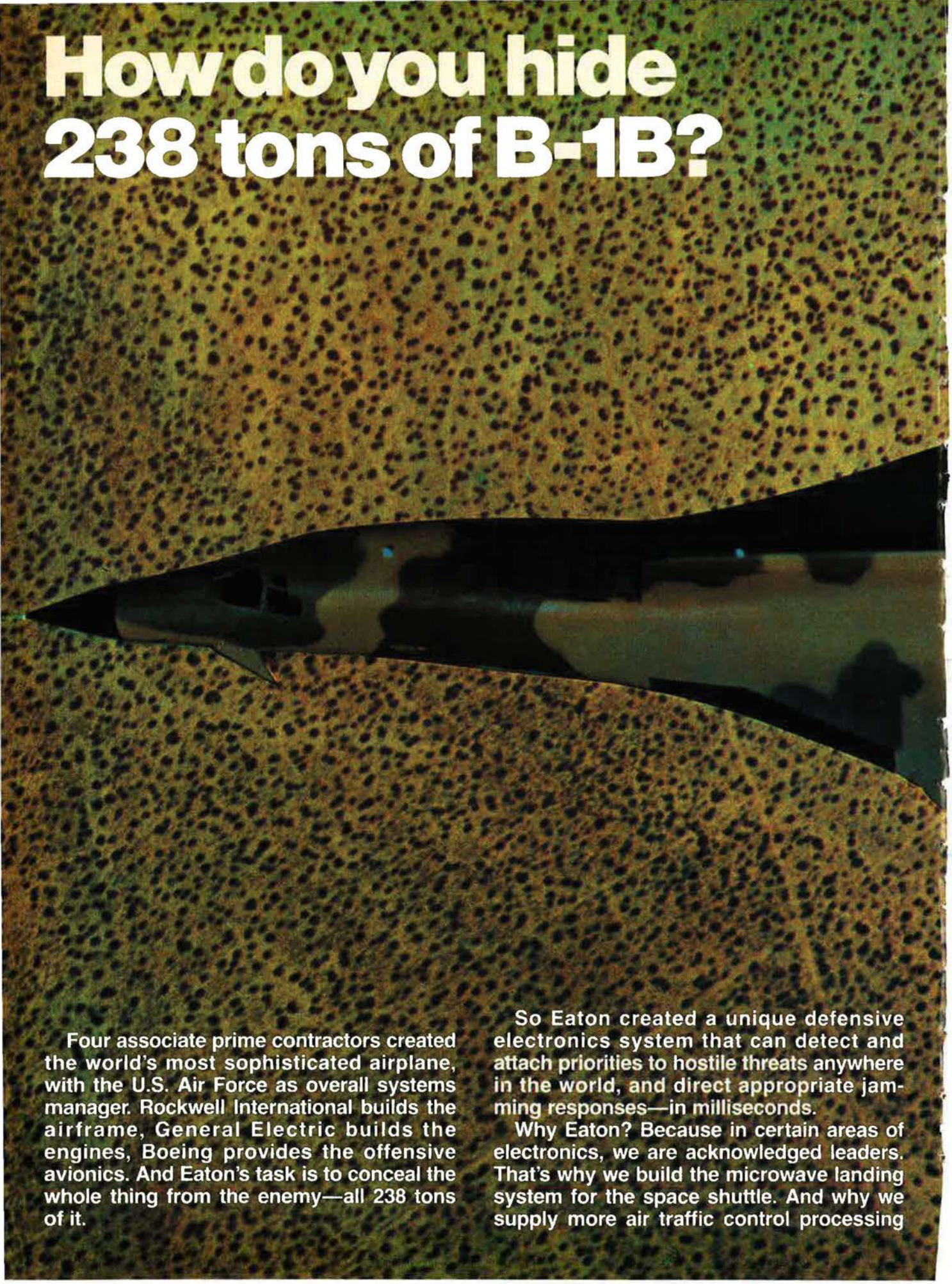
12 There are 360 SS-19 silos. SS-11, SS-19 have variable range capability, enabling them to be used for theatre support.

13 Usually in some 42 complexes with an average of 9 launchers. A reload capacity has been reported.

14 Staging and dispersal points in the Arctic could significantly increase aircraft ranges.

15 Excl tks in reserve (replaced by new ones but not withdrawn).

How do you hide 238 tons of B-1B?



Four associate prime contractors created the world's most sophisticated airplane, with the U.S. Air Force as overall systems manager. Rockwell International builds the airframe, General Electric builds the engines, Boeing provides the offensive avionics. And Eaton's task is to conceal the whole thing from the enemy—all 238 tons of it.

So Eaton created a unique defensive electronics system that can detect and attach priorities to hostile threats anywhere in the world, and direct appropriate jamming responses—in milliseconds.

Why Eaton? Because in certain areas of electronics, we are acknowledged leaders. That's why we build the microwave landing system for the space shuttle. And why we supply more air traffic control processing


With Eaton electronic camouflage.
and display systems than any other company in the world.
You may know Eaton best as a major supplier of state-of-the-art components for the automotive and industrial sectors. Which we are. But Eaton is also a major participant in the exciting business of high-technology electronics. Eaton Corporation, Eaton Center, Cleveland, Ohio 44114.
EATON

The Warsaw Pact

We have seen no major changes in the organization, equipment or roles of the East European Warsaw Pact nations' ground forces over the past twelve months. Some small changes in military manpower are reported: in Bulgaria a decrease of 15,000; in Czechoslovakia and East Germany increases of 2,750 and 5,000 respectively; in Poland a decrease of 16,750. These changes have had the effect of increasing, very slightly, the ground force strength of East Germany and that of the air components of both East Germany and Czechoslovakia, while the Polish force reductions appear to have applied to the Army. There is no indication why these changes have come about.

The most significant Baltic naval delivery was the *Tarantul*-class missile corvette *Gornik*, reported commissioned in the Polish Navy in March. This vessel carries four SS-N-2 surface-to-surface missiles. A second is expected. Romania received the first of three *Tetal*-class frigates; no details have been received. These countries' naval forces need modernization, but the new arrivals do not make any significant change in their capabilities.

Bulgaria has increased her air reconnaissance element to a full regiment, adding 50% to her earlier capabilities, and Czechoslovakia has phased out some of her elderly MiG-15 and Su-7 FGA, replacing them with MiG-23—a significant advance in both cases. There has been no reported major change in any of the other national forces.

Economic growth in Eastern Europe slowed in the late 1970s and early 1980s. Although regional NMP grew by 3% in 1983, after declining in 1981 and 1982, economic growth was not uniform throughout the Eastern Bloc. At the height of the Solidarity upheaval Poland experienced a sharp reduction in NMP (1981: −12.1%, 1982: −5.5%) and industrial production (1981: −10.5%, 1982: −2.1%) which began to rebound in 1983 (NMP 4 to 5%, Industrial Production 6.7%). NMP output growth was 0.5% in Hungary and 2.2% in Czechoslovakia in 1983. East Germany (4.4%), Bulgaria (3.0%), and Romania (3.4%), meanwhile, managed relatively stronger NMP growth through 1983. Another factor—inflation—seriously affected the economies of Poland (1982: 100.2%), Hungary (1982: 7%; 1983: 7.3%) and Romania (1982: 17%; 1983: 5.2%). Many East European economies during this period began adjusting their internal pricing, distribution, investment and planning structures to meet external trade and debt repayment requirements.

Reconciling foreign indebtedness with the resumption of economic growth is a major economic issue facing Eastern Europe. The levels of exports and debt repayments limit imports—and hence domestic expenditures and investment—particularly in Poland, Hungary and East Germany. The Eastern bloc has recently managed to lower its collective external debt from some $80 bn in 1981 to some $70 bn in 1983. Total imports from the West have declined from $50 bn in 1981 to $43 bn in 1982, although trade within COMECON increased by 9% in 1983 (largely due to changed oil pricing arrangements within COMECON). The Soviet Union continues to be the dominant trading partner. In addition, the Eastern Bloc accumulated a large rouble debt and saw its terms of trade deteriorate with all trading partners. The effect on the internal economies, particularly in Poland, was that investment was 20% less in 1983 than in 1979. Decreased productivity and output followed. Output and investment, as forecast by the IMF, are not expected to achieve their previously high rates in the near term.



WARSAW PACT

1. Bulgaria
2. Czechoslovakia
3. German Democratic Republic (East Germany)
4. Hungary
5. Poland
6. Romania

BULGARIA

Population: 9,000,000.
Military service: Army and Air Force 2 years, Navy 3 years.
Total regular forces: 147,300 (94,000 conscripts).
NMP 1982: lev 22.80 bn. Est 1983: 23.50 bn.
Est GNP range 1983: $26.0–36.0 bn.
Est def budget 1982: lev 901 m ($1.287 bn). 1983: 932 m ($1.313 bn).
NMP growth: 4.2% (1982), 3.0% (1983).
Debt: $2.8 bn (1982).
$1 = 1982: leva 0.95 (official), 0.70 (adjusted); 1983: 0.97 (off.), 0.71 (adj.).

Army: 105,000 (73,000 conscripts).
3 Military Districts:
8 motor rifle divs (3 at Cat. 3 = cadre).
5 tk bdes.
3 SSM bdes with *Scud*.
4 arty regts.
3 AA arty regts.
2 SAM regts.
1 para regt.
Special commando coys.
AFV: 400 T-34, 1,400 T-54/-55, some 60 T-72 MBT; some 60 BMP MICV; 250 BRDM-1/-2 scout cars; 1,000 BTR-50/-60, 35 OT-62, MT-LB APC.
Arty: 25 M-1942 76mm, 25 D/DS-44 85mm, M-1944 100-mm, 700 M-1931 122mm, M-46 130mm towed guns; 100 M-1938 (M-30), D-30 122mm, M-1937 152mm towed gun/how; 100 BM-21 122mm, some M-51 130mm MRL; 82mm, 350 120mm and 160mm mor, 39 *FROG*-7, 27 *Scud* SSM.
ATK: 90 M-1942 76mm ATK guns; 150 SPG-9 73mm RCL; AT-1 *Snapper*, AT-3 *Sagger* ATGW.
AD: 600 ZU-23 23mm, M-1939 37mm, S-60 57mm, KS-12 85mm and KS-19 100mm towed, ZSU-23-4 SP AA guns; SA-4/-6/-7 SAM.

RESERVES: 150,000; 3 motor rifle divs on mobilization. 600,000 more have a Reserve liability.

Navy: 8,500 (3,000 conscripts); 3 combat hel.
2 *R*-class subs.
2 *Riga* frigates.
3 *Poti* corvettes.
6 FAC(G) with *Styx* SSM: 3 *Osa*-I, 3 *Osa*-II.
14 FAC(T): 6 *Shershen*, 8 P-4(.
13 patrol craft: 6 SO-1, 7 *Zhuk* coastal(.
30 MCM vessels: 2 T-43 ocean; 2 *Sonya*, 4 *Vanya* coastal; 18 PO-2, 4 *Yevgenya*(inshore.
22 *Vydra* LCU, 5 MFP D-3 landing craft.
1 underway replenishment ship.
2 hel sqns: 1 ASW with 3 Mi-14 *Haze;* 1 SAR with 2 Mi-2, 6 Mi-4.
2 coastal arty regts (1,500): 20 btys; 100mm, 150mm guns.
3 Naval Guard coys.

Bases: Varna, Burgas, Sozopol, Atliya.

RESERVES: 25,000.

Air Force: 33,800 (18,000 conscripts); some 188 combat ac, some 12 armed hel.
1 air division: 3 combat regts:
6 FGA sqns with 60 MiG-17, 12 MiG-23.
6 interceptor/ftr sqns: 1 with some 20 MiG-23BM *Flogger* B; 5 with 60 MiG-21PFM.
1 recce regt with 36 MiG-17/-21.
1 tpt regt: 10 Il-14, 4 An-24, 2 Tu-134, 9 An-2.
1 hel regt with 10 Mi-2, 40 Mi-4/-8, 12 Mi-24, 12 Ka-26 *Hoodlum*.
Trg ac incl 80 L-29, Yak-11/-18; L-39, 30 MiG-15UTI.
AAM: AA-1 *Alkali*, AA-2 *Atoll*, AA-7 *Apex*.
1 para regt.
1 AD div: 3 zones: 30 SAM sites; 280 SA-2/-3.

RESERVES: 20,000.

Para-Military Forces: Ministry of Interior border guards: 15,000; 16 regts. Security police: 7,500. People's Territorial Militia: 150,000. 'Voluntary Organization for Co-operation in National Defence'.

CZECHOSLOVAKIA

Population: 15,500,000.
Military service: Army 2 years, Air Force 3 years.
Total regular forces: 207,250 (118,000 conscripts).
NMP 1982: Kcs 497.2 bn. Est 1983: 508.1 bn.
Est GNP range 1983: $73.0–150.0 bn.
Def budget: 1982: Kcs 24.156 bn ($3.774 bn). 1983: 23.830 bn ($3.454 bn).[1] *(All notes on p. 98.)*
NMP growth: 0.2% (1982), 2.2% (1983).
Inflation: 4.0% (1982), 8% (1983).



MiG-21s make up the bulk of the air defense force of the Polish Air Force.

Debt: $4.1 bn (1982).
$1 = koruny (1982): 6.03 (off.), 6.40 (adj.). 1983: 6.45 (off.), 6.90 (adj.).

Army: 148,000 (100,000 conscripts).
2 Military Districts:
5 armd divs (1 at Cat. 2, 2 at 3).
5 motor rifle divs.
1 arty div: 2 arty, 3 *Scud* SSM bdes, 2 ATK regts (6 bns).
1 AB bde.
6 engr bdes.
Civil Defence Troops (10,000): 5 regts.
AFV: 3,500 T-54/-55/-72 MBT; 1,100 BMP MICV; 1,250 OT-65 and BRDM scout cars; 2,700 OT-62/-64/-810 APC.
Arty: 250 M-53 100mm, 100 M-1931/-37 122mm, 75 M-46 130mm guns; 90 M-1937 152mm gun/how; 250 D-30/M-30 122mm, M-1974 122mm SP, 250 M-18/46 and DANA (Tatra 813 truck-mounted) SP 152mm how; 200 RM-70 122mm, 120 M-51 130mm MRL; 40 *FROG*, 27 *Scud* SSM.
ATK: 100 82mm RCL; 112mm P-27 RL; 400 AT-3 *Sagger* and AT-4 *Spigot* ATGW.
AD: 600 S-60 57mm towed, M-53/59 30mm SP AA guns; SA-4/-6/-7/-9 SAM.

RESERVES: 200,000; 295,000 more with liability to age 50 (men) or 60 (officers).

Air Force: 59,250 (18,000 conscripts); 439 combat ac, some 24 armed hel.
2 air armies: 3 air divs: 15 combat regts:
10 FGA sqns: 3 with 60 Su-7BM/U; 3 with 36 MiG-23; 3 with 42 MiG-21/-21U; 1 with 12 MiG-15.
18 interceptor sqns with 252 MiG-21/-21U/-23 (about half AD, half battlefield spt).
3 recce sqns: 2 with 25 MiG-21RF; 1 with 12 L-29.
2 tpt regts with 2 An-12, 6 An-24, 40 Il-14, 1 Tu-134, 2 LET L-410M.
1 hel regt, 3 indep hel sqns with 40 Mi-1, 20 Mi-2, 100 Mi-4, 10 Mi-8, 24 Mi-24.
Trg ac incl L-29.50, 24 L-39, Zlin 526.
Liaison ac incl Zlin Z-43.
AAM: AA-2 *Atoll*.
3 AD divs: 6 SAM regts: some 40 sites; 250 SA-2/-3.

RESERVES: 30,000.

Para-Military Forces: Border Troops 11,000: 7 bdes, AFV, ATK weapons. People's Militia 120,000. 'Association for Co-operation with the Army'.

GERMAN DEMOCRATIC REPUBLIC

Population: 16,860,000.
Military service: Army and Air Force 18 months, Navy (sea-going) 36 months.
Total regular forces: 172,000 (94,500 conscripts).
Est NMP 1982: DMO 201.0 bn. 1983: 210.0 bn.[2]
Est GNP range 1983: $85.2–172.0 bn.
Def budget 1983: DMO 15.850 bn ($7.709 bn). 1984: 16.961 bn ($7.538 bn).[3]
NMP growth: 2.5% (1982), 4.4% (1983).
Debt: $13.0 bn (1982).
$1 = 1983: ostmarks 2.555 (off.), 2.056 (adj.) Mid-1984: 2.750 (off.), 2.250 (adj.).

Army: 120,000 (71,500 conscripts).
2 Military Districts, 2 Army HQ:
2 tk divs (each 3 tk, 1 motor rifle regt).[4]
4 motor rifle divs (each 1 tk, 3 motor rifle regts).[4]
2 SSM bdes with *Scud*.
2 arty, 1 AA arty regts.
2 AD regts with SA-4 SAM.
3 sigs regts.
3 engr regts.
1 railway construction regt.
2 ATK bns.
1 AB bn.
AFV: About 1,500 T-54/-55/-72 MBT (1,600 more in storage); 1,000 BMP MICV; 1,000 BRDM-1/-2 scout cars; 1,500 BTR-50P/-60P/-152/-70 (M-1978), MT-LB APC.
Arty: 400 M-/D-30 towed and M-1974 122mm SP, 72 M-46 130mm guns; 108 M-1937/D-20 152mm towed, 54 M-1973 152mm SP gun/how; 108 RM-70 122mm MRL; 24 *FROG*-7, 18 *Scud* B SSM; 250 120mm mor.
ATK: 120 T-12 100mm towed ATK guns; AT-3 *Sagger*, AT-4 *Spigot* ATGW.
AD: 96 ZSU-23-4 SP AA guns; SA-4/-6/-7/-9 SAM.

RESERVES: 330,000; up to 3 months call-up per year to total 24 months; 250,000 more have a Reserve commitment to 50 (other ranks) or 60 (officers).

Navy: 14,000 incl Frontier Bde (8,000 conscripts); 15 combat hel.
2 *Rostock (Koni)* frigates with 1 × 2 SA-N-4 SAM.
10 *Parchim* corvettes with 2 SA-N-5 SAM.
15 *Osa*-I FAC(G) with 4 *Styx* SSM.

49 FAC(T): 18 *Shershen*, 31 *Libelle*(.
6 *Hai* large patrol craft.
27 *Kondor*-II coastal minesweepers.
12 *Frosch* LST.
2 *Kondor*-I intelligence collection vessels.
4 supply ships, 4 tankers, 2 mod *Frosch* lt tpts.
1 hel sqn with 13 Mi-8 (3 SAR), 5 Mi-14 ASW.
Coastal Frontier Bde (GBK; 2,750): 5 beach patrol bns, 3 afloat 'divs', 1 boat gp (recce); 37 vessels incl 3 *Parchim*, 10 *Bremse*, 19 *Kondor*-I; 152mm guns; *Samlet* SSM.

Bases: Peenemünde, Warnemünde, Dransk-Bug, Sassnitz, Wolgast, Tarnewitz, Barhöft.

RESERVES: 25,000.

Air Force: 38,000 (15,000 conscripts); 359 combat ac, 30 armed hel.
1 air div:
2 FGA regts:
4 FGA sqns: 2 with 35 MiG-17; 2 with some 12 MiG-23.
1 recce sqn with 12 MiG-21.
1 tpt regt: 3 sqns: 18 Il-14 (An-26 to replace), 15 Tu-134, An-2/-14/-26B.
3 hel regts: 9 sqns: 6 with 80 Mi-8 (about half armd); 3 with 30 Mi-24.
AD Command: 2 AD districts:
6 air regts: 18 sqns with 300 MiG-21F/MF/PF/U/-23.
7 SAM regts, some 30 sites with 200 SA-2/-3.
2 radar regts.
Trg ac incl Yak-11, L-39, Zlin 226, MiG-15UTI.
Liaison ac incl Zlin Z-43.
AAM: AA-2 *Atoll*.
ASM: AT-3 *Sagger* ATGW.

RESERVES: 30,000.

Forces Abroad: Algeria, 250; Angola, 500; Ethiopia, 550; Guinea, 125; Iraq, 160; Libya, 400; Mozambique, 100; S. Yemen, 75; Syria, 210.

Para-Military Forces: 82,500.
Ministry of Defence: Frontier Troops (50,000): 18 border, 2 indep, 1 special, 6 trg regts (?66 bns), 1 boat section; 24 patrol craft.
Ministry for State Security: 1 Guard regt (Berlin) (7,000): 6 motor rifle, 1 arty, 1 trg bns; PSZH-IV APC, 120mm mor, 85mm, 100mm ATK, ZU-23 AA guns, hel.
Ministry of Interior: People's Police Alert Units (10,500): 21 bns; BTR-40/-152 APC, 82mm mor. Transport Police (8,500): 16 coys; small arms, RPG-7 RL.
Workers' Militia: 15,000 combat groups; AFV incl SK-1 APC, 82mm mor, 76mm ATK, 23mm, 37mm AA guns.
Society for Sport and Technology (450,000, 75% active): 1 central, 14 regional subordinate district gps, some 15,000 units; small arms.
Thälmann Pioneers: School children, para-military trg.

HUNGARY

Population: 10,740,000.
Military service (incl Border Guard): 18 months; Air Force 24 months.
Total regular forces: 105,000 (58,000 conscripts).
NMP 1982: forints 696.4 bn. 1983: 730.0 bn.
Est GDP range 1983: $21.0–65.2 bn.
Def budget 1982: forints 20.260 bn ($1.318 bn). 1983: 21.070 bn ($1.22 bn).
NMP growth: 2.3% (1982), 0.5% (1983).
Inflation: 7.0% (1982), 7.3% (1983).
Debt: $7.7 bn (1982).
$1 = 1982: forints 36.631 (off.), 15.37 (adj.). 1983: 42.666 (off.), 17.26 (adj.).

Army: 84,000 (50,000 conscripts) incl Danube Flotilla.
1 tk div (at Cat. 2).
5 motor rifle divs (2 at Cat. 2, 3 at 3).
1 arty bde, 1 SSM bde with *Scud*.
1 AA arty, 4 SAM regts (1 indep with SA-4, 3 div with SA-6).
1 AB bn.
AFV: About 1,200 T-54/-55, 30 T-72 MBT; 100 PT-76 lt tks; 200 BMP-1 MICV; some 750 BRDM-2/FUG (OT-65) scout cars; 1,000 PSZH-IV, MT-LB APC.
Arty: 225 M-1938 towed, 50 M-1974 SP 122mm how; 40 D-20, 100 M-1943 towed, 20 M-1973 SP 152mm gun/how; 50 BM-21 122mm MRL; 24 *FROG*-7, 9 *Scud* SSM; 300 82mm, 100 M-43 120mm mor.
ATK: 125 SPG-9 73mm RCL; 125 85mm and T-12 100mm ATK guns; 100 AT-3 *Sagger*, 100 AT-4 *Spigot* ATGW.
AD: 100 S-60 57mm towed, 75 ZSU-23-4 SP AA guns; 30 SA-4, 60 SA-6, 500 SA-7, 50 SA-9 SAM.
Danube Flotilla (700); 10 100-ton patrol craft, river MCM, 5 small LCU, small tp tpts.

Air Force: 21,000 (8,000 conscripts); 145 combat ac, some 24 armed hel.
1 air div:
3 AD fighter regts: 9 interceptor sqns with 120 MiG-21F/PF/bis/U, 25 MiG-23BM.
1 tpt regt: 2 tpt sqns with 24 An-2/-24/-26, 2 Il-14.
1 hel regt: 3 hel sqns with 30 Mi-8, 24 Mi-24, 25 Ka-26 *Hoodlum*.
Trg ac incl L-29, MiG-15UTI.
AAM: AA-2 *Atoll*.
1 AD div: 3 SAM regts, some 20 sites; 120 SA-2/-3.

RESERVES (all services): 143,000.

Para-Military Forces: Border guards 15,000 (11,000 conscripts); 11 districts. Part-time Worker's Militia 60,000. 'Sport Association for National Defence'.

POLAND

Population: 36,900,000.
Military service: Army, internal security forces, Air Force 2 years; Navy, special services 3 years.
Total regular forces: 323,250 (185,000 conscripts).
Est NMP 1981: zloty 2,160.4 bn. 1982: 4,753.0 bn.
Est GNP range 1983: $92.2–178.0 bn.
Def budget 1983: zloty 193.0 bn ($6.433 bn). 1984: 218.0 bn ($6.229 bn).
NMP growth: −5.5% (1982), 4–5% (1983).
Inflation: 100.2% (1982).
Debt: $27.4 bn (1982).
$1 = 1983: zloty 90.0 (off.), 30.0 (adj.). Mid-1984: 110.4 (off.), 35.0 (adj.).

Army: 210,000 (153,000 conscripts).
3 Military Districts:
5 armd divs (all at Cat. 1).
8 mech divs (3 at Cat. 1, 2 at 2, 3 at 3).
1 AB div (Cat. 1).
1 amph assault div (Cat. 1).
3 arty bdes, 1 arty regt.
3 ATK regts.
4 SSM bdes with *Scud*.
1 AD bde with SA-4; 9 AD regts: 7 with SA-6, 2 with SA-8 SAM.
AFV: 3,400 T-54/-55, 50 T-72 MBT; 110 PT-76 lt tks; 800 FUG/BRDM-2 scout cars; 800 BMP-1, 2,500 SKOT/SKOT-2AP and TOPAS/TOPAS-2AP APC.
Arty: 120 M-1931 (A-19) 122mm guns; 150 M-1937 (ML-20) 152mm gun/how; 520 M-1938 (M-30) towed and M-1974 (2S1) SP 122mm, 120 M-1943 (D-1) 152mm how; 250 BM-21 122mm, BM-14 140mm MRL; 51 *FROG*-3/-5/-7, 36 *Scud* B SSM; 750 82mm, 120mm mor.
ATK: 650 D-44 85mm and T-12 100mm towed ATK guns; 73mm RCL; AT-1 *Snapper*, AT-3 *Sagger*, AT-4 *Spigot* ATGW.
AD: 750 ZU-23 23mm and S-60 57mm towed, 130 ZSU-23-4 SP AA guns; SA-4/-6/-7/-8/-9 SAM.

Navy: 22,000 (5,000 conscripts).
3 *W*-class subs.
1 SAM *Kotlin* destroyer with 1 × 2 SA-N-1 *Goa*.
13 *Osa*-I FAC(G) with 4 *Styx* SSM.
18 FAC(T): 12 *Pilica*, 6 *Wisla*.
8 mod *Obluze* large patrol craft.
50 MCM: 12 *Krogulec*, 11 T-43 ocean, 2 *Notec* coastal minesweepers; 25 K-8 boats.
23 *Polnocny* LCT, 4 *Marabut* LCM, 15 *Eichstaden* LCA.
2 mod *Moma* intelligence vessels (AGI); 1 T-43 radar picket.
1 Naval Aviation Div (2,000); 44 combat ac:
1 attack regt: 3 sqns with 34 MiG-17.
1 recce sqn with 5 Il-28, 5 MiG-17.
1 hel regt: 2 sqns with 10 Mi-2, 20 Mi-4, 5 Mi-8.
(On order: 1 *Notec* coastal minesweeper.)

Bases: Gdynia, Hel, Swinoujscie, Kolobrzeg, Ustka.

Air Force: 91,250 (30,000 conscripts); 675 combat ac, 12 armed hel.
4 air divs:
6 FGA regts: 18 sqns: 3 with 35 Su-7/-7U; 3 with 35 Su-20; 12 with 150 MiG-17.
11 AD regts: 33 sqns with some 400 MiG-21U/-23.
6 recce sqns: 35 MiG-21RF, 5 Il-28, 15 LIM-6.
2 tpt regts: 9 An-2, An-12, 12 An-26, 12 Il-14.
1 comms/liaison sqn with 2 Tu-134A, 6 Yak-40, Il-18 ac.
3 hel regts with 100 Mi-2, 12 Mi-4, 25 Mi-8, 12 Mi-24.
300 trg ac: TS-8/-11, MiG-15/-21UTI, Su-7U.
AAM: AA-1 *Alkali*, AA-2 *Atoll*.
3 AD divs: 9 SAM regts: some 50 sites; 400 SA-2/-3.

RESERVES (all services): 500,000.

Forces Abroad: Syria (UNDOF): 131.

Para-Military Forces: 218,000. Ministry of Interior border troops (160,000): 8 bdes, some 42 patrol craft incl 5 *Obluze*, 5 *Pilica*, 3 KP-131, 1 *Oksywie*, 12 *Wisloka*, 21 K-8, 9 *Gdansk*. Internal defence troops (58,000): tks, AFV, ATK guns. Citizen's Militia 350,000. 'League for National Defence' (some 200,000 active).

ROMANIA

Population: 23,000,000.
Military Service: Army, Air Force 16 months; Navy 30 months.
Total regular forces: 189,500 (109,000 conscripts).
NMP 1982: lei 628.8 bn. 1983: 654.5 bn.
Est GNP range 1982: $77.3–108.0 bn.
Est def budget 1983: lei 11,725 bn ($1.413 bn).
NMP growth: 2.6% (1982), 3.4% (1983).
Inflation: 17% (1982), 5.2% (1983).
Debt: $9.8 bn (1982).
$1 = (1982/3) lei 4.47 (off.), 8.3 (adj.).

Army: 150,000 (95,000 conscripts).
4 Army Areas:
2 tk divs (1 at Cat. 1, 1 at 2).
8 motor rifle divs (1 at Cat. 1, 3 at 2, 4 at 3).
3 mountain bdes/regts.
2 arty, 2 AA bdes, 4 arty, 2 AA arty, 5 ATK regts.
2 *Scud* SSM bdes.
2 AB regts.
AFV: 200 T-34, 1,000 T-54/-55, some M-77, 30 T-72 MBT; 400 BRDM-1/-2 scout cars; 2,600 BTR-50/-60, TAB-72 (BTR-60) APC.
Arty: 50 76mm, 50 D-44 85mm, M-1944 100mm towed, 250 SU-76/-100 SP guns; 600 M-1938/D-30 122mm, 150 M-1937/D-20 152mm guns/how; 175 BM-21/RO 122mm, 150 M-51 (ZIL) 130mm MRL; 30 *FROG*, 15 *Scud* SSM; 700 82mm, 200 120mm mor.
ATK: 57mm ATK guns; 73mm, 260 76mm and 82mm RCL; 120 AT-1 *Snapper* and AT-3 *Sagger* ATGW.
AD: 300 30mm, 37mm, 250 57mm, 85mm, 100mm towed AA guns; SA-6/-7 SAM.

RESERVES: 500,000+ (300,000 with service in last 5 years).

Navy: 7,500 (3,500 conscripts).
Black Sea Fleet, Danube Sqn, Coastal Defence.
1 *Tetal* frigate.
3 *Poti* corvettes.
6 *Osa*-I FAC(G) with 4 *Styx* SSM.
3 *Kronshtadt* large patrol craft.
19 Ch *Shanghai* FAC(P/ASW).
39 FAC(T): 21 Ch *Huchwan* hydrofoils(, 6 Sov P-4(, 12 *Epitrop*.
46 river patrol craft incl 18 VB-76 monitors.
16 minesweepers (4 GDR M-40 coastal, 12 Sov T-301 inshore); 8 Pol TR-40, 20 VD-141 minesweeping boats(; 2 MCM spt ships.
4 Mi-4 SAR hel.
Coastal Defence (2,000): HQ Constanta, 4 sectors; 18 arty btys with some 110 130mm, 150mm and 152mm guns, observer post tps, naval engineers. Would get 2 regts of naval inf on mobilization.
(On order: 2 *Tetal* frigates.)

RESERVES: 20,000.

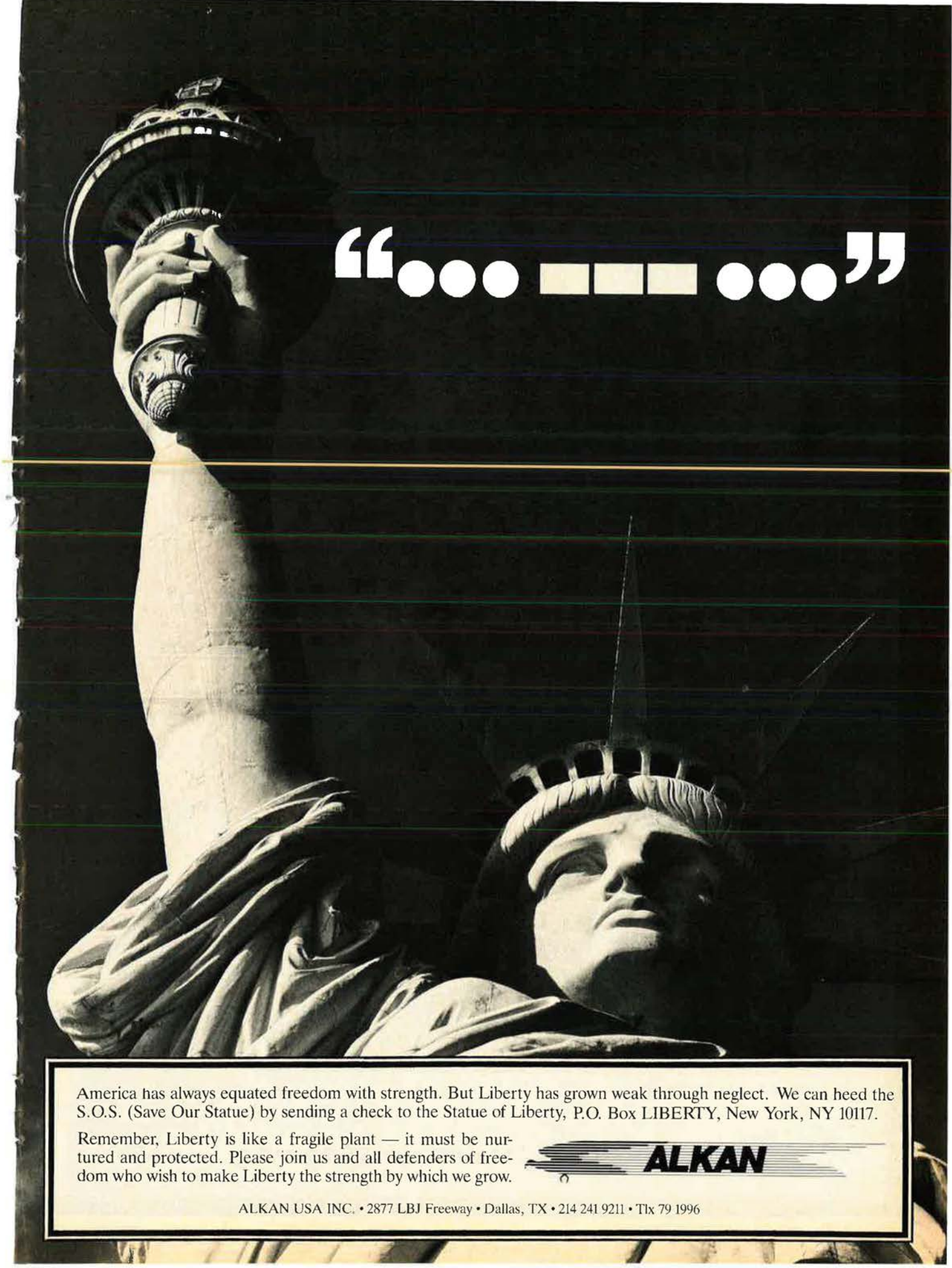
Bases: Mangalia, Constanta; Danube: Braila, Giurgiu, Sulina, Tulcea.

Air Force: 32,000 (10,000 conscripts); 318 combat ac.
2 air divs: 4 combat regts:
6 FGA sqns with 70 MiG-17.
12 interceptor sqns: 11 with 200 MiG-21F/PF/U, 1 with 30 MiG-23.
1 recce sqn with 18 Il-28.
1 tpt regt with 4 Il-14, 3 Il-18, 2 Il-62, 11 An-24, 8 An-26, 4 Li-2, 1 Boeing 707.
1 hel regt: 10 Mi-4, 25 Mi-8, 45 IAR-316B (*Alouette* III), 30 IAR-330 (*Puma*).
Trg ac: 40 L-29, 20 MiG-15UTI, 10 IAR-28MA; IAR-93 being introduced.
AAM: AA-2 *Atoll*.
1 AD div: 18 SAM sites with 108 SA-2.
(On order: some 45 IAR-93A, 165 IAR-93B FGA/trg ac.)

RESERVES: 45,000.

Para-Military Forces: 37,000. Border guards (17,000); 12 bdes. Ministry of Defence security troops (20,000); AFV, ATK guns. Local Defence: some 900,000 Patriotic Guard (perhaps 12,000 full time). Youth Homeland Defence: 650,000. 'Voluntary Sports Association'.

1 Incl police and security budget.
2 1980 prices.
3 Incl DMO 4.400 bn (1983), 4.739 bn (1984) for internal security.
4 All divs Category 1.



America has always equated freedom with strength. But Liberty has grown weak through neglect. We can heed the S.O.S. (Save Our Statue) by sending a check to the Statue of Liberty, P.O. Box LIBERTY, New York, NY 10117.

Remember, Liberty is like a fragile plant — it must be nurtured and protected. Please join us and all defenders of freedom who wish to make Liberty the strength by which we grow.

ALKAN

ALKAN USA INC. • 2877 LBJ Freeway • Dallas, TX • 214 241 9211 • Tlx 79 1996

Ford Aerospace supplies and supports more Sidewinder missiles than any other contractor in the world.



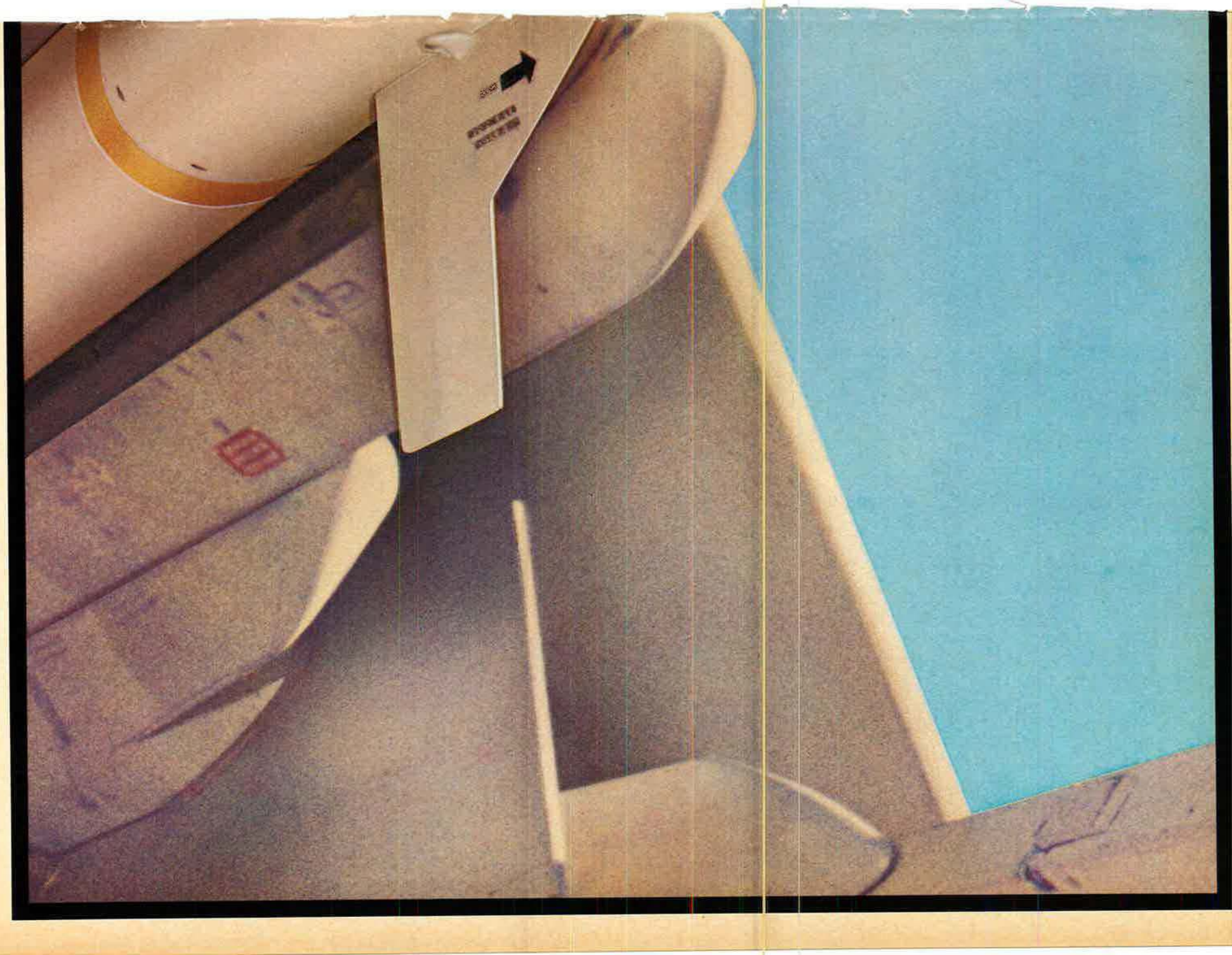
The Sidewinder missile is the most successful air-to-air combat missile ever made. And Ford Aerospace is the world industry leader in complete Sidewinder missile systems experience.

- Ford Aerospace has more experience in the manufacture and upgrade of Sidewinder guidance and control sections than all other suppliers combined [over 100,000 units in the past 30 years].
- Ford Aerospace is a principal contractor for the Sidewinder AIM-9M guidance and control section.
- Ford Aerospace is the developer and only supplier of the all-up-round Sidewinder AIM-9P missile system.
- Ford Aerospace has extensive experience in complete integrated logistics support and training, and has designed and built nearly every Sidewinder depot in the world.

Ford Aerospace:
The world's first name in tactical short-range air-to-air missile systems.

Ford

Ford Aerospace & Communications Corporation





Claws by EDO

Notice: There's an entirely new derivative class of EDO's Ejector Release Units (ERUs) and EDO Government Systems Division is building them.

Tornado's light and heavy-duty Claws for the German Air Force and Navy, and the Italian Air Force have reached the full-scale production milestone. EDO ERUs are now flying in Italy and Germany.

ERU derivatives of both Tornado units have been developed for application to other high performance combat aircraft. These ERUs utilize EDO's proven advanced technology. The incorporation of many qualified basic Tornado ERU components ensures extensive benefits in new program scheduling, unit costs and rapid response to requirements.

Right now, EDO stands ready with production capability and a complete range of proven ERU designs to provide ERUs for all classes of aircraft and helicopters, operational or planned... Look to EDO for ERUs.

For more information contact:
Marketing Department
EDO Corporation
Government Systems Division
College Point, New York 11356
Telephone 212 445-6000. Telex 127421

EDO CORPORATION GOVERNMENT SYSTEMS DIVISION

Where Technological Innovation Becomes Reality

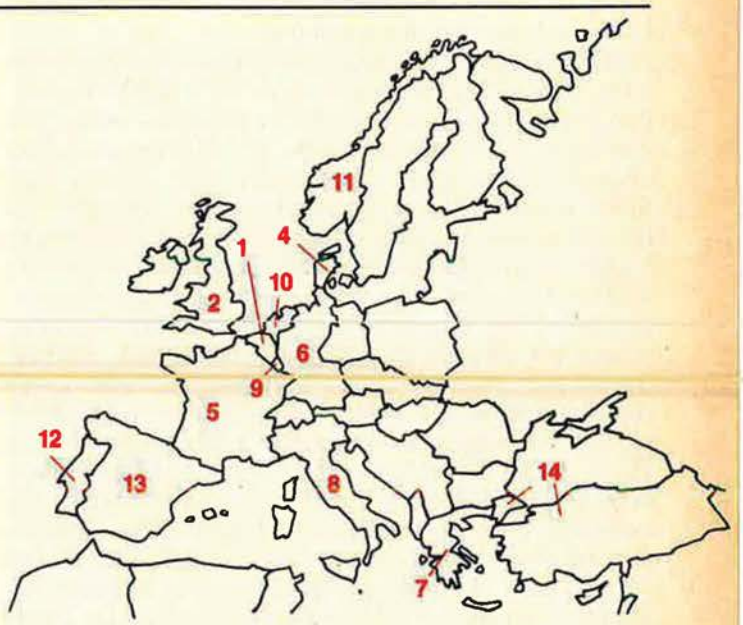
The North Atlantic Treaty

Although the year saw the first deployment of US *Pershing* II missiles in West Germany and GLCM (ground-launched cruise missiles) in Britain and Italy, much of the debate in NATO over the past twelve months has centred on the need to strengthen conventional forces. The basic principle—that only through reinforcement of conventional forces can NATO counter a Soviet advance in superior strength without early recourse to nuclear weapons—is generally accepted as valid. Any conventional force improvement that can raise the nuclear threshold is likely to be generally welcomed, but the precise direction of improvement is as yet by no means universally accepted throughout the Alliance.

Part of the disagreement stems from the fact that many of the so-called 'force multipliers' (systems to enhance the capability of the NATO defence by early and accurate identification of enemy activity, secure and durable communications to speed decision-making, command and control, weapons of precision to guarantee successful engagement of targets, penetration aids to by-pass enemy defences, etc.) depend for their effectiveness upon the detailed application of so-called high technology. Many of the weapons and systems now in the research and development phase are the products of American designers and manufacturers. There is naturally concern in Europe that many of the concepts of the high-technology battlefield may turn out to be extremely costly and may make European forces unduly dependent on the United States to the detriment of present and future European industrial development.

There is disagreement also over the most effective way to stop a Warsaw Pact conventional attack. Much of current thinking is focused on 'deep' strikes on the follow-on elements—the Pact second-echelon forces intended to give weight to deep penetrations and to subsequent exploitation of any breakthrough. Reservations are being expressed that forward defence may thus be weakened in favour of the deep-strike mission.

The facts of European geography play a significant part in the development of deep-strike doctrine. War on West German soil, for example, would produce enormous damage to the fabric of German society. Moving the area of destruction eastwards might therefore be regarded as desirable in principle, but the costs of new deep-strike weapons are likely to be high, and it seems highly doubtful whether it will prove possible to maintain forward defence at the same time. In addition, one would have to anticipate that the Soviet Union may also develop her own 'deep-strike' weapons, which would tend to shift the area of destruction back into West Germany.



THE NORTH ATLANTIC TREATY ORGANIZATION

1. Belgium
2. Britain
3. Canada (not included on map)
4. Denmark
5. France
6. Germany: Federal Republic (West Germany)
7. Greece
8. Italy
9. Luxembourg
10. Netherlands
11. Norway
12. Portugal
13. Spain
14. Turkey

Many in the United States have long criticized the West European partners for failing to assume an adequate share of the burden of defence against the Warsaw Pact. Comparisons between West European and US defence expenditures form the basis for much of this criticism. In 1978 NATO Ministers agreed to increase defence spending on conventional forces by 3% in real terms annually. Official NATO and IMF data suggest that the 3% goal has been met only by the US, Britain, Canada and France, whose defence spending has increased in percentage terms as follows:

	United States	Britain	Canada	France
1980	7.8%	4.9%	3.0%	4.0%
1981	7.8%	1.6%	4.0%	3.5%
1982	9.3%	5.2%	8.2%	1.0%
1983	11.1%	5.5%	4.5%	3.0%

Canada is certainly attempting to rebuild her conventional forces, but the others (especially France and the US) devote a significant proportion of their defence budgets to their nuclear forces. If spending on these nuclear forces is excluded, the national average growth rates are lower: some 6.5% for the US, about 4.0% for Britain and perhaps 2.0% for France. In Belgium, Denmark and the Netherlands, real defence spending actually decreased in 1983. Data from other official sources, such as Central Banks, which use different accounting procedures, suggest that in almost all NATO countries actual defence expenditures may indeed be lower than Defence Ministries have claimed.

The relative positions of the US and her European allies must be viewed, in part, in the light of their respective economic climates. In 1983 the US economy was characterized by strong growth, low inflation, declining unemployment and a rising dollar. This growth continued in early 1984, albeit at a slower rate. There was in the US a greater sense of optimism, of willingness to budget for growth. Political attitudes in the US towards defence have for some years now reflected a sense of perceived lack of security, and thus a desire to spend money on defence in order to achieve that security. Social and economic claims have been accorded lower priority, and the increased defence outlays which have marked the period since 1980 have demonstrated the US Government's commitment to enhanced defence. A comparable commitment from the European nations has been seen as fundamental to the health of the Alliance, and 1984 saw moves in the US Congress (the 'Nunn Amendment') to make US force levels in Europe contingent upon greater defence efforts on the part of Western Europe.

The economic recovery of the NATO Allies has undoubtedly lagged behind that of the United States. Throughout the period 1981–3 economic performance has been characterized by rising unemployment, mixed economic growth, declining exchange rates—which have a significant effect upon a country's ability to buy military equipment from the United States—severe capital flight to the higher interest rates paid in North America, mixed success against domestic inflation, and social pressures on the budget. Most severely hit were countries of the southern tier, especially Greece, Portugal and Turkey. Virtually all West European states have, with varying degrees of success, introduced measures to control inflation and to cut their respective budget deficits, but all are faced with rather ambitious social welfare programmes, and the high unemployment levels found throughout have placed heavy demands on welfare budgets. Nor is there the same perception of imminent threat as in the US, although there is no intention of compromising freedom. In the light of these circumstances, most West European governments believe that they are spending all they can afford on their defence establishments.

West Europeans are also sceptical of what they tend to regard as simplistic comparisons based on 'standard' criteria for defence expenditures. European nations argue that they bear other defence burdens, less clearly identified. These include indirect economic and social costs, such as those stemming from conscription (applicable to most European armed forces), while military use of public facilities and land, especially in West Germany, have no equivalent in the US. Because of their nature it is difficult to assess the true costs of these additional burdens, but they are politically relevant.

Nor is it easy to forecast when this situation is likely to ease. Operation, maintenance and capital costs are demonstrably higher in the military sector and are therefore subject to different inflationary pressure, usually higher than in the general economy. The OECD predicts that the US recovery will encourage economic growth in Europe and Canada through 1984 but 'with tight policies—dictated by concerns over budget deficits and inflation fears—the recovery outside North America seems likely to be weak and hesitant by past standards'.

The 3% real growth target was intended to upgrade conventional defences, to develop NATO infrastructure, to re-distribute NATO's costs more broadly across the Alliance, to facilitate US reinforcement of Europe and, overall, to reduce NATO's reliance on nuclear weapons. If past performance is an indicator, that figure is unlikely to be met, although some progress is being made. Moreover, most West European countries managed to increase their outlays and improve their military posture during the 1970s, when real defence spending in the US was decreasing. Some of the cushion from that investment still remains, although replacement of existing equipment with the more sophisticated weapons of the next generation will be costly. If it is true that little additional real investment can be achieved, there may be increasingly strong initiatives to ensure more effective political and fiscal control of defence expenditure and military resources.

Economic pressures continue to have a significant impact on all national defence procurement. There is some evidence of closer attention to priorities, although budgetary constraints often impose delays in production schedules which result in overall increases in the unit costs of individual items. Co-operation in arms procurement, long a goal of NATO planners, continues to take place, but at a rather desultory pace. However, agreement was reached to begin a programme for the procurement of a NATO Standard Frigate. Initial US hesitation was overcome, but how many will be ordered remains to be seen. There has been co-operation between Germany and France over a new attack helicopter, and discussions have taken place between Germany, Britain, Italy, France and Spain over the joint procurement of the next generation of fighter aircraft.

There seems little doubt that the incorporation of advanced technology is going to add yet more inflationary pressure to defence procurement. In 1982 this was estimated by the US Congressional Budget Office to be 4.4% annually in real terms. Others suggest that real annual increases of the order of 8% are not unlikely. At the same time, the costs of munitions, spare parts and support facilities are likely to rise, as NATO attempts to raise stock levels to sustain a longer period of conventional conflict.

Joint NATO agreements include the following: artillery location systems; precision-guided 155mm munitions; battlefield target acquisition systems; Identification Friend or Foe (IFF) equipment standardization; passive electronic countermeasures (ECM) equipment for aircraft; electronic jamming systems for tactical aircraft;

low-cost dispersal systems for sub-munitions; multiple-launcher rocket systems (MLRS); stand-off surveillance and target-acquisition systems; short-range anti-radiation missiles; and self-defence systems for battlefield helicopters. Other areas yet to be determined include agreement on runway attack munitions, very long-range target identification, the rapid and accurate transmission of data, improvement of command-and-control systems, and the development of better fighter aircraft, long-range remotely-piloted vehicles (RPV) and missiles for delivering conventional munitions and sub-munitions. It is possible, too, that some improvements can be achieved by greater use of existing assets, such as the rapid conversion of commercial aircraft in war for in-flight refuelling of combat aircraft—a practical and relatively inexpensive alternative to dedicated tankers, which are in markedly short supply in most West European air forces.

There has been a tentative move to revive the Western European Union (WEU), ostensibly to support and give political direction to the European contribution to NATO, and, in particular, to rationalize arms procurement. This is not without problems, as not all West European NATO nations are members of the WEU. At the same time, it is necessary to note a somewhat greater sense of urgency in the Franco-German staff talks, perhaps presaging a greater French interest in conventional co-operation with NATO, and increased emphasis on the work of the Independent European Programme Group (IEPG). Thus the West European members of NATO appear to be regarding the need to co-operate with rather greater seriousness—not least because of growing concern over the need to retain the goodwill of the US and to ensure that their interests are preserved within the Alliance—but it remains to be seen in which direction this somewhat vague impulse will lead.

BELGIUM

Population: 9,900,000.
Military service: 8 or 10 months.[1]
Total armed forces: 93,607 (3,559 women; 31,908 conscripts).
GDP 1982: B fr 3,940 bn ($86.231 bn). Est GDP 1983: 4,149 bn ($81.143 bn).
Def exp 1983: B fr 94.440 bn ($1.847 bn); NATO defn $2.682 bn. Def budget 1984: 99.000 bn ($1.769 bn); NATO defn $2.575 bn.
GDP growth: −2% (1981), −1.3% (1982).
Inflation: 8.7% (1982). 7.7% (1983).
Debt 1982: $31.0 bn
$1 = francs 45.691 (1982), 51.132 (1983), 55.975 (mid-1984).

Army: 65,102 (incl Medical Service; 26,163 conscripts).
1 Corps HQ, 2 Div HQ.
1 armd bde (2 tk, 2 mech inf, 1 SP arty bns, spt units).
3 mech inf bdes each with 1 tk, 2 mech inf, 1 SP arty bns, spt units.
1 para-cdo regt.
3 recce bns.
1 tk bn.
2 mot inf bns.
3 arty bns.
1 SSM bn with 4 *Lance*.
4 AD bns: 2 SAM with 39 *Improved HAWK*; 2 AA with *Gepard*.
5 engr bns (3 fd, 1 bridge, 1 eqpt).
4 lt aviation sqns.
AFV: 330 *Leopard* MBT, 119 *Scorpion* lt tks; 138 *Scimitar* AFV, 1,355 APC incl 130 FMC, 130 M-113, 262 *Spartan*, AMX-VCI (phasing out), M-75 (with reserves).
Arty: 15 203mm how; 90 M-108 105mm (to be retired), 25 M-44 (to be retired), 39 M-109 155mm (being upgraded), 10 M-110 203mm SP how; 5 *Lance* SSM.
ATK: 80 JPz C-90mm SP ATK guns; *Milan* ATGW; 40 *Striker* AFV with *Swingfire* ATGW.
AD: 36 20mm, 54 *Gepard* 35mm SP AA guns; 39 *Improved HAWK* SAM.
Avn: 5 *Islander* ac; 62 *Alouette* II hel.
(On order: 514 MICV, 475 M-113A2 APC; 124 M-109A2 155mm SP how.)

RESERVES: 160,000 (incl 40,000 Medical Service), some on immediate recall status; 1 mech, 1 mot inf bdes; combat, combat spt, log spt tps. Territorial defence: 11 mot inf regts, 4 mot inf bns.

Navy: 4,557 (1,227 conscripts).
4 E-71 frigates with 4 *Exocet* MM-38 SSM, 1 × 8 *Sea Sparrow* SAM.
7 US Type 498 ocean minehunters/minesweepers.
6 US Type 60 coastal MCM (4 in reserve).
14 *Herstal* inshore minesweepers.
2 log spt and comd ships (MCM).
6 river patrol boats.
3 *Alouette* III hel.
(On order: 10 *Flower* (tripartite) MCM ships.)

Bases: Kallo, Ostend, Zeebrugge.

RESERVES: 4,500 (on immediate recall status).

Air Force: 20,948 (4,518 conscripts); 147 combat ac.
5 FGA sqns: 3 with 54 *Mirage* 5BA/5BD; 2 with 22 F-16A, 14 F-16B.
2 AD sqns with 34 F-16A, 5 F-16B.
1 recce sqn with 18 *Mirage* 5BR (to get F-16).
2 tpt sqns with 12 C-130H, 2 Boeing 727QC, 3 HS-748, 5 *Merlin* IIIA, 2 *Falcon* 20.
1 SAR hel sqn with 3 HSS-1, 5 *Sea King*.
2 liaison sqns with 23 Fouga CM-170.
4 trg sqns: 2 with 28 SF-260MB, 2 with 32 *Alpha Jet*.
AAM: *Sidewinder*.
4 SAM sqns with 36 *Nike Hercules* (modernized).
1 NADGE command reporting centre, associated radar.
(On order: 34 F-16A ftr ac, 80 BDX *(Timoney)* APC.)

RESERVES: 14,000.

Joint Service: 3,000.

Forces Abroad: Germany: 24,794; 1 corps HQ, 1 div HQ, 1 armd, 1 mech inf bdes; 3 recce, 1 tk, 3 arty, 1 SSM, 2 AA, 3 engr bns; 3 aviation sqns, 6 *Nike* SAM sqns.
Para-Military Forces: Gendarmerie 16,200; 62 FN, 4 RM/62F armd cars, 5 *Alouette* II, 3 *Puma* hel.

BRITAIN

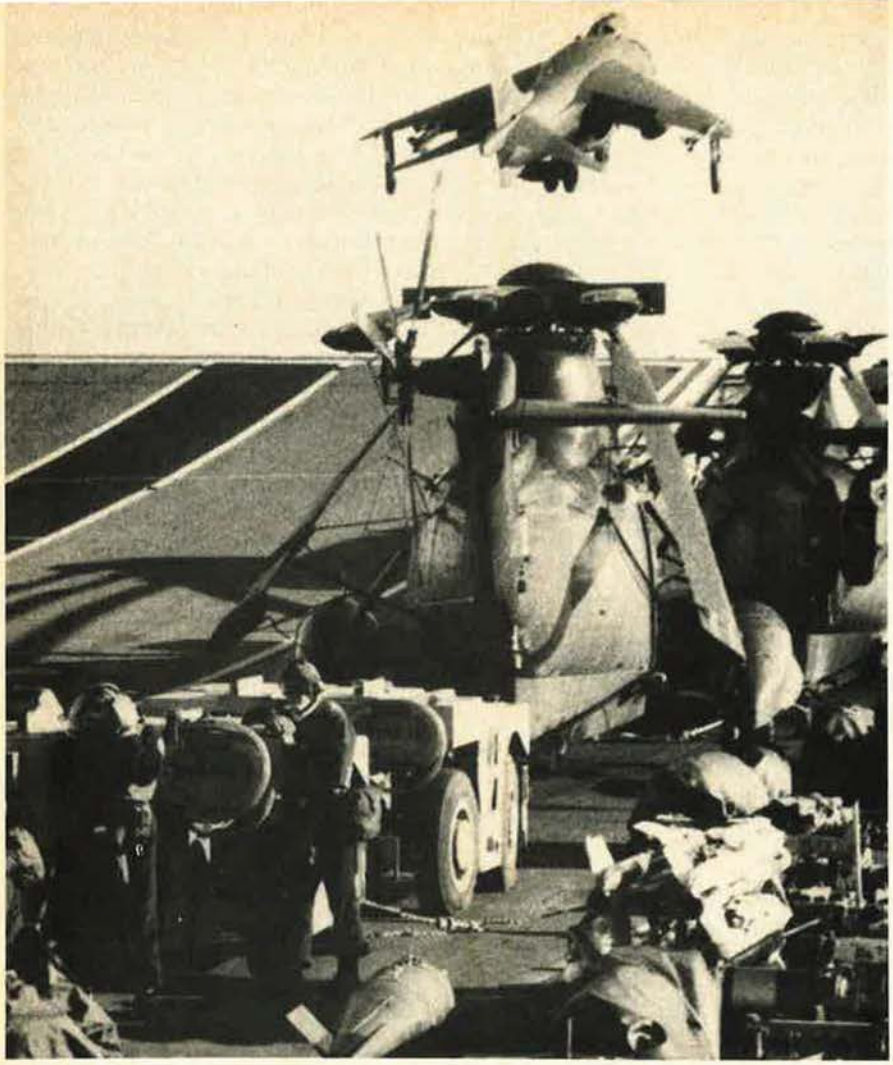
Population: 56,000,000.
Military service: voluntary.
Total armed forces: 325,909 (incl 16,246 women and some 9,732 enlisted outside Britain).
GDP 1982: £274.99 bn ($459.696 bn). 1983: 300.70 bn ($448.963 bn).
Def budget 1983/4: £15.973 bn[2] ($23.844 bn); NATO defn: $24.472 bn. 1984/5: 17.033 bn ($23.664 bn): NATO defn $24.216 bn.
GDP growth: 2% (1982). 3% (1983).
Inflation: 5.4% (1982). 5.3% (1983).
Debt 1983: $68.3 bn.
$1 = £0.5299 (1981/2), 0.5982 (1982/3), 0.6699 (1983/4), 0.7198 (mid-1984).

Strategic Forces: (2,300):
SLBM: 4 *Resolution* SSBN, each with 16 *Polaris* A3 msls with 3 MRV (being fitted with *Chevaline*).
Ballistic Missile Early Warning System (BMEWS) station at Fylingdales.



This low-angle view of a Belgian-built F-16B after takeoff shows off the aircraft's lines. The Belgian Air Force operates nineteen F-16Bs.

1 See p. 113 for footnotes.



A British Sea Harrier makes one of its "ski-jump" leaps into the air. Harrier pilots saw front-line combat duty during the Falklands war with Argentina.

Army: 161,539 (incl 6,573 women and 9,357 enlisted outside Britain, of which 8,074 are Gurkhas).
1 corps, 3 armd, 1 inf, 1 arty divs, 25 bdes, 1 Field Force HQ.
13 armd regts (2 trg).
6 armd recce regts.
47 inf bns.
6 Gurkha inf bns.
3 para bns (1 in inf, 2 in para role).
1 special air service (SAS) regt.
1 msl regt with *Lance* SSM (4 btys, each 3 msls).
3 AD regts with *Rapier* and *Blowpipe* SAM: 2 of 3 btys with 36 launchers, 1 (in BAOR) of 4 btys, 48 launchers; 2 btys SP.
19 arty regts: 2 hy, 8 SP, 6 fd (1 cdo), 1 msl, 1 GW, 1 locating; 3 indep *Blowpipe* SAM btys.
12 engr regts: 3 armd div, 1 armd, 1 amph, 6 fd, 1 Gurkha.
4 army aviation regts; 16 sqns (1 cdo), 5 indep flts; 2 trg sqns, 6 flts.
AFV: some 70 *Challenger*, 900 *Chieftain* MBT (60 in reserve), 271 FV 101 *Scorpion* lt tks; 243 FV 601 *Saladin* armd cars; 290 FV 107 *Scimitar*, 1,429 *Ferret*, 200 *Fox* recce; 2,338 FV 432, 600 FV 603 *Saracen*, 60 FV 103 *Spartan*, 500 FV 1611, some *Saxon* APC.
Arty: 100 towed, 120 FV 433 *Abbot* 105mm SP, 4 5.5-in. (140mm) trg, 31 M-107 175mm SP guns; 95 FH-70 towed, 101 M-109/A2/A3 155mm SP, 16 M-110 203mm SP how; 12 *Lance* SSM.
ATK: Carl Gustav 84mm, 120mm RCL; *Milan, Swingfire* ATGW.
AD: Blowpipe, 108 *Rapier* (some 16 SP) SAM.
Avn: 9 *Beaver* AL-1, 22 *Chipmunk* ac; 41 *Scout;* 8 *Alouette* II, 155 *Gazelle* AH-1, 110 *Lynx* AH-1 hel, some with *TOW*.
14 landing craft (2 tk, 12 med); 3 patrol craft, 2 hovercraft; 3 log ships.
(On order: Some 62 *Challenger* MBT; 250 MCV-80 MICV; some 50 AT-105 *Saxon* APC; 10 227mm MLRS; *LAW*-80 RL, *Milan, TOW* ATGW; some 150 *Rapier* (100 SP), 48 *Blowpipe* SAM; 5 *Gazelle*, 24 *Lynx* AH-5 hel (6 with *TOW*), 3 patrol craft, 12 combat spt craft.)

DEPLOYMENT (see also *Forces Abroad*, below):
United Kingdom Land Forces (UKLF): Reinforcements for 1 Br Corps, Germany: 1 inf div HQ; 2 inf Regular, 2 inf TA bdes; *United Kingdom Mobile Force* (UKMF): 1 air portable inf bde and log spt gp; *Allied Command Europe Mobile Force (LAND)* (AML(L)): 1 inf bn, 1 armd recce, 1 sigs sqns, 1 arty bty, 1 log bn; 1 avn flt; Home Defence: 10 inf, 1 AB bdes.
HQ Northern Ireland: (some 9,400); 2 inf bde HQ, 8 major units in inf role (6 resident, 2 temporary inf bns), 1 SAS, 1 engr sqn, 1 army aviation regt of 2 sqns.

RESERVES: 219,642: Regular Reserves 141,769. Territorial Army (TA) 70,629 (to be 75,000 by 1986): 2 armd, 3 lt recce regts, 35 inf bns, 2 SAS, 2 fd, 3 AD, 7 engr regts. Ulster Defence Regiment 6,929 (4,200 part time): 10 bns (internal security role in Northern Ireland only in peacetime). Home Service Force: (315, to be increased to 5,000) 4 coys; 2-year pilot scheme.

Navy: 71,281 (incl Fleet Air Arm, Royal Marines, 3,929 women and 375 enlisted outside Britain); 56 major surface combat vessels (incl 2 LPD).
Submarines, attack: 28.
13 SSN (2 *Trafalgar*, 6 *Swiftsure*, 3 *Churchill*, 2 *Valiant*); 15 SS (13 *Oberon*, 2 *Porpoise*).
Surface Ships:
3 ASW carriers with 5 *Sea Harrier* V/STOL ac, 9 *Sea King* hel: 2 *Invincible* (1 more in late 1984) with 1 × 2 *Sea Dart* SAM, *Phalanx* AD system, 1 *Hermes* (future under review) with 2 × 4 *Seacat* SAM.
12 GW destroyers: 2 *County* (1 to be sold 1984) with 1 × 2 *Seaslug*, 2 × 4 *Seacat* SAM, 4 *Exocet* SSM, 1 *Lynx* HAS-2 hel; 1 Type 82 with 1 × 2 *Sea Dart* SAM, 1 *Ikara* ASW; 9 Type 42 with 1 × 2 *Sea Dart*, 1 *Lynx* hel.
42 GP frigates: 6 Type 22 with 4 *Exocet* SSM, 2 × 6 *Sea Wolf* SAM, 2 *Lynx* hel; 6 Type 21 with 4 × 1 *Exocet* SSM, 1 × 4 *Seacat* SAM, 1 *Lynx* hel; 24 *Leander* (1 trg) with 1 *Wasp*/*Lynx* (7 with 4 *Exocet*, 3 × 4 *Seacat;* 8 with *Ikara* ASW, 2 × 4 *Seacat;* 5 with 1 × 4 *Exocet*, 1 × 6 *Sea Wolf*) (1 converting); 6 *Rothesay* (Type 12) with 1 × 4 *Seacat*, 1 *Wasp* hel.
1 *Whitby* (Type 12) ASW frigate (trg), to be replaced by *Leander* and retired end 1984.
37 minesweepers/minehunters: 6 *Hunt*, 28 *Ton* (9 reserves, 7 Fishery Patrol), 1 *River*, 2 auxiliaries (charter).
1 *Abdiel* MCM spt ship.
35 patrol craft: 3 *Peacock*, 7 *Island*, 2 *Castle*, 3 *Ton*, 4 *Bird* (2 trg), 2 *Loyal*, 3 *Falkland Islands* ex-tugs, 4 Fleet tenders (trg); 2 32-metre; 5 *Tracker* FAC (reserves).
2 assault ships (LPD) each with 4 LCM, 4 LCVP, 4 × 4 *Seacat* SAM.
Amph vessels: 6 landing ships incl 2 commercial (leased) (in Royal Fleet Auxiliary (RFA)), 2 large landing craft (Army), 13 LCM, 8 lt LCT, 29 LCVP.
1 ice patrol, 1 sub tender, 11 survey ships, 1 survey craft, 1 Royal Yacht (hospital ship).
2 hel spt ships, 1 forward repair ship.
1 BH-7 hovercraft.

ROYAL FLEET AUXILIARY (RFA): (2,600):
Naval vessels, civilian crews.
15 tankers (1 chartered, being mod).
4 fleet replenishment ships.

Included in above refitting or in reserve are: 1 SSBN, 3 SSN, 3 diesel subs, 3 frigates, 1 MCM, 1 LPD, 1 landing ship (RFA).
(On order: 1 ASW carrier, 3 *Trafalgar* SSN, 1 Type-2400 SS, 3 Type 42 destroyers, 6 Type 22 frigates, 5 *Hunt*, 11 Fleet MCM, 2 *Peacock*, 14 trg patrol craft, 3 LCT, 1 container ship (hel carrier auxiliary), 1 fleet tender; 72 *Trident* II SLBM, 2 *Phalanx* 20mm AD systems, *Sea Eagle*, 300 *Harpoon* SSM, *Javelin, Seawolf, Lightweight Seawolf* SAM.)

Bases: Devonport, Faslane, Portland, Portsmouth, Rosyth.

FLEET AIR ARM: 26 combat ac, 177 combat hel (incl some 53 in trg sqns).
3 ftr sqns (2 afloat, 1 trg) with 16 *Sea Harrier* FRS-1.
5 ASW hel sqns: 4 with 64 *Sea King* HAS-2/-5 (2 embarked); 1 with 5 HAS-5, 2 *Sea King* AEW (mod HAS-2); 1 with 2 *Sea King* HAS-2.
57 ASW hel flts (each 1 ac): 35 with *Lynx* HAS-2/-3; 22 with *Wasp* HAS-1.
2 cdo assault sqns: 1 with 9 *Sea King* HC-4 (to get 8 more; new sqn to form); 1 with 22 *Wessex* HU-5/HC-4.
1 ac trg sqn with 8 *Sea Harrier* FRS-1, 3 T-4N.
6 hel trg sqns: 1 with 10 *Wessex* HU-5; 2 with 22 *Sea King* HAS-2/-5; 1 with 11 *Lynx* HAS-2/-3; 1 with 10 *Wasp* HAS-1; 1 with 19 *Gazelle* HT-2.
5 hel flts with *Wasp* (hydrography/recce).
1 SAR sqn with 7 *Wessex* HU-5, 1 SAR/fleet requirements sqn with 3 *Wessex* HU-5 hel, 2 HS-125 (VIP) tpt ac.
1 observer trg sqn with 16 *Jetstream* T-2, 1 trg flt with 13 *Chipmunk* T-10.
Other ac incl 12 *Canberra* T-22/T-18, 27 *Hunter* T-7/-8/GA-1.
ASM: *Sea Skua*.
(On order: 14 *Sea Harrier* FRS-1, 4 *Jetstream* Mk-3 ac; 13 *Sea King* HAS-5, 15 *Sea King* HC-4, 3 *Lynx* HAS-3 hel.)

ROYAL MARINES: (7,571).
1 cdo bde with 3 cdo gps; 1 cdo arty regt, 2 cdo engr sqns (1 Regular, 1 Reserve) (with army); 1 lt hel sqn, 1 log regt, spt units.
1 Special Boat and 1 Assault sqns.
18 105mm lt guns: 18 81mm mor; *Milan* ATGW; *Blowpipe* SAM; 12 *Gazelle* AH-1, 4 *Lynx* AH-1 hel.
(On order: 2 *Lynx* hel.)

RESERVES: 34,928. Navy: Regular 23,611; Volunteer 5,320: 4 Regional Divisions, 11 MCM, 8 patrol vessels. Auxiliary Service: 2,800; 72 units, emergency assistance. Marines: Regular 2,217; Volunteer 980; 1 Assault sqn.

Air Force: 93,089 (incl 5,744 women); some 620 combat ac.
13 strike/attack sqns: 5 with 80 *Tornado* GR-1, 1 more converting; 2 with 25 *Buccaneer* S-2A/B (to retire); 4 with 48 *Jaguar* GR-1, 6 T-2.
5 close support sqns: 3 with 36 *Harrier* GR-3/T-4; 2 with 24 *Jaguar*.
8 interceptor sqns: 2 with 24 *Lightning* F-6/F-3/T-5; 6 with 72 *Phantom* (4 with FGR-2, 2 with FG-1); (36 more ac in reserve); (*Tornado* F-2 to come into service 1984).
2 recce sqns with 24 *Jaguar* GR-1, 1 flt with 3 *Canberra* PR-9.
4 MR sqns with 28 *Nimrod* MR-1/-1A/-2 (*Harpoon* ASM, *Sidewinder* AAM being fitted).
1 AEW sqn with 6 *Shackleton* AEW-2 (5 in reserve); (5 *Nimrod* AEW-3 to be phased in).
3 tanker sqns: 2 with 16 *Victor* K-2; 1 with 4 *Tristar* 500, 9 VC-10 (5 K-2, 4 K-3; being phased in).

1 strategic tpt sqn with 11 VC-10Cl, 2 *Tristar* 500.
4 tac tpt sqns with 41 C-130H incl 6 C-130HC3.
3 comms sqns with 6 HS-125 CC1/2, 4 *Andover*, 6 *Pembroke*, 1 BAe-146-100 ac; 1 *Gazelle* hel.
Queen's Flt with 3 *Andover* ac, 2 *Wessex* hel.
3 ECM/target facilities/calibration sqns with 31 *Canberra*, 3 *Nimrod* MR-1, 5 *Andover* E-3/C-1.
12 OCU: 1 NATO Trilateral Trg Establishment with 21 Br, 22 FRG, 7 lt *Tornado* GR-1; 11 others with: 22 *Tornado* GR-1, 9 *Buccaneer* Mk 2, 18 *Phantom* FGR-2, 20 *Jaguar* GR-1/T-2, 21 *Harrier* GR-3/T-4, 3 *Nimrod*, 4 *Canberra* B-2/T-4, 5 C-130, 7 *Victor* K-2 ac; 4 *Wessex* HC-2, 5 *Puma* HC-1, 2 *Sea King* HAR-3, 6 CH-47 *Chinook* hel.
2 tac weapons units with 6 *Hunter* F-6/GA-9/T-7, 74 *Hawk* T-1, 2 *Jet Provost*.
7 hel sqns: 5 tac tpt (1 with 20 *Wessex*, 2 with 26 *Puma* HC-1, 2 with 25 CH-47 *Chinook* HC-1); 9 SAR flts (5 with 18 *Wessex* HAR-2, 4 with 14 *Sea King* HAR-3).
Trg units with 47 *Hawk* T-1, 145 *Jet Provost*, 11 *Jetstream* T-1, 112 *Bulldog* T-1, 60 *Chipmunk* T-10, 19 *Dominie* T-1, 1 *Husky* T-1 ac; 5 *Whirlwind*, 14 *Wessex* HC-2, 22 *Gazelle* HT-3 hel.
AAM: *Sidewinder, Sparrow, Red Top, Firestreak, Sky Flash*.
ASM: *Martel, Harpoon*.
2 SAM sqns with 64 *Bloodhound* 2.
(On order: 4 *Harrier* GR-3, some T-4, 15 *Phantom* F Mk 3 (F-4J), 123 *Tornado* (out of 220 GR-1 FGA, 165 F-2 AD planned), 11 *Nimrod* AEW-3, 4 HS-125-700, 1 BAe-146-100 (VIP); 9 VC-10K-2/-3 ac; 7 *Chinook*, 3 *Sea King* HAR hel; AIM-9L *Sidewinder*, 12 *Rapier* SAM, *Sky Flash* AAM; *Sea Eagle* ASM; 6 AR-3D AD radar.)

ROYAL AIR FORCE REGIMENT:
4 wing HQ.
6 SAM sqns *(Rapier)* and 5 lt armd sqns.
36 *Scorpion* lt tks; 90 *Spartan* APC; SAM.

DEPLOYMENT:
Strike Command: 3 Gps; operational home command responsible for the UK Air Defence Region and Near and Far East; overseas command (RAF Germany, Belize and the Falklands).
Support Command: training supply and maintenance support of other commands.

RESERVES: 29,893. Regular 28,962. Volunteer 931: 1 air movements sqn; 4 def, 6 fd def sqns RAF Regt. Auxiliary: 6 sqns.

Forces Abroad: Army: 72,176. Navy/Marines: 5,142. Air Force: 16,655.
Antarctica: Navy: 1 ice patrol ship.
Ascension Island: Navy: Det 3 *Wessex* HU-5 hel. RAF: *Victor, Hercules* C-1P tanker dets.
Belize: 1,500. Army: some 1,200; 1 inf bn, 1 armd recce tp, 1 fd arty bty, 1 lt AD *(Blowpipe)* tp, 1 engr sqn, 1 hel flt (4 *Gazelle* AH-1). Navy: 1 destroyer/frigate (guard ship), 1 spt ship. RAF: (200); 1 flt (4 *Harrier* GR-3 FGA, 4 *Puma* hel), 1 *Rapier* AD det (4 units) RAF Regt.
Brunei: Army: 1 Gurkha inf bn, det hel sqn. Royal Marines: 1 coy.
Canada: Army: training and liaison team.
Cyprus: Army: 3,367: UNFICYP (some 760); 1 inf bn less 2 coys, 1 armd recce sqn, 1 hel flt, engr sqn and log spt. Garrison: 1 inf bn plus 2 inf coys, 1 armd recce (8 tps), 1 engr spt sqns, 1 hel flt. RAF: 1,445; 1 hel sqn (incl 1 flt (4 ac) with UNFICYP), periodic dets of other ac, 1 fd sqn RAF Regt. Navy/Marines: 19.
Egypt (Sinai MFO): 35 technical and admin personnel.
Falkland Islands: 4,000. Army: 1 inf bn gp, armd recce sqn, 1 arty, 1 engr, (4 fd, 1 spt sqns) regts, 1 sqn army air. Navy: 1 SSN, 1 ASW carrier (*Harrier* and *Sea King* ASW hel sqns), 4 escorts, spt and auxiliary ships. RAF: 1 *Phantom* sqn, 1 *Harrier* flt, 2 *Buccaneer*, 1 *Hercules* K-1 ac dets, 3 *Sea King* HAR-3, 4 *Chinook* hel dets, 1 *Rapier* SAM sqn. (Details may vary through the year.)
Germany: British Army of the Rhine (BAOR): 56,761; 1 corps HQ, 3 armd divs, 1 arty div, 7 armd, 1 air mobile bdes; 3 army air regts (10 sqns, 2 indep flts), 3 AD regts. Berlin Inf Bde: 3,000; 3 inf bns, one armd sqn. RAF:10,200; 12 ac, 2 hel sqns: 2 *Phantom* FGR-2, 2 *Tornado*, 5 *Jaguar* (1 recce), (to be replaced by 6 sqns of *Tornado*), 2 *Harrier*, 1 *Pembroke* (comms); 1 *Puma*, 1 *Chinook* (tpt); (RAF regt) 3 *Rapier* SAM, 1 fd sqn.
Gibraltar: Army: 816; 1 inf bn, 1 engr team, 1 arty surveillance tp. Navy: 793; 1 frigate, 1 spt ship; Marine dets. RAF: 427; periodic *Jaguar* ac dets.
Hong Kong: Army: 7,840; (British 1,897, Gurkha 4,703, H.K. Regt 1,240); Gurkha Field Force with 1 Br, 4 Gurkha inf bns, 1 each Gurkha engr, sigs, tpt regts, 1 hel sqn (–) with 12 *Scout* AH-1, spt units. Navy: 656 (375 locally enlisted); 3 *Ton*, 2 *Peacock* patrol craft, 1 Marine Raiding sqn. RAF: 269; 1 *Wessex* sqn.
Indian Ocean (intermittent): 1–2 destroyers/frigates, 2 spt ships; Diego Garcia, 1 naval det.
Military Advisers: 700 in 30 countries incl Belize, Brunei, Kenya, Kuwait, Nigeria, Oman, Saudi Arabia, UAE, Uganda, Zimbabwe.

CANADA

Population: 25,000,000.
Military service: voluntary.
Total armed forces: 82,858 (6,667 women).[3]
GDP 1981: $C 350.65 bn ($US 291.528 bn), 1982: $C 369.720 bn ($US 298.571 bn).
Def budget 1983/4: $C 7.986 bn ($US 6.443 bn); NATO defn $US 7.061 bn. 1984/5: $C 8.767 bn ($US 6.771 bn); NATO defn $US 7.483 bn.
GDP growth: –4.4% (1982), 3% (1983).
Inflation: 9.7% (1982), 4.6% (1983).
Debt 1982: $99.5 bn.
$US1 = $C 1.2028 (1981/2), 1.2383 (1982/3), 1.2394 (1983/4), 1.2948 (mid-1984).

Army (Land Forces): 13,000.[3]
Mobile Command (about 16,000 land and air).[4]
2 bde gps: each 1 armd regt, 3 inf bns, 1 arty (2 close spt, 1 AD btys), 1 engr regts, spt units.
1 special service force (4,000): 1 armd regt, 1 inf bn, 1 AB, 1 arty, 1 engr regts, 1 spt unit.
1 mech bde gp (under command Canadian Forces, Europe): 1 armd regt, 2 mech inf bns, 1 med SP arty, 1 mech engr regts, 1 spt unit, 1 lt hel sqn.
114 *Leopard* C-1 MBT; 100 *Lynx*, 195 *Cougar* AFV; 955 M-113, 269 *Grizzly* APC; 12 model 56 (L-5) pack, 159 towed 105mm, 50 M-109 155mm SP how; 633 *Carl Gustav* 84mm RCL; 108 *TOW* ATGW; 48 L-40/60 40mm AA guns; 122 *Blowpipe* SAM.

RESERVES: about 16,000 Militia; 131 combat arms units and spt units (all in Mobile Command), plus 1,560 in Communications Reserves. (Reserve strength (all components) to increase to 40,000 by end 1986.)

Navy (Maritime Forces): 5,500.[3]
Maritime Command (MARCOM; about 8,700).[4]
3 *Oberon* subs.
20 ASW destroyers: 4 DD-280, each with 2 *Sea King* hel, 2 × 4 *Sea Sparrow* SAM; 2 *Annapolis*, 6 *St Laurent* with 1 *Sea King* hel (to be retired from 1989); 4 *Improved Restigouche*, 4 *Mackenzie* with *ASROC*.
3 replenishment spt ships (one in refit), each with 3 *Sea King* hel.
6 coastal patrol ships (trg).
6 small patrol craft.
(On order: 6 ASW frigates.)

DEPLOYMENT AND BASES:
Atlantic: 3 subs, 13 destroyers (1 in reserve), 2 replenishment spt ships. Halifax.
Pacific: 10 destroyers (2 in reserve), 1 replenishment spt ship. Esquimalt.

RESERVES: about 3,250.

Air Force: 15,300;[3] some 160 combat ac, 32 combat hel.
Air Command (23,000).[4]
1 Air Group (1 CAG, Germany):
3 fighter sqns with 42 CF-104/-104D (to get 54 CF-188 (F-18)).
Fighter Group:
2 FGA sqns with 20 CF-116 (F-5A), 4 CF-116D (F-5D) (NATO assigned).
1 trg sqn with 4 CF-116, 21 CF-116D.
1 trg sqn 31 CF-188D (getting more).
3 AD sqns with 38 CF-101 *Voodoo* (2 to get CF-188; trg sqns to augment).
1 ECM trg sqn with 3 CC-117 (*Falcon* 20, to be 5); 17 CT-133, CF-101.
4 main, 17 auxiliary sites of Distant Early Warning (DEW) Line; Semi-Automatic Ground Environment (SAGE).
24 long-range radar sites (CADIN/Pine Tree Line).
1 space tracking and identification site.
10 Tactical Air Group (10 TAG):
6 hel sqns with 31 CH-135 (UH-1N), 36 CH-136, 7 CH-147 *(Chinook)*.
Maritime Air Group:
3 maritime patrol sqns: 18 CP-140 *Aurora*.
1 MR, 1 reserve sqns: 15 CP-121 *Tracker* (4 in reserve).
2 ASW, 1 trg hel sqns: 32 CH-124 *(Sea King;* afloat).
2 utility sqns: 9 T-33, 3 CP-121 ac, 2 CH-135 hel.
Air Transport Group:
5 tpt sqns: 3 with 26 CC-130E/H; 1 with 5 CC-137 (Boeing 707); 1 with 7 CC-109 *Cosmopolitan*, 5 CC-117 *Falcon*, 2 CC-132 (DHC-7R), 2 CC-144 *Challenger*.
4 tpt/SAR sqns (2 MARCOM-assigned) with 11 CC-115 (DHC-5), 8 CC-138 (DHC-6) ac; 3 CH-113 *Labrador*, 7 CH-113A *Voyageur* (being uprated); 3 CH-135 (UH-1N) hel.
1 SAR unit with 3 CH-113.
4 base hel flts with 9 CH-118 *Iroquois*, 2 CH-135.
Training Group:
3 schools: 1 with 18 CT-134 *Musketeer* ac, 14 CH-139 hel; 1 with 83 CT-114 *Tutor;* 1 with 2 CT-134, 17 CT-114; 2 CC-129 (C-47).
1 demonstration unit with 11 CT-114.
(On order: 138 CF-188 (113 F-18A, 25 -18B) *Hornet* ftrs; 1 CC-132 (DHC-7R *Ranger*).)

RESERVES: 950. Air Reserve Group; 2 wings with 16 CH-136 hel, 1 sqn MARCOM-assigned. Other ac incl 18 CF-104 (2 D), 3 CC-129.

Forces Abroad: Europe: 6,700; HQ (1,440); 1 mech bde gp (3,200) with 59 *Leopard* 1 MBT, 375 M-113 APC/recce, 24 M-109 155mm SP how, 40 *TOW* ATGW, 50 40mm AA guns, 70 *Blowpipe* SAM, 11 CH-136 *Kiowa* hel. 2,500 reinforcements in Canada.
1 Air Group: (760): 3 fighter sqns with 42 CF-104/-104D; (54 CF-188 to replace); 1 det with 2 CC-132 and 4 CT-133 liaison ac.
Cyprus (UNFICYP): 515.
Syria/Israel (UNDOF): 221.
Other Middle East (UNTSO): 20.

Para-Military Forces: Coast Guard: 6,561 (civilian-manned): 25 icebreakers, 16 SAR patrol vessels, 2 DHC-7R ac, 37 hel, 3 SRN-5/-6 hovercraft. Cdn Rangers: 1,300.

DENMARK

Population: 5,150,000.
Military service: 9 months.
Total armed forces: 31,400 (9,500 conscripts).
GDP 1982: Kr 469.78 bn ($56.380 bn).
Est GDP 1983: Kr 515.60 bn ($56.380 bn).
Def exp 1983: Kr 10.314 bn5 ($1.128 bn); NATO defn $1.221 bn. 1984 budget: 11.342 bn ($1.127 bn); NATO defn n.a.
GDP growth: 3.1% (1982). 2% (1983).
Inflation: 10% (1982). 6.9% (1983).
Debt 1982: $32.2 bn.
$1 = kroner 8.3324 (1982), 9.145 (1983), 10.0643 (mid-1984).

Army: 18,100 (6,800 conscripts).
2 div HQ.
5 mech inf bdes, each with 1 tk, 2 mech, 1 arty bns, 1 AD bty, 1 engr coy, spt units.
5 regimental combat teams, each with 2 inf, 1 arty bns, 1 ATK gp.
2 indep recce bns.
1 Army aviation unit, some 8 platoons.
AFV: 120 *Leopard* 1, 88 *Centurion* MBT; 48 M-41 lt tks; 650 M-113, 68 M-106 mor-armed APC.
Arty: 24 155mm guns; 144 105mm, 96 155mm, 12 M-115 203mm towed, 72 M-109 155mm SP how; 81mm, 120mm mor.
ATK: 400 *Carl Gustav* 84mm, 252 106mm RCL; *LAW* RL; 140 *TOW* ATGW.
AD: 36 L/60 40mm AA guns; *Hamlet (Redeye)* SAM.
Avn: 16 Saab T-17 lt ac; 12 Hughes 500M hel.

RESERVES: 125,400. Augmentation Force 6,000, subject to immediate recall; Field Army Reserve 45,000, comprising 15,000 Covering Force Reserve (to bring units to war strength and add 1 mech bn to each bde) and 30,000 to provide regimental combat teams, combat and log spt; Regional Defence Force 14,000 with 9 inf, 4 arty bns, ATK sqns, spt units; Army Home Guard 60,400 (8,400 women).

Navy: 5,900 (1,200 conscripts).
5 subs: 2 *Narhvalen*, 3 *Delfinen*.
5 frigates with 2 × 4 *Harpoon* SSM, *Sea Sparrow* SAM: 2 *Peder Skram*, 3 *Niels Juel*.
5 *Hvidbjørnen* fishery-protection frigates with 1 *Lynx* hel.
10 *Willemoes* FAC(G) with *Harpoon* SSM.
6 *Søløven* FAC(T) (2 in reserve).
22 large patrol craft: 8 *Daphne*, 3 *Agdlek*, 2 *Maagen*, 9 *Barsø*.
5 *Botved* coastal patrol craft(.
7 minelayers: 4 *Falster*, 2 *Lindormen*, 1 *Langeland*.
6 US Type 60 coastal minesweepers.
Coastal defence unit: 2 coastal fortresses with 155mm guns.
Air: 8 *Lynx* hel (4 embarked).
(On order: *Harpoon* SSM, *Sea Sparrow* SAM.)

Bases: Copenhagen, Korsør, Frederikshavn.

RESERVES: 3,800; Navy Home Guard 5,200 (1,500 women): 37 coastal patrol craft.

Air Force: 7,400 (1,500 conscripts); 96 combat ac.
Tactical Air Command:
3 FGA sqns with 48 F-16A/B.
1 FGA/interceptor sqn with 16 F-35XD *Draken*.
1 FGA/recce sqn with 16 RF-35XD *Draken*.
1 interceptor sqn with 16 F-104G.

Air Materiel Command:
1 tpt sqn, 3 comms flts, with 3 C-130H, 3 *Gulfstream* III, 7 Saab T-17.
1 SAR sqn with 8 S-61A hel.
Flying School: 15 T-17.
AD gp: 1 SAM bn, 6 btys: with 36 *Improved HAWK* (2 more to be formed).
AAM: *Sidewinder.*
ASM: *Bullpup.*
(In reserve: 9 F-16.)
(On order: AIM-9L *Sidewinder* AAM.)

RESERVES: 9,400; Air Force Home Guard 12,400 (1,800 women).

Forces Abroad:
Cyprus (UNFICYP): 1 bn (341).

FRANCE

Population: 54,600,000.
Military service: 12 months and voluntary system 16–24 months.
Total armed forces: 471,350[6] (12,400 women; 244,900 conscripts).
GDP 1982: F fr 3,552.0 bn ($540.442 bn). Est GDP 1983: F fr 3,894.4 bn ($510.989 bn).
Est def exp 1983: F fr 133.22 bn ($17.480 bn); NATO defn $21.381 bn. 1984: 142.100 bn ($16.817 bn); NATO defn $20.237 bn.[7]
GDP growth: 0.4% (1981), 1.6% (1982), 5% (1983).
Inflation: 9.4% (1982), 9.9% (1983).
Debt 1982: $106.1 bn.
$1 = francs 6.5724 (1982), 7.6213 (1983), 8.4499 (mid-1984).

Strategic Nuclear Forces: (19,100; some 2,800 Army, 4,900 Navy, 10,600 Air Force, 800 *Gendarmerie*).
SLBM:
5 SSBN with 16 M-20 msls (1 more building, 1 on long refit) (M-4 msl replacing M-20 from 1985).
1 experimental/trials diesel sub with 2 SLBM tubes.
IRBM: 18 SSBS S-3 msls in 2 sqns.
Aircraft:
Bombers: 4 sqns with 28 *Mirage* IVA (AN-22 nuclear bombs); 7 being converted to IVP for ASMP nuclear ASM; total 18 by end 1986.
1 trg center with 4 *Mirage* IVR recce; 1 with 12 *Mirage* IIIB/BRV trg; 4 *Noratlas* N-2501/SNB.
1 tanker wing (3 sqns) with 11 KC-135F.
Reserve: 3 *Mirage* IVA (1 recce).
(On order: 1 SSBN, 16 M-4 SLBM, ASMP ASM; 4 *Transall ASTARTE* command post ac.)

Army: 304,500 incl Army Aviation, 5,700 women (190,000 conscripts); reorganizing and reducing.
1 army HQ, 3 corps HQ.
6 armd divs.
2 lt armd divs (mil schools).
2 motor rifle (APC) divs.
Army corps regts: 3 recce, 2 drone, 1 motor rifle, 2 arty, 5 SSM with *Pluton*, 8 SAM (3 (11 btys) with 66 *HAWK*, 6 (each of 4 btys) with *Roland* I/II and twin 30mm AA guns), 5 engr, 6 sigs, 4 tpt.
3 log bdes.
Rapid Action Force (FAR): (47,000).
1 para div (12,800): 6 para inf, 1 lt armd, 1 arty, 1 engr regts, 1 spt bn.
1 air portable marine div (8,100): 4 inf, 1 lt armd, 1 arty, 1 engr, 1 comd/spt regts.
1 lt armd div (summer 1984) (6,400): 2 lt armd, 2 APC inf, 1 arty, 1 engr, 1 comd/spt regts.
1 alpine div (9,100): 1 mountain inf regt (6 bns), 1 lt armd, 1 arty, 1 comd/spt regts; 1 engr coy.
(1 air mobile div to form (1985): 1 inf, 4 hel, 1 comd/spt regts.)
1 log bde (spt units incl 1 tpt regt).
Foreign Legion: 8,000; 1 armd, 1 para, 4 inf (trg), 2 engr regts; 1 lt bde.
Indep regts: 1 EW, 2 para, 4 engr.
AFV: 1,102 AMX-30 (165 -30B2) MBT; 500 AMX-13 lt tks (158 with SS-11 ATGW); 189 AMX-10RC, 300 Panhard EBR-90 hy, 75 ERC-90S, 664 AML-60/90 lt armd cars; 835 AMX-10P/PC/VOA MICV; 1,100 AMX-13 VTT, 1,860 VAB, 42 VAB *(HOT)* APC.
Arty: 60 AU-F-1 155mm SP guns; 165 HM-2, 908 BF-50 155mm towed, 30 AU-50 105mm, 214 F-3 155mm SP how; 44 *Pluton* SSM; 596 120mm mor.
ATK: 135 AMX-13/SS-11, 1,400 *Milan*, 156 *ENTAC* ATGW, 12,000 89mm RL.
AD: 100 76T1, 280 53T2 20mm, 350 30mm and 40mm towed, 69 AMX-30 DCA twin 30mm SP AA guns; 69 *HAWK*, 128 *Roland* I/II SAM.
Air: 4 CL-89 recce drones.

ARMY AVIATION (ALAT): (6,600).
6 combat hel regts: 7 lt gps, 2 schools.
206 *Alouette* II, 68 *Alouette* III with AS-11 ATGW; 130 SA-330 *Puma*, 165 SA-341F and 90 SA-342M *Gazelle* hel with *HOT;* 70 *Broussard*, 30 L-19 lt ac.
(On order: 635 AMX-30B2 MBT conversion; 96 AMX-10RC, 162 ERC-90S armd cars; MICV; 122 AU-F-1 155mm SP guns; 148 TR 155mm how; 55 227mm MLRS; 23 120mm mor; 907 *HOT* (VAB and *Gazelle*), 407 20mm AA guns; SA-341, 15 SA-342 *(HOT)* hel.)

RESERVES: 305,000 (8 inf divs, 1 formed from military schools; 6 'Home' bdes: 2 mixed, 23 territorial defence regts; to be reorg 1985: some units to full strength).

Navy: 67,700 incl Naval Air, (1,100 women; 17,300 conscripts); 48 major surface combat vessels. 2 home (CECLANT, CECMED); 2 overseas comds.
17 attack subs: (2 *Rubis* SSN; 4 *Agosta*, 9 *Daphne*, 2 *Narval*).
2 *Clemenceau* carriers: 1 attack with 39 ac (2 flts with 20 *Super Etendard*, 1 with 7 F-8E, 1 with 6 *Alizé;* 1 det with 4 *Etendard* IVP), 4 hel; 1 ASW (LPH) with 40 hel (varies).
1 hel carrier (capacity 8 *Lynx* hel) with 6 *Exocet* SSM (trg).
1 command cruiser with 4 *Exocet* SSM, 1 × 2 *Masurca* SAM.
19 destroyers: 4 AA (2 *Suffren* with 4 *Exocet*, 1 *Malafon* ASW/SSM, 1 × 2 *Masurca* SAM; 2 T-47 with 1 *Tartar* SAM); 15 ASW (4 C-70 with 4 *Exocet*, 1 × 8 *Crotale* SAM, 2 *Lynx* hel; 3 F-67 with 6 *Exocet*, 1 × 8 *Crotale*, 1 *Malafon*, 2 *Lynx;* 1 T-56 with 1 *Malafon;* 1 hel; 1 T-53 with 4 *Exocet*, 1 *Lynx;* 5 T-47 with 1 *Malafon;* 1 C-65 with 4 *Exocet*, 1 *Malafon*).
25 frigates: 9 *Rivière*, (8 with 4 *Exocet*); 16 Type A-69 (4 with 2 *Exocet;* 5 with 4; 1 more in 1984).
1 D-400 FAC(G) with 2 *Exocet* MM-38 SSM.
5 FAC: 4 *Patra*, 1 *La Combattante* I.
4 large patrol craft: 1 *Sirius*, 2 Cdn *La Dunkerquoise*, 1 P-681 *Albatros*.
3 *Eridan*, 5 *Circe* minehunters, 5 US *Aggressive* ocean minehunters.
11 coastal minesweepers: 6 *Berlaimont*, 5 Type D.
6 assault ships: 2 *Ouragan* (with 4 *Super Frelon* or 6 *Gazelle/Alouette* hel, 9 LCM or 2 LCT), 4 *Batral*.
5 LST, 9 LCT, 30 LCM.
7 ocean-going tankers, 6 maintenance/log ships.
Msls: SSM: *Exocet* MM-38, MM-40; SM-39 sub-launched being introduced. ASW: *Malafon*. SAM: *Crotale, Masurca, Tartar.*

Bases: Cherbourg, Brest, Lorient, Toulon.

NAVAL AIR FORCE: (12,300); 121 combat ac, 37 combat hel.
3 strike sqns with 36 *Super Etendard* (AN-52 nuclear weapons; 5 to be mod for ASMP).
1 interceptor sqn with 14 F-8E (FN) *Crusader*.
2 ASW sqns with 16 *Alizé* (mod) (11 more to be modernized).
4 MR sqns with 27 *Atlantic*, 3 *Gardian*.
1 recce sqn with 8 *Etendard* IVP.
1 OCU: 12 *Etendard* IVM, 12 Fouga *Zephir*, 5 *Alizé*.
4 ASW hel sqns: 3 with 23 *Lynx;* 1 with 8 *Super Frelon*.
1 assault hel sqn with 6 *Super Frelon*.
14 comms/liaison/SAR units (1 VIP): with 14 *Navajo*, 8 Nord 262, 1 Nord N-25404, 4 *Xingu*, 2 mod *Alizé*, 3 *Rallye* 880, 5 *Gardian*, 8 MS-760, 5 *Falcon* 10MER ac; 28 *Alouette* II/III, 3 *Lynx*, 2 *Super Frelon* hel.
5 trg units with 13 Nord 262, 2 *Navajo* 9 EMB-121 *Xingu*, 13 *Rallye* 100S, 6 CAP-10 ac; 10 *Alouette* hel.
ASM: *Exocet* AM-39, AS-11/-12/-30, *Martel* AS-37.
AAM: R-530, *Sidewinder*, R-550 *Magic*.

(On order: 6 SSN; 7 C-70 destroyers (3 ASW, 4 AA), 7 A-69 frigates, 70 P-400 FAC(G), 7 minehunters; 1 LSD, 2 LCT, 10 LCM; 1 ocean tanker, 33 *Exocet* SM-39 sub-launched SSM; 14 *Crotale* 8B SAM; 42 *Atlantic* II ASW ac.)

COMMANDOS (590): 4 assault units (1 reserve), 1 sub spt unit.

NAVAL BASE DEFENCE FORCE (2,400).

DEPLOYMENT: Atlantic Fleet: 5 SSBN, 9 other subs, 1 hel carrier, 20 escorts, 11 MCM, 8 amph. Channel Flotilla: 3 frigates, 7 MCM. Mediterranean Fleet: 2 SSN, 9 subs, 2 carriers, 14 escorts, 5 MCM, 5 amph.
See also *Forces Abroad.*

PUBLIC SERVICE FORCE (MHSP): Naval personnel, general coastguard duties; 1 *Sterne*, 1 *Mercure* patrol craft, 1 ex-trawler, 1 *Albatros* fishery protection vessel, 3 ac.

RESERVES: 30,000.

Air Force: 99,150 (5,600 women, 37,600 conscripts); some 492 combat ac.
Air Defence Command (CAFDA): (7,700).
12 interceptor sqns: 2 with 25 *Mirage* IIIC (1 (10 ac) in Djibouti), 1 with 15 *Mirage* IIIE, 8 with 120 *Mirage* F-1C, 1 with 14 *Mirage* 2000C (forming).
1 OCU with 15 *Mirage* F-1B.
4 trg flts with 30 *Magister* and *Broussard*.
Air-defence system: automatic *STRIDA* II, 10 radar stations.
12 SAM (1 trg) sqns with 24 *Crotale* btys (48 fire, 24 radar units).
200 AA btys (20mm guns).
AAM: R-530, Super 530F, R-550 *Magic* I/II, *Sidewinder.*
Tactical Air Force (FATAC): (19,600).
5 strike sqns: 3 with 45 *Jaguar*, 2 with 30 *Mirage* IIIE tactical (AN-52 nuclear weapons).
10 FGA sqns: 3 with 45 *Mirage* IIIE, 2 with 30 *Mirage* 5F, 5 with 75 *Jaguar* A.
3 recce sqns: 2 with 19 *Mirage* IIIR, 11 -IIIRD (F-1 replacing); 1 with 15 *Mirage* F-1CR.
2 OCU: 33 *Jaguar* A/E.
8 trg flts with *Magister, Broussard*.
AAM: *Sidewinder*, R-550 *Magic*, R-530.
ASM: AS-30/-30L, *Martel* AS-37.
Attached to COTAM:
2 AEW sqns: 1 with 5 *Noratlas;* 1 with 1 DC-8 (EE-51) ELINT.
3 liaison sqns with *Magister, Broussard*.
1 hel sqn with 9 *Alouette* II/III.
Air Transport Command (COTAM): (4,200).
1 hy tpt sqn with 5 DC-8F.
6 tac tpt sqns: 5 with 41 Transall C-160, 20 C-160NG, 1 with 10 *Noratlas*.
14 lt tpt/trg/SAR sqns with 140 ac, incl 19 Nord 262, 10 *Mystère* 20, 1 *Mystère* 50, 18 *Paris*, 23 *Broussard*, 8 DHC-6, 4 *Caravelle*, 6 EMB-121 *Xingu*.
1 OCU with 3 *Noratlas*, 7 *Transall* C-160.
5 hel sqns with 26 *Alouette* II, 28 *Alouette* III, 13 *Puma*, 15 *Dauphin*.
1 hel OCU with 9 *Alouette* II, 9 *Alouette* III, 2 *Puma*.
Training Command (CEAA): (6,600).
Some 400 ac, incl some 103 *Alpha Jet*, 157 *Magister*, 3 *Flamant*, 6 *Noratlas*, 16 EMB-121, *Xingu*-1, 12 *Epsilon*, 57 CAP-10B/-20.
Trials Units: 1 sqn with *Mirage* F-1, -2000, *Jaguar;* 1 sqn with 2 DHC-6, 1 N-262.
(On order: 60 *Mirage* 2000M, 31 -N, 45 F-1CR ftrs; 3 Transall C-160 tpts, 110 *Epsilon* trg ac; 20 AS-350D, 30 AS-335 *Ecureuil*-2 hel, 150 *Magic* I/II, 40 Super 530 AAM; 50 AS-30 laser ASM; 330 SATCP, 40 20mm AA guns, 100 *Crotale* SAM.)

RESERVES: 58,000.

Inter-service
Central Staff: 3,588.
Service de Santé: 8,712 (2,140 conscripts).

Forces Abroad:
Europe. *Germany:* 48,500; 3 armd divs. Berlin: 2,700; 1 armd regt, 1 inf regt.
Overseas Dependencies: 16,500; Army 9,800, Navy 2,000, Air 1,700, *Gendarmerie* 3,000. Four inter-service overseas commands: Antilles-Guyana (7,300; 1 marine inf regt, 1 marine inf bn, 2 ships, 1 *Atlantic* MR ac); South Indian Ocean (Mayotte, La Reunion) (3,350; 1 para, 1 inf, 1 marine regts, 1 inf coy); New Caledonia (2,800; 1 marine inf regt); Polynesia (5,000, incl ALPACI; 1 marine regt). Two naval commands: Indian Ocean (ALINDIEN): 3,500, 5 frigates, 3 minor combatants, 2 amph, 4 spt ships; Pacific (ALPACI): 5 frigates, 5 minor combatants, 7 amph, 12 spt ships, 2 *Gardian* MR ac).
Other Overseas: some 7,220 from all services (numbers vary according to local circumstances). Eqpt incl 120 AFV, spt vessels, 25 combat and 25 tpt ac, 43 hel.
Deployed:
Central African Republic (C.A.R.) (980). 1 bn gp incl 2 motor coys; 1 platoon AML armd cars (6); spt coy with L-19 lt ac, 120mm mor, *Milan* ATGW; 1 FGA det with *Jaguar*, 1 Army avn spt det with 3 SA-330 *Puma*, 2 C-160 tpt ac.
Chad (3,000). 1 Para, 1 marine regts; 1 armd coy with 3 sqns, 10 AMX-10RC; air elms with *Mirage, Jaguar*, 2 *Atlantic* MR, C-160 tpt ac; *Puma*, 12 *Gazelle (HOT)* hel. (Air may be based in the C.A.R.)
Djibouti (3,250). 1 mixed regt: 6 inf coys, 4 armd sqns, 2 arty (1 AA) btys; 1 sqn with 10 *Mirage* IIIC, 1 C-160 tpt ac, 3 *Alouette* II hel; naval elms incl 1 *Atlantic* MR ac.
Gabon (350). 1 marine inf bn; *Jaguar*, 1 C-160, *Atlantic* ac, 1 *Alouette* III hel.
Ivory Coast (480). 1 marine inf bn, 1 *Alouette* III hel.
Middle East. Lebanon (UNIFIL) (1,386): 1 inf bn, log bn. Sinai MFO (40): incl 2 *Twin Otter*, 1 C-160 tpt ac.
Saudi Arabia (80). Technical advisers.
Senegal (1,170). 1 marine inf regt, 1 *Atlantic* MR, 1 C-160 tpt ac, 2 *Alouette* II/III hel.
Africa, general: (956), trg teams.

Para-Military Forces: Gendarmerie 85,312 (incl 605 women, 8,700 conscripts, 950 civilians); 3,678 territorial squads, 130 intervention units; 93 general traffic units, 21 highway sqns, 4 platoons; 130 mobile sqns; 240 overseas units. 121 AML, 20 VBC-90 armd cars; 28 AMX-13 VTT, 155 VBRG-170 APC; 284 81mm mor; 11 patrol boats; 6 Cessna 206C ac; 31 *Alouette* II, 8 AS-350B *Ecureuil*, 11 *Alouette* III hel. Reserves: 125,000.



Aerial view of a German Air Force C-160 Transall. The German Air Force's Transport Command has four squadrons equipped with seventy-five of these aircraft.

GERMANY: FEDERAL REPUBLIC

Population: 61,400,000 (incl West Berlin).
Military service: 15 months.
Total armed forces: 495,000[8] (100 women, 230,500 conscripts);[9] on mobilization about 1,250,000.
GDP 1982: DM 1,602.5 bn ($660.389 bn). 1983: 1,666.2 bn ($652.567 bn).
Est def exp 1983: DM 46.751 bn ($18.310 bn); NATO defn $22.127 bn. 1984: 47.846 bn ($17.396 bn); NATO defn $21.139 bn.
GDP growth: −1.1% (1982). 1.3% (1983).
Inflation: 4.8% (1982). 3.2% (1983).
Debt 1982: $120 bn.
$1 = DM 2.4266 (1982), 2.5533 (1983), 2.7504 (mid-1984).

Army: 335,600[9] (181,200 conscripts).
HQ Support Elements: 25,400: General Army Office subordinate echelon and spt tps.
Field Army: 266,000.
3 corps: 12 divs (6 armd, 4 armd inf, 1 mountain, 1 AB):
36 bdes: 17 armd (each with 3 tk, 1 armd inf, 1 armd arty bns), 15 armd inf (each with 1 tk, 3 armd inf, 1 armd arty bns), 1 mountain, 3 AB.
Total: 66 tk, 62 armd inf, 33 armd arty, 4 mountain, 9 para bns.
11 armd recce bns.
11 div arty regts, 7 corps hy arty bns.
4 SSM bns with *Lance*.
3 AD regts, 1 AD bn with *Roland* II SAM.
11 AA regts with *Gepard* 35mm SP guns.
3 army aviation comds, each with 1 lt, 1 med tpt hel regt: 1 ATGW hel regt.
1 mixed aviation regt.
Territorial Army: 44,200.
3 Territorial Commands, 5 Military District Commands, 29 Military Region Commands, 80 Sub-region Commands (county/town level):
6 Home Defence bdes (each with 2 tk, 2 inf, 1 arty bns): 1 at 85%, 3 at 65%, 2 at 52% manning levels.
6 Home Defence bdes (each with 1 tk, 2 inf, 1 fd arty bns): weapons storage units only in peacetime.
4 Territorial Service spt comds.
Security tps: 15 Home Defence Regts (with 45 mot inf bns only), 150 coys, 324 security platoons; defensive, comms, military police and service units on mobilization.
AFV: 340 M-48A2/A2C, 650 M-48A2G/A2, 2,437 *Leopard* 1, 800 *Leopard* 2 MBT; 410 SPz-2 *Luchs*, 2,136 *Marder* MICV; 560 TPz-1, 3,095 M-113 APC.
Arty: 260 105mm, 216 FH-70, 586 M-109 155mm how, 230 M-110A2 203mm SP how; 987 120mm mor (500 SP); 209 *LARS* 110mm MRL; 26 *Lance* SSM.
ATK: 520 JPz-4-5 90mm SP ATK guns; 204 106mm RCL; 1,975 *Milan*, 346 *TOW* ATGW, 316 RJPz-*(HOT) Jaguar* 1, 2 RJPz-*(TOW)* SP ATGW.
AD: 1,748 20mm towed, 432 *Gepard* 35mm SP AA guns; 800 *Redeye*, 120 *Roland* SAM.
Air: 190 UH-1D, 150 *Alouette* III, 170 PAH-1 (BO-105P with *HOT*), 80 BO-105M, 107 CH-53G hel.
(On order: 1,000 *Leopard* 2 MBT; 430 TPz-1 APC; 200 227mm MLRS MRL; 160 RJPz-*(TOW) Jaguar* 2 ATGW veh (rebuilt JPz-4-5); 20 *Roland* II SAM; 40 PAH-1, 70 BO-105M hel.)

Navy: 36,200,[9] incl naval air (10,700 conscripts).
24 subs: 18 Type 206, 6 Type 205.
7 destroyers: 3 *Lütjens* (Type 103A) with 1 *Tartar* SSM and 8 *ASROC*; 4 *Hamburg* (Type 101A) with 2 × 2 *Exocet* MM-38 SSM.
8 frigates: 5 *Bremen* (Type 122) with 2 × 4 *Harpoon* SSM, 1 × 8 *Sea Sparrow*, 2 × 24 *Stinger*, 2 RAM-ASMD SAM, 2 *Lynx* hel; 3 *Köln* (Type 120).
5 *Thetis* corvettes.
38 FAC(G) with 4 *Exocet* MM-38 SSM: 10 Type 143, 8 Type 143A, 20 Type 148.
1 Type 142 FAC(T) (Type 143A FAC(G) replacing).
18 *Lindau* MCM: 12 Type 331 coastal minehunters (MHC), 6 Type 351 *Troika* drone control minesweepers (MSCD), 18 F-1 drone vessels (MCD).
21 *Schütze* coastal minesweepers.
18 inshore minesweepers: 4 Type 393/394B, 14 Type 393/394A.
10 *Rhein* depot, 4 *Lüneburg* (Type 701), 4 *Coburg* (Type 701C) spt ships, 4 tpts, 9 tankers.
22 Type 520 LCU, 26 Type 521 LCM.
(On order: 1 Type 122 frigate, 2 Type 143A FAC(G), 126 RIM-7M *Sea Sparrow* SAM.)

Bases: Flensburg-Murwik, Wilhelmshaven, Kiel, Olpenitz, Eckernförde.

NAVAL AIR ARM: 123 combat ac; 12 combat hel.
3 attack sqns: 1 with 30 F/TF-104G; 2 with 47 *Tornado*.
1 recce sqn with 27 RF-104G.
2 MR sqns with 14 *Atlantic*, 5 ELINT *Atlantic*.
1 ASW hel sqn with 12 *Sea Lynx* Mk 88.
1 SAR hel sqn with 22 *Sea King* Mk 41.
1 utility sqn with 19 Do-28-2 ac.
ASM: AS-30, AS-34 *Kormoran*.
(On order: 64 *Tornado* MRCA.)

Air Force: 106,000[9] (38,600 conscripts); 486 combat ac.
Tactical Command (GAFTAC): 456 combat ac.
4 divs: 2 tac, 2 AD.
20 FGA sqns: 5 with 90 F-104G; 4 with 53 F-4F; 4 with 60 *Tornado*; 7 with 126 *Alpha Jet*.
4 interceptor sqns with 60 F-4F.
4 recce sqns with 60 RF-4E.
ECM trg: 7 HFB-320 *Hansa Jet*.
8 SSM sqns with 72 *Pershing* 1A.
3 SAM regts (each 2 bns of 4 btys) with 216 *Nike Hercules* launchers.
3 SAM regts (each of 3 bns of 4 btys) with 216 *Improved HAWK* launchers.
4 aircraft control and warning regts; 13 sites.
AAM: *Sidewinder*.
Transport Command (GAFTC).
4 tpt sqns with 75 Transall C-160.
5 hel sqns with 92 UH-1D.
1 special air mission wing with 4 Boeing 707-320C, 3 C-140 *Jetstar*, 6 HFB-320 *Hansa Jet*, 3 VFW-614, 6 Do-28-2 *Skyservant* ac, 4 UH-1D hel.
Training Command: 30 combat ac.
Trinational *Tornado* trg det (Cottesmore, Britain); 22 *Tornado*.
OCU (George Air Force Base (AFB) USA): 8 F-4E.
Pilot trg wing (Sheppard AFB USA) 35 T-37B, 41 T-38A.
Primary trg unit: 34 P-149D.
Miscellaneous liaison, range and base flts with 65 Do-28D.
(On order: 129 *Tornado* FGA, 6 CL-600 *Challenger*.)

RESERVES: 750,000 (all services).

Para-Military Forces: Border Police (Ministry of Interior): 20,000; FV-601(D) *(Saladin)* armd cars, MOWAG SW-1/-2 APC; 2 P-149D, 1 Do-27A-3 ac, BO-105M, 21 *Alouette* II hel.

GREECE

Population: 10,200,000.
Military service: Army 22, Navy 26, Air Force 24 months.
Total armed forces: 178,000 (1,800 women; 137,000 conscripts).
GDP 1982: dr 2,518.0 bn ($37.693 bn). 1983: 3,064 bn ($34.793 bn).
Def exp 1983: dr 151.8 bn ($1.724 bn); NATO defn $2.416 bn. Est 1984: 247.722 bn ($2.287 bn); NATO defn n.a.
GDP growth: 0.5% (1982).
Inflation: 20.0% (1982). 20.0% (1983).
FMA 1983: $280 m.
Debt 1982: $10.6 bn.
$1 = drachmas 66.803 (1982), 88.064 (1983), 108.340 (mid-1984).

Army: 135,000 (99,500 conscripts incl 1,400 women).
3 Military Regions, 4 corps, 1 specialized comd HQ.
1 armd div.
1 mech div.
11 inf divs.
1 para-cdo div (1 para, 1 cdo and 1 marine regts, 3 cdo bns).
3 armd bdes.
1 mech bde.
4 armd recce bdes.
13 fd arty bns.
7 AA arty bns.
2 SSM bns with 8 *Honest John*.
2 SAM bns with *Improved HAWK*.
3 army aviation bns.
1 indep aviation coy.

AFV: 350 M-47, 900 M-48 incl 212 M-48A3, 225 M-48A5, 200 AMX-30, 106 *Leopard* 1A3 MBT; 190 M-24, 54 *Kuerassier* (105mm) lt tks; 180 M-8 armd cars; 240 AMX-10P MICV; 100 *Leonidas*, 115 M-3 half-track, 430 M-59, 1,000 M-113 APC.
Arty: 36 M-107 175mm guns; 108 75mm pack, M-56, 300 M-101/-102 105mm, 270 M-114A1 155mm, 72 M-115 203mm towed, 126 M-52A1/M-108 105mm, 54 M-44, 72 M-109A2 155mm, 20 M-110 203mm SP how; 36 *Honest John* SSM; 81mm, 120mm mor.
ATK: M-18 57mm, 75mm, some 350 EM-67 90mm, 700 106mm RCL; 50 M-113A2 *Tow;* SS-11, *Cobra, TOW, Milan* ATGW.
AD: RH-202 twin 20mm, 40mm, incl M-42 Twin SP, M-51 75mm, M-117/118 90mm AA guns; 36 *Improved HAWK* (108 msls), 37 M-48 *Chaparral, Redeye* SAM.
Avn: 2 *Super King Air*, 2 *Aero Commander*, 1 DHC-2 Beaver, 50 U-17A ac; 8 AH-1 with *TOW*, 10 CH-47C, 5 Bell 47G, 22 UH-1D, 50 AB-204B/-205, 10 AB-206A hel.
(On order: 46 *Kuerassier* 'lt tks' (SP ATK); 50 M-113A2 *TOW* SP ATGW; 58 M-198 towed, 36 M-109A2 155mm SP how, 350 90mm RCL; *Artemis* 30 twin 30mm AA guns.)

RESERVES: about 350,000: Field Army 227,000; Territorial Army 123,000 (incl some 100,000 National Guard).
Territorial Army 23,000 incl 5,000 reservists on 4-week refresher trg. 3 Territorial (17 Sub-Commands: 12 indep inf bdes. National Guard: 100 bns (mainly coastal defence); lt tks; 120 M-20 armd cars; 120 M-2/-3 half-track APC; 36 75mm pack, 125 25-pdr (88mm), 105mm guns/how; M-18 57mm, 200 M-20 75mm, 106mm RCL; 40mm AA guns.

Navy: 19,500 (12,000 conscripts incl 200 women); 17 combat hel.
10 subs: 8 Type 209; 2 US *Guppy* IIA/III.
14 US destroyers: 7 *Gearing* (6 with 1 × 8 *ASROC*, 1 with 1 *Alouette* III hel), 1 *Sumner*, 6 *Fletcher.*
7 frigates: 2 *Kortenaer* (8 *Harpoon* SSM, *Sea Sparrow* SAM, 2 AB-212 hel), 4 US *Cannon*, 1 FRG *Rhein.*
18 FAC(G): 16 *La Combattante* II/III (8 with 4 *Exocet*, 6 with 6 *Penguin* SSM), 2 *L'Esterel* with 4 SS-12.
11 FAC(T): 6 *Jaguar*, 5 *Nasty*(.
11 coastal patrol craft(.
2 coastal minelayers, 14 coastal minesweepers (9 MSC-294, 5 US *Adjutant*).
1 LSD, 7 LST, 5 LSM, 2 LCT, 8 LCU, 13 LCM, 21 LCA, 34 LCVP.
2 ASW hel sqns: 1 with 5 AB-212, 3 AB-212 ECM; 1 with 4 *Alouette* III.

Bases: Salamis, Suda Bay.

RESERVES: about 24,000.

Air Force: 23,500 (15,000 conscripts incl 200 women); 303 combat ac.
Tactical Air Force: 7 combat wings: 1 tpt wing.
8 FGA sqns: 3 with 52 A-7H, 6 TA-7H; 3 with 53 F/TF-104G; 2 with 36 F-5A, 6 F-5B.
6 interceptor sqns: 3 with 53 F-4E; 1 with 24 F-5A/B; 2 with 36 *Mirage* F-1CG.
2 FGA/recce sqns: 1 with 15 RF-84F, 6 RF-4E; 1 with 8 RF-5A.
1 MR sqn with 8 HU-16B *Albatross* (with Navy).
3 tpt sqns with 12 C-130H, 6 YS-11, 6 C-47, 20 *Noratlas*, 1 *Gulfstream*, 9 CL-215.
9 base flts with 6 C-47, 48 T-33A ac, 8 AB-205A hel.
3 hel sqns with 14 AB-205A, 2 AB-206A, 5 Bell 47G, 8 UH-19D, 2 AB-212, 5 CH-47C.
Air Training Command:
4 sqns: 1 with 19 T-41A; 1 with 21 T-37B/C; 2 with 37 T-2E, 6 F-104G.
AAM: *Sparrow, Sidewinder, Super Sidewinder, Falcon*, R-550 *Magic.*
ASM: *Maverick, Bullpup.*
1 SAM wing: 1 gp with 36 *Nike Ajax.*
(On order: some 14 F-104G ac, 6 CH-47C hel, 280 AIM-7M *Sparrow*, 300 *Super Sidewinder* AAM, 200 *Maverick* ASM, 40 *Skyguard* AD systems plus 4 extra twin 35mm AA guns.)

RESERVES: about 30,000.

Forces Abroad: Cyprus: 1,750; 1 inf bn (950), cdos (350); officers/NCOs seconded to Greek-Cypriot forces (450).

Para-Military Forces: Gendarmerie: 25,000; MOWAG *Roland*, 15 UR-416 APC. Coastguard and Customs: 4,000; some 100 patrol craft, 2 Cessna *Cutlass* ac.

ITALY

Population: 58,000,000.
Military service: Army and Air Force 12, Navy 18 months.
Total armed forces: 375,100 (239,000 conscripts).
GDP 1982: L 469,797 bn ($347.355 bn). Est 1983: 535,904 bn ($352.847 bn).
Def exp 1983: L 11,649 ($7.670 bn); NATO defn $9.788 bn.
1984: 13.820 bn ($8.143 bn); NATO defn $10.279 bn.
GDP growth: −0.3% (1982). −0.9% (1983).
Inflation: 15% (1982). 15.9% (1983).
Debt 1982: $66.0 bn.
$1 = lire 1,352.5 (1982), 1,518.8 (1983), 1,697.2 (mid-1984).

Army: 260,000 (189,000 conscripts).
3 corps HQ.
1 armd div (2 armd, 1 mech bdes).
3 mech divs (each of 1 armd, 2 mech bdes).
2 indep mech bdes.
4 indep mot bdes.
5 alpine bdes.
1 AB bde.
2 amph bns.
1 msl bde (1 *Lance* SSM, 3 *Improved HAWK* SAM bns).
AFV: 550 M-47, 300 M-60A1, 920 *Leopard* 1 MBT; 4,410 M-106, M-113, M-548 and M-577, AMX-VC1 APC.
Arty: 1,116: 36 M-107 175mm SP guns; 320 105mm model 56 pack, 724 155mm (incl 150 FH-70 towed, 220 M-109E (SP), 36 203mm how; 81mm, 120mm mor; 6 *Lance* SSM.
ATK: 57mm, 106mm RCL; *Cobra*, SS-11 *TOW, Milan* ATGW.
AD: 20mm, 230 40mm AA guns; 40 *Improved HAWK* SAM.

ARMY AVIATION:
4 wings (10 sqns, 29 flts); 10 indep sqns (21 flts). (Flt usually has 6 ac/hel.)
19 lt ac and hel sqns: 8 with SM-1019 ac, 9 with AB-206, 2 with AB-205A hel.
10 recce hel sqns with AB-206.
2 target acquisition sqns: 1 with SM-1019 ac, 1 with AB-206 hel.
17 multi-role hel sqns: 1 with AB-204B, 15 with AB-205A, 1 with AB-205B.
4 med tpt hel sqns with CH-47.
1 trg, 4 repair units.
75 SM-1019, 30 O-1E lt ac, 100 AB-205A, 140 AB-206A/A1, 24 CH-47C, 5 A-109 *Hirundo*, 18 AB-204B, 14 AB-212, 70 AB-47G/J hel.
(On order: 20 FIROS 6 × 51mm MRLS, 850 *TOW, Milan* ATGW; FIM-92A *Stinger* SAM + msls; 60 A-129 *Mangusta* hel.)

RESERVES: 550,000, immediate mobilization perhaps 250,000.

Navy: 44,500, incl 1,500 air arm, 750 marines (24,590 conscripts).
10 subs: 4 *Sauro*, 4 *Toti*, 2 US *Tang.*
1 *Vittorio Veneto* hel carrier with 9 AB-212 ASW hel, 4 *Teseo* (*Otomat* Mk 2) SSM, 1 × 2 *Terrier* SAM.
2 *Andrea Doria* cruisers each with 4 AB-212 ASW hel, 1 × 2 *Terrier* SAM.
4 GW destroyers: 2 *Audace* with 2 AB-212 ASW hel, 1 *Standard* SAM; 2 *Impavido* with 1 *Standard.*
15 frigates: 7 *Maestrale* with 4 *Teseo* SSM, 1 × 4 *Albatros*/*Aspide* SAM, 2 AB-212 hel; 4 *Lupo* with 8 *Teseo* SSM, 1 × 8 *Sea Sparrow* SAM, 1 AB-212 hel; 2 *Alpino* with 2 AB-212 hel; 2 *Bergamini* with 1 AB-212 hel.
8 corvettes: 4 *De Cristofaro*, 4 *Albatross.*
7 *Sparviero* hydrofoils with 2 *Teseo* SSM.
2 *Freccia* FAC (1 with 1 × 5 *Sea Killer* SSM).
4 US *Aggressive* ocean, 13 *Agave* coastal, 5 *Aragosta* inshore minesweepers; 1 *Lerici*, 1 *Agave* minehunters.
2 US *De Soto County* LST, 19 US LCM. 2 *Stromboli* replenishment tankers.
1 Marine inf gp with 30 VCC-1, 10 LVTP-7 APC, 16 81mm mor, 8 106mm RCL, 6 *Milan* ATGW.

Bases: La Spezia, Taranto, Ancona, Brindisi, Augusta, Messina, La Maddalena, Cagliari, Naples, Venice.

NAVAL AIR ARM: (1,500); 93 combat hel.
5 ASW hel sqns: 30 SH-3D, 10 AB-204AS, 55 AB-212.
ASM: *Marte* Mk 2.
(On order: 2 *Sauro* subs, 1 hel carrier, 2 *Audace* destroyers, 1 *Maestrale* frigate, 4 *Minerva* corvettes with *Albatros* multi-role weapon system, 3 *Lerici* minehunters, 2 LPD, 6 SH-3D, 7 AB-212 hel.)

RESERVES: 221,000.

Air Force: 70,600 (28,300 conscripts); 300 combat ac.
6 FGA/recce sqns: 2 with 36 *Tornado*, 2 with 36 F-104S, 2 with 36 G-91Y.
1 lt attack sqn with 15 MB-339.
3 lt attack/recce sqns with 36 G-91R/R1/R1A.
6 interceptor sqns with 72 F-104S.
2 recce sqns with 30 F/RF-104G.
2 MR sqns with 14 *Atlantic* (Navy assigned; being increased).
1 ECM/recce sqn with 2 G-222VS, 6 PD-808.
1 navigation aid calibration sqn: 4 G-222, PD-808, C-47, MB-339.
1 OCU with 18 TF-104G.
3 tpt sqns: 2 with 32 G-222, 1 with 10 C-130H.
Comms sqns with 16 P-166M, 32 SIAI-208M, 8 PD-808, MB-326, 2 DC-9 ac; 2 SH-3D hel.
SAR sqns with 15 AB-204, 6 AB-212, 20 HH-3F hel.
1 combat trg det (Cottesmore, Britain) with 7 *Tornado.*
6 trg sqns with 50 G-91T, 70 MB-326/-339A, 25 SF-260M ac; 35 AB-47G2, 3 AB-204B hel.
AAM: AIM-7E *Sparrow*, AIM-9B/-9L *Sidewinder.*
ASM: *Kormoran.*
8 SAM groups with 96 *Nike Hercules.*
(On order: 64 *Tornado* MRCA, 187 AM-X FGA ac; 18 AB-212 hel; 4 *Spada* SAM systems, *Aspide* AAM.)

RESERVES: 28,000 some additional ac (logistic reserve).

Forces Abroad:
Egypt (Sinai MFO) (90); 3 minesweepers. Lebanon (UNIFIL) (40).

Para-Military Forces: Carabinieri 90,000: 1 mech bde with 13 bns, 1 AB bn, 2 cav sqns; 37 M-47 MBT; Fiat 6616, 80 M-6, M-8 armd cars; 470 Fiat 242/18AD, 240 M-113 APC; 23 AB-47, 2 A-109, 5 AB-205, 23 AB-206 hel. Ministry of Interior: Public Security Guard 67,927: 11 mobile units; 40 Fiat 6614 APC, 3 P-64B ac; 1 AB-47Y3B-1, 6 A-109A, 12 AB-206A1, 4 AB-212 hel. Treasury Department: Finance Guards 48,691; 6 AB-47J, 69 NH-500M hel, 350 patrol craft(.
(On order: 3 AB-212, 1 A-109A hel.)

LUXEMBOURG

Population: 365,300.
Military service: voluntary, 3 years.
Total armed forces: 720.
GDP 1982: fr 154.250 bn ($3.376 bn). Est 1983: 163.995 bn ($3.207 bn).
Est def exp 1982: fr 1.44 bn ($31.516 m); NATO defn $41.430 m. 1983: 1.596 bn ($31.213 m); NATO defn $42.577 m. Budget 1984: 2.295 bn ($41.0 m); NATO defn n.a.
GDP growth: −1.5% (1981). −3.5% (1982).
Inflation: 9.4% (1982). 9.5% (1983).
$1 = francs 45.691 (1982), 51.132 (1983), 55.975 (mid-1984).

Army: 720.
1 lt inf bn.
1 indep coy.
5 *Commando* APC; *LAW* RL; *TOW* ATGW.

Air: Luxembourg has no air force of her own, but for legal purposes all NATO's airborne early warning ac will have Luxembourg registration.
1 sqn with 10 E-3A NATO standard.
(On order: 8 E-3A.)

Para-Military Forces: Gendarmerie 470.

NETHERLANDS

Population: 14,400,000.
Military service: Army 14–16, Navy and Air Force 14–17 months.
Total armed forces: 103,267 (incl Royal Military Constabulary; 1,450 women; 46,368 conscripts).
GDP 1982: gld 365.90 bn ($137.031 bn). 1983: 370.550 bn ($129.831 bn).
Est def exp 1983: gld 12.646 bn ($4.431 bn); NATO defn $4.572 bn. Budget 1984: 13.071 bn ($4.227 bn); NATO defn $4.216 bn.
GDP growth: −1.7% (1982). −3% (1983).
Inflation: 5.5% (1982). 2.5% (1983).
Debt 1982: $16.8 bn.
$1 = guilders 2.6702 (1982), 2.8541 (1983), 3.0925 (mid-1984).

Army: 64,664 (40,785 conscripts), though see Reserves.
1 Corps HQ, 3 mech div HQ.
2 armd bdes.
4 mech inf bdes.
3 armd recce bns.
3 SP AA bns.
1 SSM bn with *Lance.*
3 hel sqns (Air Force manned).
AFV: 468 *Leopard* 1 (10 mod to 1A4), 135 *Leopard* 2, 322 *Centurion* MBT; 79 AMX-13 lt tks; 66 AMX-VC1, 698 M-113, 735 YP-408 (to retire), 1,307 YPR-765 APC.
Arty: 44 M-101 105mm, 134 M-114 155mm, 75 AMX 105mm (being retired), 222 M-109 155mm, 13 M-107 175mm (being replaced by 203mm), 61 M-110 203mm SP guns/how; 6 *Lance* SSM; 92 81mm, 194 107mm, 153 120mm mor.
ATK: Carl Gustav 84mm, 253 106mm RCL; *LAW* RL; 350 *Dragon*, 320 *TOW* ATGW.
AA: 54 L-40/70 40mm towed, 95 *Gepard* 35mm SP AA guns.

Avn: 67 *Alouette* III, 30 BO-105 hel (Air Force crews).
(On order: 310 *Leopard* 2 MBT; 660 YPR-765 APC; 486 *Stinger* SAM.)

RESERVES: 145,000, many on short leave, immediate recall. 1 armd, 2 mech inf bdes, corps troops and 1 indep inf bde would be completed by call-up of reservists; 2+ inf bdes could be mobilized for territorial defence. Home Guard: 4,300; 3 sectors; inf weapons.

Navy: 16,867, incl naval air arm and marines (1,437 conscripts).
6 subs: 2 *Zwaardvis*, 2 *Potvis*, 2 *Dolfijn* (1 in reserve).
2 *Tromp* GW destroyers (flagships) with 8 *Harpoon* SSM, 1 *Standard*, 8 *Sea Sparrow* SAM, 1 *Lynx* hel.
16 frigates with 8 *Harpoon* SSM: 10 *Kortenaer* with *Sea Sparrow* SAM, 1–2 *Lynx* hel; 6 *Van Speijk* with 2 × 4 *Seacat* SAM, 1 *Lynx* hel.
4 *Wolf* corvettes (2 in reserve).
3 *Balder* large patrol craft.
9 *Dokkum* coastal minesweepers (5 in reserve); 4 *Dokkum*, 6 *Alkmaar* minehunters.
2 *Poolster* fast combat spt ships.
3 survey ships (2 North Sea, 1 oceanographic).
10 LCA(.

Bases: Den Helder, Flushing, Curaçao.

NAVAL AIR ARM: (1,700): 13 combat ac, 17 combat hel.
3 MR/ASW sqns with 11 P-3C *Orion* II, 2 F-27MPA (Air Force manned). (6 *Atlantic* MR in reserve.)
1 ASW hel sqn with 17 *Lynx* SH-14B/C.
1 SAR hel sqn with 5 *Lynx* UH-14A.

MARINES: (2,600).
2 amph combat gps.
1 mountain/arctic warfare coy.
(On order: 2 *Walrus* subs; 4 multi-role, 2 AD *Kortenaer* frigates; 9 *Alkmaar* minehunters; 4 LCVP; 2 P-3C MR ac; *Harpoon* SSM.)

RESERVES: about 20,000; 7,500 on immediate recall.

Air Force: 16,810 (3,565 conscripts); some 174 combat ac.
5 FGA sqns: 3 with 54 NF-5A, 1 with 18 F-104G (getting F-16), 1 with 18 F-16.
2 FGA/interceptor sqns with 36 F-16A/B.
1 recce sqn with 18 F-16 (RF-104G phasing out in 1984).
2 OCU: 1 with 18 NF-5B, 1 with 12 F-16B.
(Some 16 more F-16A/B have been delivered.)
1 tpt sqn with 12 F-27.
1 SAR flt with 4 *Alouette* III.
AAM: AIM-9 *Sidewinder.*
12 SAM sqns with 36 *Improved HAWK* (8 in Germany).
2 SAM sqns with 23 *Nike Hercules.*
25 *Shorad/Flycatcher,* 40 L-70 AA systems.
(On order: 46 F-16A FGA, 10 F-16B ac; 20 *Patriot* SAM launchers, 160 msls.)

RESERVES: 6,000 on immediate recall.

Inter-Service Organization: 1,071 (271 conscripts).

Forces Abroad:
Germany: 5,500; 1 armd bde, 1 recce, 1 engr bns, spt elements.
Lebanon (UNIFIL): 165: 1 inf coy.
Egypt (Sinai MFO): 105: 1 det.
Netherlands Antilles: 1 frigate, 1 amph combat det, 1 MR det with 2 F-27MPA ac.

Para-Military Forces: Royal Military Constabulary *(Koninklijke Marechaussee):* 3,855 regulars, 310 conscripts; 3 divs comprising nine districts with 87 'bdes'. Civil Defence *(Corps Mobiele Colonnes):* 22,000 on mobilization under Army command.

NORWAY

Population: 4,146,000.
Military service: Army 12, Navy and Air Force 15 months.
Total armed forces: 36,785 (22,500 conscripts).
GDP 1982: N kr 362.560 bn ($56.176 bn). Est 1983: 401.277 bn ($54.997 bn).
Def exp 1983: N kr 12.696 bn ($1.740 bn); NATO defn $1.706 bn. 1984: 12.948 bn ($1.657 bn); NATO defn $1.662 bn.[10]
GDP growth: 0.9% (1982), 3.3% (1983).
Inflation: 14% (1982), 12% (1983).
Debt: $31.7 bn (1982).
$1 = kroner 6.4540 (1982), 7.2964 (1983), 7.8142 (mid-1984).

Army: 19,500 (12,000 conscripts).
1 lt bde gp of 3 inf bns, 1 tk coy, 1 SP fd bn, 1 AA bty (North Norway), 2 border garrison bns.
1 all-arms gp: 1 inf bn, 1 tk coy, 1 SP fd, 1 AA btys (South Norway).
Indep armd sqns, inf bns and arty regts.
70 *Leopard* 1, 30 M-48A5 MBT; 70 NM-116 (M-24/90) lt tks; NM-135 (20mm) MICV; M-113 APC; 250 105mm and 155mm towed; 130 M-109 155mm SP how; 107mm mor; *Carl Gustav* 84mm, 106mm RCL; M-72 66mm RL; *ENTAC* (being retired), *TOW* ATGW; FK20-2 20mm, 40mm AA guns; RBS-70 SAM; 23 O-1E, 8 L-18 lt ac.
(On order: M-113 APC, RBS-70 SAM.)

RESERVES: 165,000: 12 bdes of about 5,000 men each (some being reorg), 2 armd sqns, spt units and territorial forces; 21 days refresher training each 3rd/4th year to age 44. Home Guard 72,100 (90 days initial service); 18 Districts, areas and sub-areas.

Navy: 7,500, incl 1,000 coast artillery (5,500 conscripts).
14 *Kobben* (Type 207) subs.
5 *Oslo* frigates with 6 *Penguin* SSM, 1 × 8 *Sea Sparrow* SAM.
2 *Sleipner* corvettes.
38 FAC(G) with *Penguin* SSM: 18 *Storm* (6 × 1), 14 *Hauk* (6 × 1), 6 *Snögg* (4 × 1).
1 *Vadsø* coastal patrol craft.
2 *Vidar* minelayers, 9 US MSC-60 minesweepers, 1 minehunter.
1 *Horten* depot/trg ship, 7 coastal tpts.
7 LCT: 2 *Kvalsund*, 5 *Reinøysund.*
15 coast def fortresses (to be rebuilt): 50 arty, mine and torpedo btys: 75mm, 105mm, 120mm, 127mm, 150mm guns.
1 SAR/recce hel sqn with 6 *Lynx* (coastguard).
8 *Tjeld* FAC(T) in reserve.
(On order: 6 *Ula* (Type 210) subs; 8 120mm guns.)

Bases: Horten, Bergen, Ramsund, Tromsø.

RESERVES: 25,000. Coastguard (352 incl 55 civilians): 6 patrol vessels incl 3 *Nordkapp* fitted for 6 × 1 *Penguin* II SSM, 6 *Lynx* hel (Air Force manned), 7 armed fishery protection vessels. Home Guard (5,400).

Air Force: 9,500 (5,000 conscripts); 114 combat ac.
5 FGA sqns: 4 with 72 F-16; 1 (OCU) with 35 F-5A.
1 MR sqn with 7 P-3B *Orion.*
2 tpt sqns: 1 with 6 C-130H, 3 *Falcon* 20S; 1 with 4 DHC-6 ac, 2 UH-1B hel.
1 SAR hel sqn with 10 *Sea King* Mk 43.
2 utility hel sqns with 26 UH-1B (10 in storage).
21 *Safari* trg ac.
AAM: *Sidewinder.*
ASM: *Bullpup.*
4 lt AA bns with 32 L-60/-70 40mm guns.
1 SAM bn (4 btys) with 128 *Nike Hercules.*
(On order: 54 *HAWK* launchers and 162 msls (lease), *Penguin* Mk 3 ASM.)

RESERVES: 25,000. 7 lt AA bns for airfield defence with 56 L-60 40mm guns. Home Guard 2,500: 2 bns, airfield def btys.

Joint Services Orgs: 285.

Civil Defence: 53 Districts, 14 mobile columns. 108 local units. Permanent staff some 400; total mobilization strength 62,500 (planned).

Forces Abroad: Lebanon (UNIFIL): 838; 1 bn, 1 service coy, plus HQ personnel.

PORTUGAL

Population: 10,200,000.
Military service: Army 16, Navy 24, Air Force 21–24 months.
Total armed forces: 63,500 (37,700 conscripts; see Army).
GDP 1982: esc 1,858.0 bn ($23.379 bn). 1983: 2,274.0 bn ($20.527 bn).
Est def exp 1982: esc 50.10 bn ($630.403 m); NATO defn $803.0 m. 1983: 60.60 bn ($547.030 m); NATO defn $713.315 m.
GDP growth: 3.5% (1982), −5% (1983).
Inflation: 26% (1982), 38% (1983).
Debt: $18.5 bn.
$1 = escudos 79.473 (1982), 110.780 (1983).

Army: 39,000 (30,000 conscripts, 3 intakes a year, 4 months alternating service).
6 Territorial Commands (4 military regions, 2 island commands).
1 mixed bde.
3 cav regts.
11 inf regts, 3 indep inf bns.
1 cdo regt.
2 fd, 1 AA, 1 coast arty regts.
2 engr regts.
1 sigs regt.
1 military police regt.
1 Special Forces, 4 spt bns.
AFV: 25 M-47, 23 M-48A5 MBT; 11 M-24 lt tks; 43 Panhard EBR/ETT hy, 63 AML-60/-90 lt armd, 32 *Ferret* Mk 4 scout cars; 75 M-113 (incl -A2 *TOW*), 9 M-577A2 (81mm mor); 86 *Chaimite* APC.
Arty: 24 5.5-in. (140mm) guns; 36 M-101A1 105mm towed, 6 M-109A2 155mm SP how; 39 150mm, 152mm, 234mm coast arty; 54 107mm, 81 120mm mor.
ATK: 100 90mm, 127 106mm RCL; 45 *TOW* ATGW.
AD: 18 Rh-202 20mm, 20 Bofors L-60 40mm AA guns; 16 *Blowpipe* SAM.

Navy: 15,000 incl marines (4,200 conscripts).
3 *Albacora* (Fr *Daphne*) subs.
17 frigates: 4 *Andrade*, 6 *Coutinho*, 4 *Belo*, 3 *Silva.*
10 *Cacine* large patrol craft.
13 coastal patrol craft: 2 *Aleixo*, 6 *Albatroz*, 4 *Bonanca*, 1 river.
4 minesweepers.
2 LCT, 10 LCM, 1 LCA.

Base: Lisbon (Alfeite), Faro.

MARINES: (2,500; 1,000 conscripts).
3 bns (2 inf, 1 police), spt units.
Chaimite APC, mor, amph craft.

Air Force: 9,500, incl 1,800 para (3,500 conscripts); 74 combat ac.
1 combat command, 5 administrative wings:
3 FGA sqns: 1 with 20 A-7P; 1 with 20 G-91R3, 8 T3; 1 with 20 G-91R4, 2 T3.
1 recce sqn with 4 C-212B.
1 OCU with 12 T-38.
2 tpt sqns: 1 with 5 C-130H; 1 with 12 C-212.
3 SAR sqns: 1 with 6 C-212 ac; 2 with 12 SA-330 *Puma* hel.
2 hel/utility sqns with 37 *Alouette* III.
2 liaison sqns with 32 Reims-Cessna FTB-337G.
3 trg sqns: 1 with 2 C-212A ac, 3 *Alouette* III hel; 1 with 24 T-37C; 1 with 30 *Chipmunk.*
1 para gp (1 bn, 2 coys).
(On order: 30 A-7 FGA (6 trg), 3 C-130 tpt ac; 12 A-109A hel (4 with *TOW*).)

RESERVES (all services): 169,000.

Para-Military Forces: National Republican Guard 14,600; *Commando* Mk III APC. Public Security Police 15,291. Fiscal Guard: 7,385.

SPAIN

Population: 38,800,000.
Military service: 15 months. (Army to reduce to 12 months).
Total armed forces: 330,000 (214,000 conscripts); (force reduction programme being introduced).
Est GDP 1982: pts 19,737 bn ($179.656 bn). 1983: 22,703 bn ($158.286 bn).
Est def exp 1983: pts 480.00 bn ($3.347 bn); NATO defn n.a.[11]
GDP growth: 1.2% (1982), 2.3% (1983).
Inflation: 16.5% (1982), 16.0% (1983).
FMA: $400 m (1983).
Debt: $37.4 bn (1982).
$1 = pesetas 109.86 (1982), 143.43 (1983).

Army: 240,000 (170,000 conscripts); to reduce to 195,000 by 1985.
Immediate Intervention Force:
1 corps HQ.
1 armd div, 1 mech div, 1 mot div } each with 2 bdes.
1 armd cav bde.
1 inf bde (Reserve).
1 para bde (3 bns).
1 airportable bde.
1 arty bde.
1 locating, 1 fd rocket, 1 lt AA regts.
1 engr, 1 sigs regts.
1 chemical/nuclear defence regts.
Territorial Defence Force:
9 Military Regions (being reorg, incl Ceuta and Melilla), 2 overseas comds (see *Deployment*).
2 mountain divs (each 1 bde and 1 cadre bde).
Legion: HQ, 4 regts, spt units (overseas forces).
9 inf bdes (8 may be disbanded).
1 mountain bde.
1 arty bde (incl 1 *HAWK* SAM gp, 1 *Nike Hercules* bty).
2 hy arty regts.
7 coast/AA arty regts.
General Reserve Force:
1 ATK inf regt.

with Hydra 70
Close is more than Good enough



Fire and Forget

Hydra 70 lets Tactical Air Force pilots launch rockets and accurately hit targets up to six kilometers away. Once the 70mm rockets have left the launcher, no guiding, tracking or manuevering the weapons until impact is necessary. Instead, the pilot can pop-up, launch and then continue nap-of-the-earth flying until additional targets are selected for gun, rocket or Maverick attacks.

Self-Suppression

Because of the firepower and versatility packed into each 19 round Hydra 70 launcher, pilots flying close air support missions can lay down effective suppressing while still beyond the range of most ground-to-air gun systems. Warhead choices include nine sub-munition anti-armor/personnel rockets, shaped charge, chaff, flechette, smoke, flare and high explosive rounds. Any five types can be loaded in the launcher and fired to a precise point in space. Range in 100-meter increments and missile selection is made by the pilot just prior to firing.

Selective Anti-Armor

When launched at massed armor formations, Hydra 70 chaff and sub-munition rockets can cause an enemy formation to "button-up," disperse and seek cover. Dispersion reduces his ability to mass his defensive weapons against the attacking aircraft and the chaff clouds his radar fire control picture. Thus Hydra 70 helps clear the way for pilots to carefully select targets for attack by rockets or guns.

For more information on Hydra 70, call or write.

BEI

BEI DEFENSE SYSTEMS COMPANY
A DIVISION OF BEI ELECTRONICS, INC.
BEI DEFENSE SYSTEMS CO., P.O. Box 1367, Euless, TX 76039
(817) 267-8191 TWX 910-893-5022

1 engr, 2 railway engr regts.
1 sigs regt.
Independent Units:
Army HQ inf gp.
Royal Guard Regt (incl inf, naval, air force coys and escort cav sqn).
Army Aviation (FAMET): 40 armed hel.
HQ with 1 hel, 1 spt, 1 trg sqn.
1 attack bn.
1 tpt bn (1 med, 1 hy coys).
3 hel units.
AFV: 300 AMX-30, 350 M-47E, 110 M-48 (105mm) MBT; 180 M-41 lt tks; 60 AML-60, 80 AML-90 armd cars; 200 BMR-600 MICV; BLR, 500 M-113 APC.
Arty: 168 122/46 122mm towed, 12 M-107 175mm SP guns; 911 105mm M-26 and M-56 pack, 84 M-114 155mm, 12 M-115 8-in. (203mm) towed, 48 M-108 105mm, 24 M-44, 96 M-109A 155mm, 4 M-55 203mm SP how; 200 88mm, 200 6-in. (152.4mm), 24 203mm, some 12 12-in. (305mm), some 12 15-in. (381mm) coast guns; 1,200 81mm, 107mm, 400 120mm mor; R-2B 105mm, *Teruel* 140mm, L-21 216mm, L-10 300mm, L-8 381mm MLRS.
ATK: 350 106mm RCL; 42 M-65 88.9mm RL; 50 *Milan*, 50 *Cobra*, 18 *Dragon*, *HOT*, 12 *TOW* ATGW.
AD: 20mm, 64 35/90, 280 40/90, 120 90mm AA guns, 14 *Nike Hercules*, 24 *Improved HAWK* SAM.
Avn: 59 HU-8/-10B (UH-1B/H), 3 HA-16 (*Alouette* III), 60 HA-15 (BO-105; 12 with 20mm guns, 28 with *HOT*), 5 AB-206A, 6 AB-212, 12 HR-12B (OH-58A), 12 HT-17 (CH-47C) hel.
(On order: VEC 3562 recce, 220 BMR-600 MICV, 176 M-133 APC; 540 *TOW* msls; 12 CH-47C, 28 AB-412, 18 OH-58A hel; 96 *Chaparral* SAM (1,760 msls); 18 *Roland* SAM launchers (500 msls); 28 *Skyguard* AD systems.)

DEPLOYMENT:
Ceuta/Melilla: 19,000; 2 armd cav, 3 Foreign Legion, 2 coast/AA Arty, 2 engr regts, 4 *Regulares* inf gps, 2 special sea coys.
2 Overseas Forces comds:
Balearic Islands: 5,800; 3 inf, 2 coast/AA regts, 1 engr bn, 1 lt cav gp, 1 cdo coy.
Canary Islands: 16,000.
3 inf regts (1 cadre).
1 Foreign Legion (2 bns, 1 lt cav gp).
2 coast/AA arty regts.
1 engr gp (2 bns).
1 lt cav gp.
1 cdo coy.

Navy: 57,000, incl marines (44,000 conscripts). 9 Commands (Escort, Naval Air, Submarine, Mine Warfare, Marines, 4 Naval Region HQ).
8 subs: 2 *Agosta*, 4 *Daphne*, 2 *Guppy* IIA.
1 US *Independence* carrier (9 AV-8A, 24 hel).
11 destroyers: 6 with 1 hel (1 *de Lauria*, 5 US *Gearing* with 1 Hughes 369 hel, 4 with 1 *ASROC*), 5 US *Fletcher*.
11 frigates: 5 *Baleares* (F-70) 1 with 2 × 4 *Harpoon* SSM, 16 *Standard* SAM, 1 × 8 *ASROC*; 6 *Descubierta* (F-30) with 1 × 8 *Sea Sparrow/Aspide* SAM.
4 *Atrevida* corvettes.
12 FAC(P): 6 *Lazaga*, 6 *Barcelo*.
18 large patrol craft (3 ex-minesweepers).
26 coastal and 38 inshore patrol craft(.
4 US *Aggressive* ocean, 8 *Jucar* coastal MCM.
2 attack tpts.
1 LSD, 3 LST, 7 LCT, 2 LCU, 20 LCM.

NAVAL AIR: 11 combat ac, 51 combat hel.
1 attack sqn with 9 AV-8A *Matador*, 2 TAV-8A.
1 comms sqn with 2 *Commanche*, 2 *Citation*.
5 hel sqns (3 ASW); 1 with 11 AB-212 (4 ECM), 1 with 11 Hughes 369, 1 with 14 SH-3D *Sea King*; 1 with 4 AH-1G (armed), 11 Bell 47G.

MARINES: (11,925).
1 marine regt (2 inf, 1 spt, 1 log bns).
5 marine garrison regts.
18 M-48S MBT; LVTP-7 amph APC; 8 Oto Melara 105mm towed, 8 M-52A1 105mm SP how; 81mm mor; M-72 66mm RL; 72 106mm RCL; *TOW*, *Dragon* ATGW.
(On order: 2 *Agosta* subs, 1 carrier, 3 FFG-7 frigates, 4 32.2-metre patrol craft, 20 15.9-metre patrol vessels; 12 *Bravo* (AV-8B) ac, 6 SH-60B hel; 12 RGM-84A *Harpoon* SSM, SM-1 *Standard* SAM.)

Bases: Ferrol (Galicia), Cadiz (San Fernando)/Rota, Cartagena.

Air Force: 33,000; 215 combat ac.
Air Combat Command (MACOM):
3 wings.
6 interceptor sqns: 2 with 35 F-4C, 4 RF-4C; 2 with 21 *Mirage* IIIEE, 6 IIIEB; 2 with 45 *Mirage* F-1CE, 3 F-1CE/BE.
1 liaison flt with 1 Do-27.
Tactical Command (MATAC):
2 wings.
2 FGA sqns with 14 F-5A, 13 RF-5A, 6 F-5B.
1 recce sqn with 9 AR-10C (HA-220).
1 MR sqn with 6 P-3B *Orion*.
1 liaison flt with 6 O-1E, 11 Do-27, Do-28.
AAM: *Sparrow*, *Sidewinder*, R-550 *Magic*.
Air Command, Canary Islands (MACAN):
1 FGA sqn with 24 *Mirage* F-1C.
1 SAR sqn with 3 F-27-400 MR ac, 8 AB-205 hel.
1 tpt sqn with 7 C-212, 2 Do-27.
Transport Command (MATRA):
3 wings:
5 sqns with 5 C-130H, 6 KC-130H, 6 *Azor*, 25 C-212 *Aviocar*, 12 DHC-4, 8 Do-27.
Training Command (MAPER):
2 OCU with 23 F-5A/B, 2 Do-27.
14 sqns with 6 *Aztec*, 29 F-33C *Bonanza*, 50 C-101, 14 C-212E, 1 *Navajo*, 49 T-33A, 45 T-6, 6 *King Air*, 3 *Baron*, BU-131A/CASA I-131.
2 hel sqns with 28 HE-7A (AB-47), AB-205, Hughes 300C and UH-1H.
Air Force HQ Group (ACGA):
2 tpt sqns with 2 DC-8-52, 4 *Mystère* 20, 1 *Navajo*, 4 C-212.
3 spt sqns with 14 CL-215, 2 Do-27, 5 C-212, 2 DHC-4A, 8 C-7.
1 utility hel sqn with 5 *Puma*.
2 SAR sqns with 4 C-212, 4 Do-27 ac, 12 *Super Puma*, 9 AB-205, 4 AB-206, 3 AB-47, 3 *Alouette* III hel.
1 trg sqn with 4 C-101, 2 C-212.
(On order: 72 F-18 ftrs; 2 P-3C *Orion* MR; 4 C-212 SAR, 13 C-101 trg ac; 17 Hughes 300C hel; *Super Sidewinder* AAM.)

RESERVES (all services): 1,085,000.

Para-Military Forces: Guardia Civil 63,500: 25 inf *tercios* (regts), 3 reserve mobile comds, 1 railway security, 1 traffic security gps, 1 anti-terrorist special gp (UAR); BLR APC, 1 B-11T (BK-117) hel. (On order: 20 BO-105, 3 BK-117 hel.) *Policia Nacional* 47,000: 26 inf bns, 2 cav sqn gps, 3 cav tps, 1 special ops cdo gp (GEO), civil security gps. Ministry of Transportation and Communications: *Maritime Surveillance Force*; some 54 patrol boats, (10 320-ton, 4 32-metre, 16-metre), many armed.

TURKEY

Population: 48,600,000.
Military service: 20 months.
Total armed forces: 602,000 (544,000 conscripts).
Est GDP 1982: TL 8,578.0 bn ($52.771 bn). 1983: 12,250.0 bn ($4,333 bn).
Est def exp 1983: TL 444.0 bn ($1.952 bn): NATO defn $2.469 bn. Budget 1984: 583.6 bn ($1,635 bn); NATO defn n.a.
GNP growth: 4.5% (1982), 3.0% (1983).
Inflation: 30% (1982), 41% (1983).
Est FMA: $460 m (1983).[12]
Debt: $22.3 bn (1982).
$1 = liras 162.55 (1982), 225.46 (1983), 357.01 (mid-1984).

Army: 500,000 (475,000 conscripts).[13]
4 army HQ: 10 corps HQ.
1 armd div.
2 mech divs.
14 inf divs.
4 armd bdes.
4 mech bdes.
11 inf bdes.
1 para bde, 1 cdo bde.
4 SSM bns with *Honest John*.
1 SAM bty forming.
Corps units: 10 tk, 30 hy/med, 20 AA arty bns, indep fortress defence regts.
AFV: 500 M-47, 2,775 M-48A1, 180 M-48A5, 77 *Leopard* 1A3 MBT; 2,000 M-113 APC.
Arty: 150 M-59 155mm towed, 36 M-107 175mm SP guns; 95 M-116A1 75mm pack, some 600 M-101A1 105mm, 400 M-114A1 155mm, 116 M-115 203mm towed, 345 M-7/M-108 105mm, 108 M-44/M-109 155mm, 8 M-55 203mm SP how; 1,750 60mm, 81mm, M-2 4.2-in. (107mm), 120mm mor; 18 *Honest John* SSM.
ATK: 1,200 M-18 57mm, 390 M-20 75mm, 1,000+ M-40 106mm RCL; 85 *Cobra*, SS-11, *TOW*, *Milan* ATGW.
AD: 300 twin 20mm, 900 M-1A1 40mm, M-51 75mm, M-117/-118 90mm guns, some *Rapier* SAM.
Avn: 2 DHC-2, 20 U-17, 8 Cessna 206, 20 Cessna 421, 5 Do-27, 14 Do-28, 15 *Baron*, 5 T-42, 40 *Citabria* 150S trg ac; 156 AB-204/-205, 20 Bell 47G, 30 UH-1D, 30 TH-300C hel.
(Plus eqpt in store incl 200 M-47 MBT, 100 M-4 lt tks; M-8 recce, 350 M-59, 800 M-2/-3 APC; M-7 towed, M-52 SP 105mm, M-44 SP 155mm how.)
(On order: *TOW*, 1,500 *Milan* ATGW, 40 UH-1H hel, some 12 *Rapier* SAM.)

RESERVES: 700,000.

Navy: 46,000, incl marines (36,000 conscripts); 18 combat ac, 13 combat hel.
16 subs (2 in reserve): 5 Type 1200, 10 US *Guppy*, 2 *Tang* (on loan).
13 US destroyers: 8 *Gearing* (3 leased, 5 with 1 × 8 *ASROC*) 1 *Sumner*, 1 *Carpenter*, 2 *Fletcher*, 1 *Smith*.
2 *Berk* frigates, each with 1 hel.
14 FAC(G): 5 *Dogan* (Lürssen FPB-57) with 2 × 4 *Harpoon* SSM; 9 *Kartal* (Type 141 *Jaguar*) with 4 *Penguin* 2 SSM.
4 FRG *Jaguar* FAC(T).
25 large patrol craft (incl 1 *Girne*, 2 US *Asheville*, 6 PC-1638, 4 PGM-71).
4 83-ft coastal patrol craft(.
1 *Nusret*, 6 coastal minelayers.
26 minesweepers: 12 US *Adjutant*, 4 Cdn MCB, 6 FRG *Vegesack* coastal, 4 US *Cape* inshore.
7 LST (3 dual-purpose minelayers), 32 LCT, 16 LCU, 20 LCM.
56 auxiliary ships incl 1 US destroyer tender, 2 FRG depot ships (trg), 9 tankers (5 fleet).
Naval Aviation:
1 ASW sqn: 18 S-2E ac; 3 AB-204B, 6 AB-212 ASW, 4 UH-1H ECM, 10 UH-1H SAR hel; (2 S-2A in reserve).
1 marine bde (5,000): HQ, 3 bns, 1 arty bn (18 guns), spt units.
(On order: 1 Type 209 sub, 4 *Meko*-200 frigates, 7 *Zobel* FAC(G), 13 LCT, 1 tanker.)

Bases: Gölçük, Istanbul, Izmir, Ereğli, Iskenderun.

RESERVES: 70,000.

Air Force: 56,000 (33,000 conscripts); some 458 combat ac.
2 tac, 1 tpt, 1 air trg commands.
17 FGA sqns: 2 with 42 F-5A, 10 F-5B; 2 with 40 F-100D; 5 with 80 F-4E; 8 (2 forming) with 96 F-104G, 12 TF-104.
2 interceptor sqns with 32 F-104S, 4 TF-104G.
2 recce sqns: 1 with 27 RF-5A, 1 F-5B; 1 with 7 RF-4E.
6 tpt sqns: 1 with 7 C-130E; 1 with 20 C-160D; 3 with 60 C-47A, 2 Beech 18; 1 (VIP) with 3 *Viscount* 794 ac, 15 UH-1H hel.
1 VIP flt with 2 C-47A.
3 comms flts, 3 liaison flts with C-47, AT-11, 10 T-33A ac; UH-1H hel.
10 base flts with 24 T-33A, AT-11, 2 C-47A ac, UH-1H, UH-19B hel.
5 OCU: 2 sqns with 36 F-5A/B, 17 F-104G; 2 with 20 T-33A/-38A; 1 with 25 T-37C.
3 trg sqns with 24 T-34A, 40 T-38A, 20 T-41D.
2 *Rapier* SAM sqns forming.
Schools with C-47 ac; UH-1H, UH-19B hel.
AAM: *Sidewinder*, 750 AIM-9P3 *Super Sidewinder*, *Sparrow*, *Falcon*, *Shafrir*.
ASM: AS-12, *Bullpup*, *Maverick*.
8 SAM sqns with 72 *Nike Hercules*.
(On order: 160 F-16 ftr, 52 G-222 tpt, 2 *Citation* II trg ac; *Super Sidewinder*, *Sparrow* AAM; 24 *Rapier* SAM.)

RESERVES: 66,000.

Forces Abroad:
Cyprus: 1 corps of 2 inf divs (17,000); 150 M-47/-48 MBT; M-113 APC; 212 105mm, 155mm, 203mm guns/how; 40mm AA guns.

Para-Military Forces: Gendarmerie 125,000 (incl 3 mobile bdes with V-150, UR-416 APC). Coastguard 1,100: 35 large, 10 coastal patrol craft. (On order: 5 SAR-33 FAC.)

---

1 Conscripts serve 6 months if posted to Germany, 10 months if serving in Belgium.

2 Includes replacement costs for Falkland losses.

3 The Canadian Armed Forces were unified in 1968. Of the total strength, some 49,000 are not identified by service.

4 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. Mobile Command has operational control of 10 TAG. HQ 4 ATAF in Europe has operational control of 1 CAG. There is also a Communications Command and a Canadian Forces Training System.

5 At January 1983 price level.

6 Incl inter-service central staff and *Service de Santé*, but not *Gendarmerie*.

7 A 5-year military developmeht plan for 1983/8 totalling approx. F fr 830 bn has also been introduced.

8 Incl 11,200 military personnel in the Ministry of Defence, Central Military Agencies, Central Medical Agencies and 6,000 reserve duty training positions.

9 *Not* incl inter-service personnel and part-time reservists.

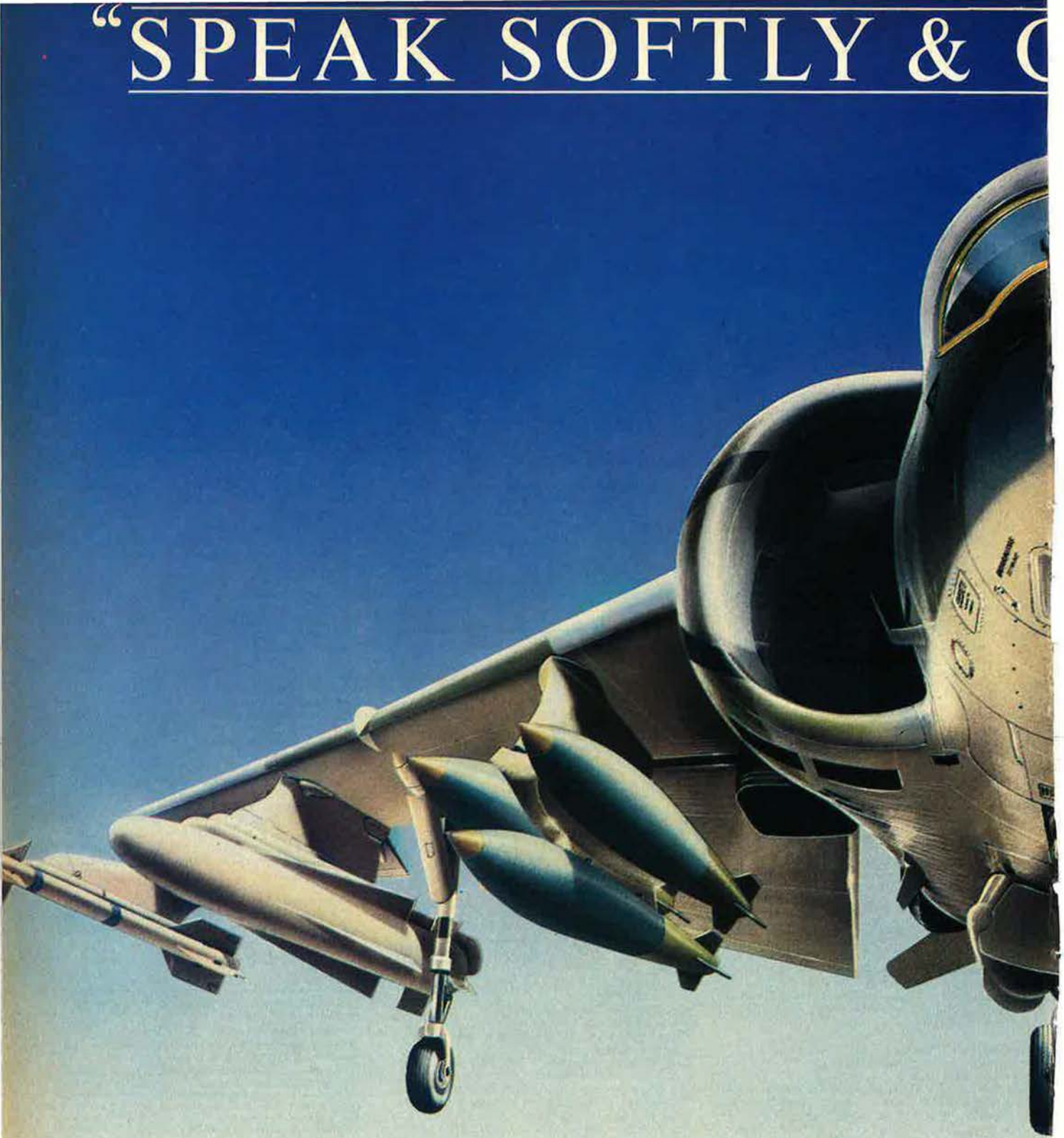
10 Incl UNIFIL costs.

11 An additional budget of pts 3.1 bn, plus $400 m per annum in US FMA for modernization of the armed forces, runs concurrently as of 1983.

12 Calculated from US published information and estimates for other contributors.

13 About half the divs and bdes are below strength.

"SPEAK SOFTLY & C



When you are first to fight, you must carry your own weapons with you. That is why the US Marines fought so hard to get the AV-8B Harrier II.

The day the Marines acquired the Harrier II, they acquired vastly more clout.

It is a unique aircraft. Period. Quite simply put, the most versatile attack aircraft in the world.

From desert wastes to urban sprawl, from the tropics to the poles, whether storming a beach or holding a hill, it goes with the Marines: ready in some nearby forest clearing aboard an assault ship or by a small country road, always available to provide the additional rapid punch that can mean the difference between success and failure.

In the STOVL (Short Take Off and Vertical Landing mode, it can carry over 9000 lbs of lethal ordnance. Fitted with an advanced bombing system, it can deliver everything from sophisticated 'smart' missiles to 'dumb' bombs with pinpoint accuracy.

ROLLS-ROYCE LIMITED, 65 BUCKINGHAM GATE, LONDON SWIE

RRY A BIG STICK"

THEODORE ROOSEVELT



This Marine machine, the Harrier II, is manufactured by McDonnell Douglas and British Aerospace, but its unique capabilities are made possible by a unique engine: the Rolls-Royce Pegasus F402.

The Pegasus has an exceptional thrust to weight ratio with up to 22000 lb thrust available through 4 nozzles which direct the thrust from vertically downwards to straight aft – or even to some degree forward.

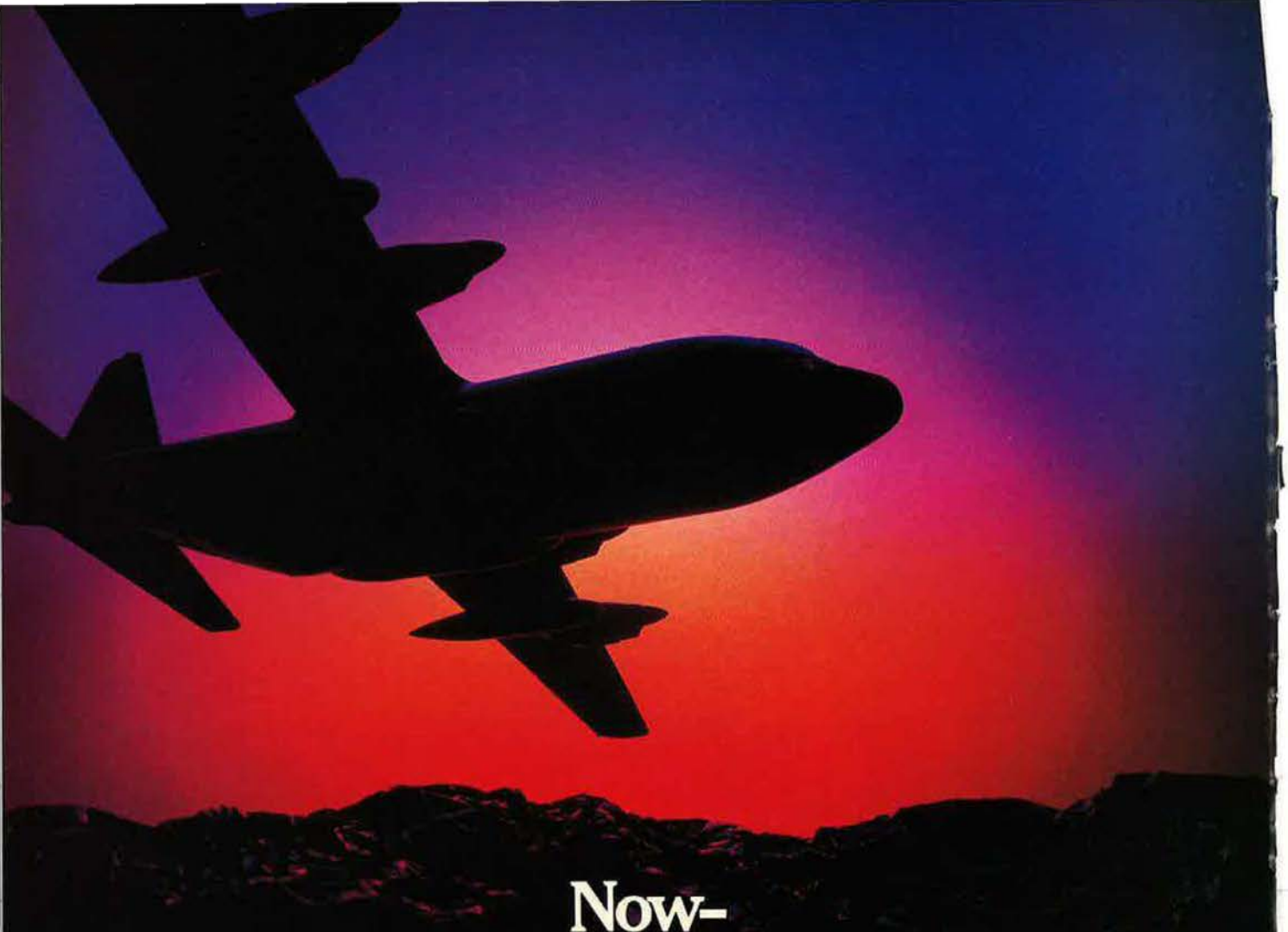
It is this vectored thrust capability that makes the airplane's unique basing flexibility and consequent unique rapid response possible. It also provides for unique inflight agility which, when combined with Sidewinder air-to-air missiles and the modern high velocity 25 mm gun, makes the Harrier II a dangerous airplane to attack.

Just the sort of 'Big Stick' Teddy Roosevelt had in mind way back in 1901.

ROLLS RR ROYCE

PEGASUS

LLS-ROYCE, INC. 475 STEAMBOAT ROAD, GREENWICH, CONNECTICUT 06830



Now–
Airborne Chirpsounding!



The AN/TRQ-35(V) HF Tactical Frequency Management System has been revolutionizing ground and sea-based military communications for some years now. However, size and weight have severely limited application of the Chirpsounder® system to critical, and much more difficult, ground-air and air-air HF communications. BR COMMUNICATIONS' new RCS-6 extends the philosophy of the AN/TRQ-35(V) to the airborne arena.

Packaged in an airborne case with companion power supply unit, the RCS-6 receiver is easily installed in an aircraft equipment bay. Choice of two control heads allows adaptability to various airborne configurations. The RCS-6 control head displays not only HF propagation data but also high-reliability Chirpcomm® messages on a CRT display.

The introduction of the RCS-6 Airborne Chirpsounder Receiver represents yet another achievement in BR COMMUNICATIONS' efforts to bring effective, adaptive HF techniques to the marketplace.

Interested? Contact us for details about the RCS-6.

We're Making HF Work!

BR Communications

1249 Innsbruck Drive, P.O. Box 61989, Sunnyvale, CA 94088 USA (408) 734-1600 Telex 357 484

Other European Countries

Albania: Albania joined the Warsaw Pact in 1955 but left it in 1968, moving into a closer relationship with China. After Chairman Mao's death in 1976, Chinese aid was progressively reduced. Since 1978 little military aid has been received from any source. The Constitution precludes the establishment of foreign bases or the stationing of foreign troops in Albania.

Austria: Austria's constitution contains a declaration of permanent neutrality. A small indigenous arms industry supplies many of the needs of the armed forces and provides a few foreign sales.

Cyprus: In 1959 Britain, Greece and Turkey signed a Treaty of Guarantee assuring the independence, territorial integrity and security of the newly independent bi-national state. Under this Treaty Britain maintains a garrison in two Sovereign Base Areas at Akrotiri and Dhekelia. Under an associated Treaty of Alliance with the Republic of Cyprus, Greece and Turkey are each also entitled to maintain a contingent on the island. In 1963 a constitutional dispute led the Turkish-Cypriot community to withdraw from the central government and ultimately, on 15 November 1983, to form a 'Turkish Republic of Northern Cyprus'. Both Turkish-Cypriot and Greek-Cypriot communities maintain their own armed forces. The United States maintains a signals establishment on the island, and the United Nations has a peace-keeping force (UNFICYP) there.

Finland: A 1948 Treaty of Friendship, Co-operation and Mutual Assistance requires Finland to fight any aggression directed against the USSR across her territory. In case of need the Soviet Union will provide assistance or joint action. Finland has her own defence industry, but has tended to buy her major arms from the USSR and Sweden, together with some equipment from Britain, France and the United States.

Ireland: Independent since 1922, Ireland plays an active role in UN peace-keeping operations. With no significant arms industry, Ireland has bought arms from many sources, *e.g.* Britain, France, Sweden and the US.

Malta: After independence in 1964, Malta had a defence agreement with Britain. The island was a NATO base from 1972 to 1979. In September 1980 Malta undertook to remain neutral, outside any alliances, and banned foreign troops and bases, including Soviet warship docking facilities. Italy agreed to consultation if Malta were attacked and to guarantee her independence. In December 1981 France and Algeria also agreed to support and guarantee her neutrality.

Sweden: Neutral in both World Wars, Sweden has a permanent peace-keeping organization which has provided personnel for UN duties since 1964. Her self-defence organization is largely supported by a domestic defence industry but some external purchases have been made, mainly from the United States.



OTHER EUROPEAN COUNTRIES

1. Albania
2. Austria
3. Cyprus
4. Finland
5. Ireland
6. Malta
7. Sweden
8. Switzerland
9. Yugoslavia

Switzerland: Permanently neutral since 1815, Switzerland belongs to no defence alliance. Her small armaments industry produces most of her equipment and plays a significant role in the Swiss export trade.

Yugoslavia: Expelled from the Cominform in 1948, she has since been a leading force in the Non-Aligned Movement, maintaining a balanced relationship with each Bloc. She has no defence alliances, though a limited naval repair agreement exists with the USSR. She has her own defence industry but has bought most of her major military equipment from the USSR.

ALBANIA

Population: 2,800,000.
Military service: Army 2 years; Air Force, Navy and special units 3 years.
Total armed forces: 40,400 (22,400 conscripts).
Est GNP 1981: lek 11.900 bn ($2.380 bn).
Def budget 1982: lek 935 m ($155.8 m). 1983: 910 m ($137.3 m).
GDP growth: 4% (1982), 4% (1983).
Debt 1983: $5.4 bn.[1]
$1 = lek 5.0 (1981), 6.0 (1982), 6.63 (1983).

Army: 30,000 (20,000 conscripts).
1 tk bde.
5 inf bdes.
4 arty regts.
8 lt coastal arty bns.
70 T-34, 15 T-54, 15 T-59 MBT; 20 BA-64 armd; BRDM-1 scout cars; BTR-40/-50/-152, K-63 APC; M-1942, SU-76 SP 76mm, D-44 Type-56 85mm, M-1931 122mm, Type-59 130mm guns; M-1938, Type-60 122mm, M-1937, Type-66 152mm gun/how; D-1 152mm how; 82mm, 120mm, 160mm mor; Type-63 107mm MRL; T-21 82mm RCL; M-1942 45mm, M-1943 57mm, D-44, Type-56 85mm ATK guns; M-1939 37mm, S-60 57mm, KS-12 85mm, KS-19 100mm AA guns.[2]

RESERVES: 150,000.

Navy: 3,200 (1,000 conscripts).[2]
3 Sov *W*-class subs (1 trg).
2 Sov *Kronshtadt* large patrol craft.
6 Ch *Shanghai*-II FAC.
32 Ch *Huchwan* hydrofoil(.
12 Sov P-4 FAC(T)(.
9 Sov PO-2 patrol craft.
5 Sov minesweepers: 1 T-43 ocean, 4 T-301 inshore.
(Plus, in reserve: 1 *W*-class sub, 2 *Kronshtadt* patrol craft, 1 T-43, 2 T-301 minesweepers.)

Bases: Durres, Valona, Sazan I., Pasha Liman.

Air Force: 7,200 (1,400 conscripts); 100 combat ac.[2]
6 ftr sqns with 20 MiG-15/F-2, 30 MiG-17, 30 MiG-19/F-6, 20 Ch F-7.
1 tpt sqn with 3 Il-14M, 10 An-2.
2 hel sqns with 30 Mi-4.
1 trg sqn with MiG-15UTI.
SAM: Some 5 SA-2 sites.

RESERVES: 5,000.

Para-Military Forces: 12,500. Internal security force 5,000; frontier guard 7,500.

AUSTRIA

Population: 7,500,000.
Military service: 6 months recruit trg; 60 days reservist refresher trg during 15 years, 30–90 days additional for specialists.
Total armed forces: 50,000 (32,000 conscripts); some 70,000 reservists on refresher trg.
Est GDP 1983: OS 1,208 bn ($67.249 bn).
Def exp 1983: OS 14.844 bn ($826.365 m). Def budget 1984: 14.823 bn ($767.038 m).
GDP growth: 1.1% (1982), 1.5% (1983).
Inflation: 5.4% (1982), 3.3% (1983).
Debt 1982: $13.2 bn.
$1 = schilling 17.963 (1983), 19.325 (mid-1984).

Army: 45,300 (29,500 conscripts).
Army HQ.
Standing Alert Force (some 15,000):
1 mech div of 3 mech bdes (each 1 tk, 1 mech inf, 1 SP arty, 1 SP ATK bns), 1 comd, 1 AA, 1 engr, 1 sigs bns.
Standing Field Units:
Army: 1 HQ, 1 recce bns; 1 sigs, 1 log regts.
Corps: 2 HQ, 1 arty, 1 SP ATK, 2 AA, 3 engr, 2 sigs bns; 2 log regts.
Indep: 1 air-mobile, 2 mountain, 1 guards bns.
9 Regional (county) Commands.
28 *Landwehrstammregimente* (trg regts).
Peacetime: trg and maintenance.
Mobilization: active personnel for mobile and territorial forces.
Cadre Force (full strength on mobilization):
8 mobile bde HQ:
Bde tps (45,000): 24 inf, 8 arty, 8 engr/ATK, 8 comd/spt bns.
Territorial tps (82,000): 33 inf bns, 21 lt inf, 6 engr/ATK bns, 40 engr/ATK coys.

1 See p. 120 for footnotes.

AFV: 50 M-60A3, 120 M-60A1 MBT; 464 Saurer 4K4F APC.
Arty: 108 IFH 105mm, 24 FHM-1 155mm, 56 M-109 155mm SP how; 22 SFKM2 155mm fortress guns; 18 M-51 130mm MRL; 351 81mm, 105 M-2/M-30 107mm, 82 120mm mor; 552 20mm, 56 35mm towed, 38 M-42 40mm SP AA guns.
ATK: 300 M-68 105mm turret-mounted guns; *LAW* RL; 74mm, 84mm, 397 M-40 106mm RCL; 240 M-52/M-55 85mm towed, 225 *Kuerassier* JPz SK 105mm SP ATK guns.
(On order: 42 155mm SP how.)

RESERVES: 158,000; 970,000 have a reserve commitment.

Air Force:[3] 4,700 (2,500 conscripts); 32 combat ac.
1 Air Div HQ; 3 Air Regts:
4 FGA sqns with 32 Saab 105OE.
6 hel sqns with 12 AB-206A, 23 AB-212, 23 *Alouette* III, 12 OH-58B *Kiowa*, 17 AB-204.
1 trg/liaison sqn with 2 *Skyvan*, 12 *Turbo-Porter*, 6 O-1E, 18 Saab 91D, 19 L-19.
6 PC-7 *Turbo-Trainer* ac.
3 AD bns with 36 20mm, 18 35mm AA guns; *Super-Bat* and *Skyguard* AD systems.

Forces Abroad: Cyprus (UNFICYP): 1 inf bn (299). Syria (UNDOF): 1 inf bn (530). Other Middle East (UNTSO): 13.

CYPRUS

Population: 664,000 (500,000 Greek-, 150,000 Turkish-Cypriots, 14,000 others).

REPUBLIC OF CYPRUS.
Military service: conscription, 26 months.
Total armed forces: 10,000.
GDP 1982: £C 1.006 bn ($2.120 bn). Est 1983: 1.092 bn ($2.076 bn).
Est def exp 1982: £C 21.5 m ($45.301 m). 1983: 30.395 ($57.796 m).
GDP growth: 4.8% (1982), 2.6% (1983).
Inflation: 6.4% (1982), 5.1% (1983).
$1 = £C 0.4746 (1982), 0.5259 (1983).

National Guard:[4] 10,000.
1 armd bn.
2 recce/mech inf bns.
20+ inf bns (under strength).
7 arty gps.
8 spt units.
10 T-34 MBT; 100 EE-9 *Cascavel*, 20 Marmon-Harrington armd cars (in reserve); 17 BTR-50 APC; 130 M-1944 100mm, M-101 105mm and 25-pdr (88mm) guns and M-116 75mm how; Yug YMRL-32 128mm MRL; M-18 57mm, M-40 106mm RCL; M-55 20mm, 40mm, 3.7-in. (94mm) AA guns; 1 58-ft patrol craft; 2 AB-47J hel.
(On order: 84 VAB APC.)

RESERVES: 60,000 (have yearly refresher training): 30,000 immediate; 30,000 second-line.

Para-Military Forces: 3,000 armed police; 2 96-ft patrol boats, 1 *Islander* lt tpt ac.

NORTHERN CYPRUS
Military service: conscription, 24 months.
Est GDP 1982: TL 36.750 bn ($226.084 m).
Def exp 1982: TL 750 m ($4.61 m). Def budget 1983: 1.071 bn ($4.750 m).
$1 = Turkish lira 162.55 (1982), 225.46 (1983).

Security Forces: some 4,500.
7 inf bns.
1 armd coy.
8 T-34 MBT (operability questionable).

RESERVES: 5,500 first-line, 10,000 second-line.

FINLAND

Population: 4,840,000.
Military service: 8–11 months (11 months for officers and NCOs); three entries per year.
Total armed forces: 36,500 (25,000 conscripts; total mobilizable strength about 700,000).
GDP 1982: m 236.770 bn ($49.104 bn). 1983: 265.38 bn ($47.644 bn).
Est def exp 1983: m 4.400 bn ($789.932 m). Def budget 1984: 4.180 bn ($718.090 m).[5]
GDP growth: 2.6% (1982), 2.0% (1983).
Inflation: 10.4% (1982), 9.3% (1983).
Debt 1982: $19.1 bn.
$1 = markkaa 4.8204 (1982), 5.5701 (1983), 5.8210 (mid-1984).

Army: 30,900 (22,300 conscripts).
7 Military Areas; 25 Military Districts:
1 armd bde.
7 inf bdes (1 cdo).
2 fd arty regts.
2 coast arty regts.
7 indep inf bns.
2 indep fd arty bns.
3 coast arty bns (1 mobile).
1 AA arty regt (incl 1 SAM bn with SAM-79).
5 indep AA arty bns.
2 engr bns.
1 sigs regt, 1 bn.
T-54/55 MBT; PT-76 lt tks; BMP-1 MICV; BTR-50P, BTR-60 (to retire) APC; M-41 105mm, M-60 122mm, M-54 130mm guns; M-37/-61 105mm, M-38/D-30 122mm, M-40 150mm, ML-20 152mm, M-68/-74 155mm how; 81mm, 120mm mor; M-55 55mm, *Miniman* 74mm, SM-58-61 95mm RCL; SS-11, M-82 (AT-4 *Spigot*) ATGW; 20mm, ZU-23 23mm, 30mm, GDF-002 35mm, L-60/L-70 40mm, S-60 57mm towed, ZSU-57-2 SP AA guns; SAM-79 (SA-3), SAM-78 (SA-7) SAM.
(On order: T-72 MBT, 59 A-180 *Sisu* APC, *TOW* ATGW.)

Navy: 2,700 (1,400 conscripts).
2 *Turunmaa* corvettes.
6 FAC(G): 1 *Helsinki* with RBS-15SF SSM; 4 *Tuima* (Sov *Osa*-II), 1 *Isku* (experimental) with MTO-66 *(Styx)* SSM.
4 *Nuoli* FAC.
1 *Hurja* coastal patrol craft((experimental).
5 *R*-class large patrol craft.
3 minelayers (1 trg), 6 *Kuha*, 7 *Kiiski* inshore minesweepers.
1 HQ/log ship.
5 *Valas* tpts, 14 small LCU/tpts, 3 *Pukkio* spt ships; 6 *Hauki* tpts.
(On order: 3 *Helsinki* FAC(G), RBS-15SF SSM.)

Bases: Upinniemi (Helsinki), Turku.

Air Force: 2,900 (1,300 conscripts); 76 combat ac.
3 AD districts: 3 fighter wings.
3 ftr sqns with 27 MiG-21bis, 24 J-35S *Draken*.
1 OCU: 8 MiG-21U/UM, 3 J-35C, 8 *Hawk* trg ac.
1 recce flt with 6 MiG-21F.
1 tpt sqn: 2 C-47 (retiring), 3 F-27-100, 3 *Learjet* 35 ac; 1 hel flt with 6 Mi-8 (also SAR), 2 Hughes 500.
Trainers incl 15 *Magister*, 27 *Hawk*, 30 *Vinka* (Leko 70).
Liaison ac: 9 *Cherokee Arrow*, 6 *Chieftain*.
AAM: AA-2 *Atoll*, RB-27, RB-28 *(Falcon)*.
(On order: 10 J-35 *Draken AD*, 15 *Hawk* trg ac, AD system.)

RESERVES (all services): some 700,000 (36,000 a year do conscript training; 42,000 reservists: total obligation 40–100 days refresher training (average 8 days annually) between service and age 50; officers to 60). Some 210,000 would, with the Regulars, form the 'fast deployment force' to cover full mobilization. Mobilization units supporting general, local or spt forces are org in bdes, bns, etc., under Military Areas.

Forces Abroad: (UN only, not within Force totals): Cyprus (UNFICYP) 10. Syria (UNDOF) 1 bn (395). Lebanon (UNIFIL) 1 bn (495). Other Middle East (UNTSO) 21. Pakistan (UNMOGIP) 4.

Para-Military Forces: Ministry of Interior: Frontier Guards 3,500, four districts, 7 bns; Coastguard (600), 3 districts; 4 large, 9 coastal, 34 patrol craft; ac and 3 Mi-8 hel (SAR). (On order: 2 large patrol boats.)

IRELAND

Population: 3,550,000.
Military service: voluntary.
Total armed forces: 13,943.
GDP 1982: £E 12.436 bn ($17.687 bn). Est 1983: 13.943 bn ($17.405 bn).
Def exp 1982: £E 247.7 m ($352.297 m). 1983: 261.3 m ($326.177 m). Def budget 1984: 230.0 m ($256.955 m).
GDP growth: −1.4% (1982), 0.5% (1983).
Inflation: 17% (1982), 10.3% (1983).
Debt: $18.3 bn (1982), $19.6 bn (1983).
$1 = £E 0.7031 (1982), 0.8011 (1983), 0.8951 (mid-1984).

Army: 12,205.
1 inf force (2 inf bns).
4 inf bdes: 2 with 2, 1 with 3 inf bns, 1 fd arty regt, 1 motor recce sqn, 1 engr coy; 1 with 2 inf bns, 1 armd recce sqn, 1 fd arty bty.
Army tps: 1 tk sqn, 1 AD regt, 1 Ranger coy.
Total units:
11 inf bns (3 with MICV coy; UNIFIL bn *ad hoc* – dets from other bns).

1 tk sqn.
1 armd sqn.
3 recce sqns.
3 fd arty regts (each of 2 btys); 1 indep bty.
1 AD regt (1 regular, 3 reserve btys).
3 fd engr coys.
1 Ranger coy.
12 *Scorpion* lt tks; 20 AML-90, 32 AML-60 armd cars; 60 Panhard VTT/M3, 8 *Timoney* APC; 35 25-pdr (88mm) gun/how; 12 105mm lt guns; 199 60mm, 250 81mm, 92 120mm mor; 447 *Carl Gustav* 84mm, 96 PV-1110 90mm RCL; 4 *Milan* ATGW; 24 L/60, 2 L/70 40mm AA guns; 4 RBS-70 SAM.

RESERVES: 954 first-line, 14,377 second-line. 4 second-line Reserve Army Gps (garrisons): 2 Gps have 6 inf bns (1 Gp has 4, 1 has 2); 6 fd arty regts (2 Gps have 2; 2 have 1); 3 Gps have 1 motor sqn, 1 engr, 1 supply/tpt coy, 1 sigs coy; 3 AA btys (1 Gp has 2, 1 has 1).

Navy: 896 (to be increased to about 1,500).
1 P-31 offshore patrol vessel with 1 hel.
4 patrol vessels.
2 Br *Ton* coastal MCM (fishery protection).

Base: Cork.

RESERVES: 5 coys (361).

Air Force: 842; 15 combat ac.
3 Wings (1 trg):
1 COIN sqn with 6 CM-170-2 *Super Magister.*
1 COIN/trg sqn: 9 SF-260WE ac; 2 SA-342L *Gazelle* trg hel.
1 liaison sqn with 7 Cessna FR.172H, 1 FR.172K.
1 hel sqn with 8 *Alouette* III.
1 composite sqn with 3 *King Air* (2 MR, 1 trg), 1 HS-125-700 (VIP).
(On order: 5 AS-365F *Dauphin* II MR hel (2 for Navy).)

Forces Abroad: Cyprus (UNFICYP) 6. Lebanon (UNIFIL) 1 bn + (722); 4 AML-90 armd cars, 13 VTT/M3 APC. Other Middle East (UNTSO) 21.

MALTA

Population: 355,000.
Military service: voluntary.
Total armed forces: 800.
GDP 1982: £M 461.80 m ($1.123 bn).
Est def exp 1982: £M 6.20 m ($15.078 m). 1983: 6.50 m ($15.038 m).
FMA 1982: $3.642 m.
$1 = £M 0.4112 (1982), 0.4322 (1983).

Army: 800.
1 inf bn (incl 1 arty coy (6 40mm AA guns). RPG-7 RL; 50 ZPU-4 14.5mm quad machine guns.
1 task force.
1 marine section with 15 patrol craft(.
1 air flt with 1 AB-206 *Jet Ranger*, 3 *Alouette* III, 3 AB-47G hel (serviceability questionable).

Para-Military Forces: Reserves *(Id Dejma)* some 800: Voluntary general duties (500), women's service (280). Pioneers/labour corps, 3 bns; 1,000.

SWEDEN

Population: 8,380,000.
Military service: Army and Navy 7½–15 months, Air Force 8–12 months.
Total armed forces: 65,650 (47,850 conscripts;[6] mobilizable to about 800,000 in 72 hours, excl 500,000 auxiliary orgs). 25,000 civilians provide spt services.
GDP 1982: S kr 622.64 bn ($99.105 bn). 1983: 695.41 bn ($90.701 bn).
Def budget 1982/3: S kr 19.110 bn ($2.688 bn). 1983/4: 20.488 bn ($2.589 bn).[7]
GDP growth: 0.5% (1982), 2.3% (1983).
Inflation: 9.0% (1982), 8.9% (1983).
Debt: $36.8 bn (1981), $38.9 bn (1982).
CY: $1 = kronor 6.2826 (1982), 7.6671 (1983).
FY: $1 = kronor 7.1101 (1982/3), 7.9129 (1983/4).

Army: 47,000 (37,000 conscripts).[6]
6 Military commands; 26 Defence districts *(Laens).*
Peace establishment:
50 armd, cav, inf, arty, AA, engr and sig regts (local defence, cadre for mobilization, basic conscript trg).
War establishment (700,000 on mobilization, incl 100,000 Home Guard):
4 armd bdes.
1 mech bde.
19 inf, 5 *Norrland* bdes.
60 indep armd, inf, arty and AA arty bns.
1 army aviation bn (39 hel).
11 arty aviation platoons (66 ac).
Local Defence Districts: 100 indep bns, 400–500 indep coys and Home Guard units.
AFV: 340 Strv-101, Strv-102/-104 *(Centurion)*, 330 Strv-103B MBT; 200 Ikv-91 lt tks; Pbv-302 APC.
Arty: Type-4140 105mm, M-39 150mm, 155mm SP guns, FH-77 Model 50 155mm how; Bkv-1A 81mm, 120mm mor.
ATK: Miniman 74mm, *Carl Gustav* 84mm, PV-1110 90mm RCL; RB-53 *Bantam*, RB-55 *TOW* ATGW.
AD: 20mm, 40mm AA guns; RB-69 *(Redeye)*, RBS-70 (incl (late 1984) Lvrbv SP), RB-77 *(Improved HAWK)* SAM.
Avn: 66 SK-61C *(Bulldog)* ac; 15 HKP-3 (AB-204B) tpt, 10 HKP-5 (Hughes 300C) lt trg, 24 HKP-6 *(Jet Ranger)* utility hel.
(On order: Pvrbv 551 *TOW* veh.)

Navy: 9,650, incl coast arty (6,250 conscripts),[6] 10 combat hel.
12 subs: 3 *Näcken*, 5 *Sjöormen*, 4 *Draken*.
2 *Halland* destroyers.
28 FAC(G): 16 *Hugin* with 6 RB-12 *(Penguin)*, 12 *Spica* II (R-131) with RBS-15 SSM.
6 *Spica* I (T-121) FAC(T).
6 *Hanö* large, 10 coastal patrol craft.
2 minelayers, 1 minelayer/trg ships.
9 *Arko* coastal, 18 inshore minesweepers.
13 LCM, 74 LCU, 54 LCA.
5 coast arty bdes; 12 mobile, 53 static btys with 75mm, 105mm, 120mm, 152mm guns; RB-08, RB-52 SSM; 30 defence (arty/SSM/inf) bns and coys; coast rangers (coys); 10 coastal, 16 minelayers; 18 60-/70-class coastal patrol craft; 8 LCM, 81 LCU, 54 LCA.
2 hel sqns with 10 HKP-4 (Vertol 107) ASW/MCM, 3 HKP-2 *(Alouette* II) utility, 10 HKP-6 liaison.
(On order: 4 A-17 subs, 2 *Stockholm (Spica* III) FAC(G), 1 LCU, *Landsort* minehunters; RBS-15 SSM.)

Bases: Muskö, Härnösand, Karlskrona, Göteborg (spt only).

Air Force: 9,000 (4,600 conscripts),[6] 410 combat ac.
1 attack gp.
4 AD districts.
12 wings (liaison ac 48 SK-50 (Saab 91) *Safir*).
6 FGA sqns: 5 with 95 AJ-37 *Viggen*, 1 with 20 SK-60B/C (Saab 105).
12 AD sqns: 6 with 110 J-35F *Draken*, 2 with 36 J-35D, 4 with 70 JA-37 *Viggen*.
6 recce sqns with 52 SH/SF-37 *Viggen*.
2 OCU: 1 with 15 SK-37 *Viggen;* 1 with 12 SK-35C *Draken*.
1 tpt sqn with 8 C-130E/H, 2 *Caravelle*.
Comms units with SK-60A, 1 C-47, lt civil ac.
Trainers incl 124 SK-60A/B/C, 57 SK-61, 24 J-32B/D/E *Lansen* (drone).
1 SAR sqn with 10 HKP-4, 10 HKP-5 hel.
1 utility unit with 6 HKP-2, 7 HKP-3 hel.
AAM: Rb-24, AIM-9J/L *Sidewinder*, Rb-27 *(Falcon)*, Rb-28 *(Improved Falcon)*, Rb-71 *(Skyflash)*.
ASM: Rb-04E, Rb-05A, Rb-75 *(Maverick)*.
AD: Semi-automatic control and surveillance system, *Stril* 60, co-ordinates all AD components.
(On order: 76 JA-37 *Viggen*, 30 JAS-39 *Gripen* multi-role ac, RBS-15F ASM.)

RESERVES (all services): 735,500; voluntary auxiliary organizations 500,000.

Forces Abroad: Cyprus (UNFICYP): 1 inf bn (400). Lebanon (UNIFIL): HQ/log/medical tps (140).

Para-Military Forces: Coast Guard (550): 2 TV-171 fishery protection vessels, 67 patrol craft; (Air Arm) 2 Cessna 337G, 1 402C. Civil Defence: shelters for some 5 million people outside military ages (16–65).

SWITZERLAND

Population: 6,500,000.
Military service: 17 weeks recruit training followed by reservist refresher training of 3 weeks for 8 out of 12 years for *Auszug* (20–32), 2 weeks for 3 years for *Landwehr* (33–42), 1 week for 2 years for *Landsturm* (43–50).
Total armed forces: about 1,500 regular and 18,500 recruits[8] (mobilizable to some 1,100,000 incl Civil Defence in 48 hours).
GDP 1982: fr 196.0 bn ($96.537 bn). 1983: 202.66 bn ($96.546 bn).
Def exp 1983: fr 4.313 bn ($2.055). Def budget 1984: 4.476 bn ($1.974 bn).[9]
GDP growth: 1.2% (1982), 6.4% (1983).
Inflation: 6.6% (1981), 5.7% (1982), 3.0% (1983).
Debt 1982: $28.6 bn.
$1 = francs 2.0303 (1982), 2.0991 (1983), 2.2676 (mid-1984).

Army: *War establishment:* 580,000 on mobilization.
3 fd corps, each of 1 mech, 2 inf divs, corps units.
1 mountain corps of 3 mountain inf divs, corps units.
Fd corps tps: 3 infantry, 3 cyclist, 3 engr regts (3 bns); 3 sigs, 3 traffic control bns; 3 hel sqns, 3 lt ac flts.
Mountain corps tps: 1 mountain inf, 1 engr, 1 sigs regts; 7 indep inf, 2 pack horse bns; 1 traffic, 1 hel sqn.
17 indep bdes (11 frontier, 3 fortress, 3 redoubt).
6 Territorial Zones: 13 medical, 12 log, 11 civil def regts.
Indep units: 3 hy arty, 3 engr, 2 sigs regts.
20 Fortress Guard companies.
AFV: 300 Pz-55/57 *(Centurion)*, 160 Pz-61, 400 Pz-68 MBT; 1,350 M-113 APC.
Arty: 900 105mm Model-35 guns and Model-46 how; M-50 towed, 476 PzHb-66 (M-109U) 155mm SP how; RWK-014 30-tube 81mm MRL; 3,000 81mm, 120mm mor.
ATK: 1,340 Model-50/57 and 90mm ATK guns; 106mm RCL; 20,000 83mm RL; 6 MOWAG *Piranha* with *TOW;* 800 *Bantam, Dragon* ATGW.
AD: 1,200 20mm, 600 GDF-002 35mm AA guns.
Marine: 11 *Aquarius* patrol craft(.
(On order: 210 *Leopard* 2 MBT, 125 M-113 APC, *Dragon* ATGW.)

Air Force:[10] 45,000 on mobilization (maintenance by civilians); some 310 combat ac.
3 air regts.
11 FGA sqns; 2 with 32 F-5E and some *Venom* (in service to December 1984); 9 with 145 *Hunter* F58/T-68.
4 fighter sqns with 72 F-5E/F.
2 interceptor sqns with 31 *Mirage* IIIS/BS.
1 recce sqn with 16 *Mirage* IIIRS, 7 *Venom* FB-54.
4 liaison/SAR sqns with 16 *Porter*, 24 *Turbo-Porter*, 6 Do-27, 3 *Twin Bonanza*.
4 hel sqns with 21 *Alouette* II, 76 *Alouette* III hel.
Trainers incl 10 PC-7, 37 *Vampire* T-55, 65 *Vampire* DM-100 Mk 6, 2 *Mirage* IIIBS, 68 Pilatus P-3.
AAM: *Sidewinder*, AIM-26B *Falcon*.
ASM: AS-30.
1 air force fd bde (3 fd regts, 1 para coy, 1 lt ac wing).
1 airbase bde with 3 AA arty regts, each with 4 batteries of 20mm and 35mm guns.
1 AD bde with 1 SAM regt (2 bns, each of 2 btys; 64 *Bloodhound*), 7 AA arty regts (each of 3 btys; 20mm and 35mm guns, *Skyguard* fire control).
3 comd and comms, 1 log regts.
(On order: 4 F-5F ftrs; 30 PC-7 *Turbo-Trainer* ac; 60 *Rapier* SAM launchers (from end-1984); 500 AGM-65 *Maverick* ASM.)

RESERVES (all services): 625,000 (45,000 officers, 110,000 NCOs, 3,000 women auxiliaries).

Para-Military Forces: 480,000 (300,000 fully trained). Shelter programme for 5,108,000; emergency supplies and medical facilities.

YUGOSLAVIA

Population: 23,100,000.
Military service: 15 months.
Total armed forces: 239,700 (154,000 conscripts).
GMP[11] 1981: YD 2.208 bn ($63.147 bn). 1982: 2.903 bn ($57.741 bn).
Est def exp 1982: YD 119.0 bn ($2.367 bn). 1983: 150.58 bn ($1.622 bn).
GNP growth: 1.5% (1981), 0.0% (1982).
Inflation: 32% (1982), 39% (1983).
Debt 1982: $19.0 bn.
$1 = dinar 34.966 (1981), 50.276 (1982), 92.839 (1983).

Army: 191,000 (140,000 conscripts).
7 Military Regions:
10 inf divs.
8 indep tk bdes.
9 indep inf bdes (incl 3 mech, 3 lt).
3 'mountain' bdes.
1 AB bde (Air Force manned, Army control).
12 fd, 11 AA arty regts.
6 ATK regts.
4 SAM regts (SA-6).
AFV: 1,500 T-34/-54/-55, some T-72, 60 M-47 MBT; PT-76 lt tks; M-3A1, M-8, BRDM-2 scout cars; some M-80 MICV; 200 BTR-40/-50/-152, M-60 APC.
Arty: 1,800 M-1955, M-1931/-37 122mm, M-46 130mm and ML-20 152mm guns; M-48 76mm, 105mm incl SP, M-1938, D-30 and M-1974 SP, 122mm, 155mm how; 82mm, 120mm mor; M-73 and M-63 128mm MRL; 4 *FROG*-7 SSM.
ATK: M-1943, PAK-40 75mm, T-12 100mm, M-36B2 90mm towed and SP ATK guns; 57mm, M-60 82mm, M-65 105mm RCL; Bov-1 veh with ATGW; *Snapper, Sagger* ATGW.

AD: M-55/-75 20mm, M-53 30mm, M-1939 37mm, L/70 40mm, S-60 57mm, M-1944 85mm, M-127 90mm, 3.7-in. (94mm) towed, Bov-3 (20mm), M-53/59, ZSU-57-2 SP AA guns; SA-6/-7/-9 SAM.
(On order: some 500 M-80 MICV.)

RESERVES: 500,000; (mobilization troops to complete units to war establishment). (Some 500 T-34/85, M-4 MBT; 300 M-18 *Hellcat* 76mm, M-36B2 90mm SP ATK guns in store.)

Navy: 12,000 incl 1,500 marines (6,000 conscripts).
7 subs: 2 *Sava*, 3 *Heroj*, 2 *Sutjeska*.
2 *Koni* frigates with 4 *Styx* SSM, 1 × 2 SA-N-4 SAM.
3 corvettes: 2 *Mornar*, 1 *Le Fougueux* (reserve).
16 FAC(G) with *Styx* (6 *Rade Koncar*, 10 *Osa*-I).
15 Sov *Shershen* FAC(T).
24 large patrol craft: 10 *Kraljevica*, 7 Type 131, 7 *Mirna* (some in reserve).
31 minesweepers: 4 *Vukov Klanac* coastal, 10 inshore (4 *Ham*, 6 M-117), 17 river((10 M-301, 7 *Nestin*) (some in reserve).
13 DTM-211 LCU/minelayers, 22 601-type LCA.
1 ASW hel sqn with 10 Ka-25.
1 tpt hel sqn with 20 Mi-8, *Partizan (Gazelle)*.
2 marine bdes (2 regts, each of 2 bns).
25 coast arty btys with M-44 85mm, M-36 88mm, M-37 122mm, M-54 130mm, D-20 152mm guns; *Styx* SSM.
(On order: some 6 *Mirna* patrol craft.)

Bases: Lora/Split, Pula, Sibenik, Kardeljevo, Kotor.

Air Force: 36,700 (8,000 conscripts); some 420 combat ac, 20 armed hel.
2 air divisions:
12 FGA sqns with 25 *Kraguj*, 150 *Galeb/Jastreb*, some 25 *Orao*, some G-4 *Super Galeb*.
9 interceptor sqns with 130 MiG-21F/PF/M/bis, 20 MiG-21U.
2 recce sqns: 35 *Galeb/Jastreb* RJ-1, some *Orao*.
1 OCU: 30 *Galeb/Jastreb* J-1/Ty-1, some *Orao*.
2 tpt sqns: 15 C-47, 6 Yak-40, 2 An-12, 15 An-26, 2 DC-6B, 12 Il-14M, 2 *Mystère*-50 (VIP), 4 CL-215, PC-6.
Trainers incl 80 *Galeb/Jastreb*, 100 UTVA-75, UTVA-66 ac, 15 *Partizan* hel.
4 hel tpt sqns: 20 Mi-4, 70 Mi-8, 45 *Partizan*, 2 A-109 *Hirundo*. (Some 20 hel are armed.)
AAM: AA-2 *Atoll*.
ASM: AGM-65 *Maverick*.
Air Defence Force: (Army personnel, eqpt, Air Force control):
15 AA regts.
8 SA-2, 6 SA-3 SAM bns.
(On order: *Super Galeb*, some 180 *Orao* FGA, *Turbo-Porter* tpt ac, some 94 SA-341H *Partizan* hel.)

Para-Military Forces (under Army): Frontier Guards 15,000. Territorial Defence Force 1–3 million; mobile bdes, bns with arty and AA guns. Civil Defence 2 million on mobilization. Militia with TAB-71/-72 APC.

1 Estimated total since 1949.

2 Spares are short; some eqpt may be unserviceable.

3 Austrian air units, an integral part of the Army, are listed separately for purposes of comparison.

4 Mainly Greek-Cypriot conscripts, but some seconded Greek Army officers and NCOs.

5 Defence budget likely to increase as Government spending plans are revised.

6 There are normally some 95,000 more conscripts (70,000 Army, 4,500 Navy, 6,000 Air Force) plus 15,000 officer and NCO reservists doing 11–40 days refresher training at some time in the year. Obligation is 5 times per reservist between ages 20 and 47.

7 Plus a further budget of S kr 854.5 m for Civil Defence and S kr 525.6 m for economic defence (strategic material stockpiling, etc.). Additional funding for a defence development plan: S kr 2.2 bn for 1984–7.

8 Two recruit intakes a year (Jan/Jun) each of 17,000. Some 400,000 reservists a year do refresher training.

9 Including civil defence outlays.

10 Aviation Corps, an integral part of the Army.

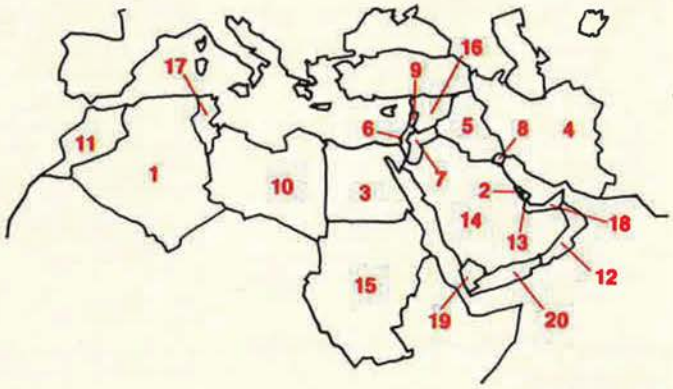
11 Gross Material Product.

The Middle East and North Africa

Bilateral Agreements with External Powers

The Soviet Union signed a fifteen-year Treaty of Friendship and Co-operation with Iraq in April 1972 and a further agreement in December 1978. A similar treaty was signed with Syria on 8 October 1980, and Soviet air defence units are deployed in Syria under this Treaty. A Treaty of Friendship and Co-operation, signed with South Yemen in October 1979, was ratified in February 1980, and an agreement of Joint Co-operation was signed in January 1983. Soviet units use Aden's naval and air facilities. All three countries have received significant Soviet arms deliveries. Despite this, Iraq has tried to broaden her contacts with the West, particularly with France and Italy. In November 1979 Iran unilaterally abrogated two paragraphs of a 1921 treaty under which Moscow reserves the right to intervene in Iran's internal affairs if a third country threatens to attack the USSR from Iranian territory. The USSR has refused to accept this abrogation. Egypt still has major stocks of Soviet-pattern equipment, and spares and supplies have been provided by other Warsaw Pact nations, the People's Republic of China, Western nations and domestic manufacture.

Bulgaria and the People's Democratic Republic of Yemen (South Yemen) signed a Protocol for Co-operation in April 1980 and a Treaty of Friendship and Co-operation on 14 November 1981. Similar agreements with Hungary were reported in April and November 1981. Libya signed treaties of Friendship and Co-operation with Bulgaria and Romania in January 1983. Sudan and Romania signed an agreement providing technical co-operation and training in November 1982.



THE MIDDLE EAST AND NORTH AFRICA

1. Algeria
2. Bahrain
3. Egypt
4. Iran
5. Iraq
6. Israel
7. Jordan
8. Kuwait
9. Lebanon
10. Libya
11. Morocco
12. Oman
13. Qatar
14. Saudi Arabia
15. Sudan
16. Syria
17. Tunisia
18. United Arab Emirates (UAE)
19. Yemen Arab Republic (North)
20. Yemen: People's Democratic Republic (South)

The United States concluded a mutual defence agreement with Israel in July 1952. A strategic co-operation understanding, reported in early 1982, led in March 1984 to a series of agreements covering aid and support, details of which have not been published. A similar agreement with Egypt (April 1952) was probably in abeyance between 1971 and 1975. A 1981 agreement enables the US to use Egyptian bases, but with significant reservations on Egypt's part. The status of US funding is in doubt. A similar agreement was reached with Morocco in May 1982. A 1959 mutual security agreement with Iran, though only an executive agreement, not a formally ratified treaty, has not been specifically abrogated. An agreement has been concluded with Oman to provide economic and military aid in exchange for permission to use Salalah and Masirah as staging bases. An agreement with Bahrain permits the US Navy to use port facilities. In November 1981 a strategic co-operation agreement was signed with Tunisia.

Britain concluded treaties of friendship with Bahrain, Qatar and the United Arab Emirates (UAE) in August 1971. She has supplied arms to Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan and the UAE. France has continuing arms-supply arrangements with Egypt, Iraq, Lebanon, Libya, Morocco, Sudan and Tunisia. West Germany has provided technical training assistance to Sudan under a 1982 agreement. Spain has reached a defence agreement with Morocco enabling her navy to use Moroccan ports. The benefits to Morocco have not been identified.

China signed a Treaty of Friendship with North Yemen in 1964, under which minor arms were provided. Arms and spare parts were sent to Egypt under agreements signed in 1978/9 and 1983. A military co-operation agreement was signed with Sudan in January 1982 and arms supplied. North Korea and Libya signed a Treaty of Alliance or Friendship and Co-operation in November 1982 which permits exchanges of military data, specialists and supplies.

Peace-Keeping Forces

The United Nations withdrew the 4,000-man United Nations Emergency Force (UNEF) from the Sinai on 24 July 1979; its duties were temporarily assumed by the United Nations Truce Supervisory Organization (UNTSO), 298 officers, which has been active in the region since 1949. The Egyptian/Israeli border is now patrolled by the 2,200-man Multi-national Force and Observers (MFO) under the Israeli/Egyptian peace treaty; contingents come from the US (1,100), Australia (110), Britain (35), Colombia (500), Fiji (469), France (40), Italy (90), the Netherlands (105), New Zealand (35) and Uruguay (70).

The United Nations also deploys in the Golan Heights the 1,279-man Disengagement Observer Force (UNDOF), made up of contingents from Austria (529), Canada (221), Finland (383) and Poland (151).

The United Nations Interim Force in Lebanon (UNIFIL) consists of some 6,285 men from France (496), Fiji (623), Finland (1,386), Ghana (557), Ireland (732), Italy (40), Netherlands (807), Norway (839), Senegal (559) and Sweden (144).

A Multi-National Force, set up in Beirut, Lebanon, in September 1982 to monitor the cease-fire and composed of Italian (2,038), French (1,100), US (2,000) and British (87) troops, was withdrawn in March 1984.

Arrangements within the Region

Algeria, Bahrain, Djibouti, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, the Palestine Liberation Organization (PLO), Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia and North and South Yemen are members of the League of Arab States (Egypt's membership was suspended in March 1979). Among its subsidiary bodies are the Arab Supreme Defence Council, comprising Foreign and Defence Ministers (set up in 1950), the Permanent Military Committee of army general staffs (1950), which is an advisory body, and the Unified Arab Command (1964).

Syrian and Palestine Liberation Army forces, comprising the Arab Deterrent Force, remain in northern Lebanon. Syria has reinforced her component and maintains a degree of control over the Arab guerrilla group elements in the Beqa'a Valley and northern Lebanon. Israeli forces, supported by a Lebanese militia, control the south.

Algeria and Libya signed a defence agreement in 1975; though a merger was discussed in 1982, this has not yet occurred. Egypt and Sudan came to a joint defence agreement in 1977. The Joint Defence Council's minutes of December 1981 were tantamount to another, and in October 1982 an 'Integration Charter' was signed, covering, amongst other activities, military policy. This Charter will be studied 'for 10 years', but Egyptian defence co-operation has been noted during successive crises between Sudan and Libya. Saudi Arabia has long supported Morocco against *Polisario* guerrillas; the two countries signed a security pact in February 1982. An understanding between Saudi Arabia and Iraq is believed to have been signed in 1979. Jordan and Iraq ratified a Defence agreement in March 1981. The Gulf Co-operative Council, created in May 1981 by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE, is developing a mutual defence structure to include a joint strike force, air defence, transport and procurement. It is being reinforced by internal security pacts between Saudi Arabia and Bahrain, Qatar, Oman (1982) and the UAE. A draft Gulf security agreement is being considered. Libya, South Yemen and Ethiopia formed an Aden Treaty Tripartite Alliance in 1981; it included a joint defence commitment but nothing more concrete has been reported. North and South Yemen have agreed to a merger (1981); the details remain obscure. Jordan, Morocco and North Yemen have announced the departure of unspecified numbers of volunteers to assist Iraq against Iran, but no formed units have been despatched. Iraq has stated that multi-national composite units have been formed; their roles are obscure at this time. Sudan and Ethiopia agreed on a regime of security, stability and noninterference in each other's internal affairs in July 1982.

Arms movements in the region are peculiarly complex. Egypt has supplied arms to Morocco, Sudan and Iraq. Algeria and Libya have supplied arms to *Polisario*, and most Arab countries have supplied Palestinian guerrillas with arms. In some cases a third nation funds the recipient's foreign arms purchases. Iran has reportedly received arms, supplies and spares from, *inter alia*,

Israel, North Korea and Eastern Europe and is also buying material on the open market in Western Europe. Iraq has apparently recently received arms from Egypt, the USSR, China, North Korea, France, Portugal and Brazil.

In 1975 an Arab Organization for Industrialization (AOI) was set up in Egypt under the aegis of Saudi Arabia, Qatar, the UAE and Sudan to encourage indigenous Arab arms production. Arab involvement ended following Egypt's rapprochement with Israel. Egypt has been entering into co-production agreements with Britain, France, the US and Yugoslavia. To replace the AOI, Iraq, Kuwait, Qatar, Saudi Arabia and the UAE agreed in 1979 to set up an $8-billion arms industry in the UAE. This proposal is still being studied by the Gulf Co-operative Council.

ALGERIA

Population: 21,700,000.
Military service: 6 months.
Total armed forces: 130,000.
GDP 1981: DA 188.1 bn ($43.584 bn), 1982: 206.3 bn ($44.924 bn).
Est def operating budget 1982: DA 3.893 bn ($847.742 m).[1] 1983: 4.200 bn ($877.046 m).[1]
GDP growth: 4.2% (1982), 7.3% (1983).
Inflation: 6.7% (1982), 4.0% (1983).
Debt: $15.5 bn (1982).
$1 = dinar 4.3158 (1981), 4.5922 (1982), 4.7888 (1983).

Army: 110,000.
7 Military Regions.
2 armd bdes.
5 mech bdes.
6 mot inf bdes.
1 AB/special force bde.
28 indep inf bns.
2 para bns.
5 indep arty bns.
11 AD bns.
4 engr bns.
12 coys desert troops.
AFV: 300 T-54/-55, 300 T-62, 100 T-72 MBT; 100 BRDM-2 armd cars; 500 BMP-1 MICV; 350 BTR-50/-60, 300 BTR-152 APC.
Arty: 60 ZIS-3 (M-1942) 76mm, 100 D-44 85mm, 150 M-1931/37 122mm towed, 40 ISU-122, 30 M-1974 122mm, 30 ISU-152 152mm SP guns; 40 M-1938, 150 D-30 122mm, 20 M-1937 152mm towed how; 150 BM-21 122mm, 20 BM-24 240mm MRL; 160 120mm, and 160mm mor.
ATK: 90 215-2 57mm, 50 SU-100 SP guns; 20 AT-3 *Sagger, Milan* ATGW.
AD: 440 37mm, 57mm, 85mm, 100mm, 130mm towed, 100 ZSU-23-4 and ZSU-57-2 SP AA guns; 18 SA-6, SA-7/-9 SAM.
(On order: 44 Panhard M-3 APC.)

RESERVES: up to 100,000.

Navy: 8,000.
2 *R*-class subs.
2 *Koni* frigates with 2 × 2 SA-N-4 SAM.
3 *Nanuchka* corvettes with 4 SS-N-2b SSM, 2 × 2 SA-N-4 SAM.
12 FAC(G) with *Styx* SSM; 3 *Osa*-I, 9 *Osa*-II.
4 Brooke Marine FAC.
1 T-43 ocean minesweeper (in reserve).
1 *Polnocny* LCT, 1 *Brooke* LST.
(On order: 2 FAC(G), 1 LST.)

Bases: Algiers, Annaba, Mers el Kebir.

Air Force: 12,000; some 300 combat ac, 37 armed hel.
7 FGA sqns: 2 with 20 Su-7BM; 2 with 60 MiG-17; 3 with some 40 MiG-23BM, some 18 Su-20 (*Fitter C*).
4 interceptor sqns: 3 with 95 MiG-21MF/F; 1 with 18 MiG-25 *Foxbat* A.
1 recce sqn with 4 MiG-25R *Foxbat* B.
1 COIN sqn with 24 *Magister.*
1 MR sqn with 7 F-27 (Navy-assigned).
1 OCU with 4 MiG-15.
1 tpt sqn with 8 An-12, 8 C-130H, 6 C-130H-30, 1 Il-18, 1 *Mystère-Falcon*, 1 *Caravelle.*
6 hel sqns with 4 Mi-6, 28 Mi-4, 12 Mi-8, 37 Mi-24, 5 *Puma*, 6 Hughes 269A, 4 *Alouette* II.
Other ac incl 6 *King Air*, 2 *Super King Air* T-200T (MR), 3 *Queen Air.*
Trainers incl MiG-15/-17/-21UTI, Su-7U, 2 MiG-23U, 3 MiG-25U, 6 T-34C.
1 SAM regt: 24 SA-2 (96 msls), some 20 SA-3.
AAM: AA-2 *Atoll.*

Para-Military Forces: Gendarmerie 24,000: 44 Panhard M-3 APC. Coastguard 550: 2 P-2 FAC(T)(16 *Baglietto* FAC(G)((6 Gemini 36, 10 Type 20).

BAHRAIN

Est population: 400,000.
Military service: voluntary.
Total armed forces: 2,800.
GDP 1981: BD 1.698 bn ($4.516 bn), 1982: 1.736 bn ($4.617 bn).
Est def exp 1982: BD 84.1 m ($223.670 m).[2] 1983: 95.2 m ($253.191 m).[2]
GDP growth: 6.7% (1982), 5.0% (1983).
Inflation: 8.9% (1982), 3.0% (1983).
Debt: $410 m (1982).
$1 = dinar 0.3760 (1981/2/3).

Army: 2,300.
1 bde:
1 inf bn.
1 armd car sqn.
1 arty, 2 mor btys.
8 *Saladin*, 20 AML-90 armd, 8 *Ferret* scout cars; 110 M-3 APC; 8 105mm lt guns; 6 81mm mor; 6 120mm RCL; *TOW* ATGW; 6 RBS-70 SAM.
(On order: 7 M-198 155mm how; *TOW* ATGW.)

Navy: 300.
2 Lürssen 45-metre FAC(G) with 4 *Exocet* SSM.
2 Lürssen 38-metre FAC.

Air Force: 200.
1 hel sqn with 10 AB-212.

Para-Military Forces: Coastguard: 180; 16 coastal patrol craft, 2 landing craft (1 *Loadmaster*, 1 60-ft). Police: 2,500; 2 Bell 412, 2 *Scout*, 3 BO-105, 2 Hughes 500D hel.

EGYPT

Population: 47,200,000.
Military service: 3 years (selective).
Total armed forces: 460,000 (255,000 conscripts).
GNP 1982: £E 20.396 bn ($29.141 bn). 1983: 22.225 bn ($31.755 bn).
Def budget 1982/3: £E 1.746 bn ($2.495 bn). 1983/4: 2.130 bn ($3.043 bn). Est 1984/5: 2.600 bn ($3.715 bn).
GDP growth: 6.5% (1982), 7.3% (1983).
Inflation: 15% (1982), 16% (1983).
Est FMA: $1 bn (1982), $1.5 bn (1983).
Debt: $22.2 bn (1982).
$1 = £E 0.6999 (1982/4).

Army: 315,000 (180,000 conscripts).[3]
3 Army HQ.
3 armd divs (each with 1 armd, 2 mech bdes).
5 mech inf divs (each with 2 mech, 1 armd bdes).
4 inf divs (each with 2 inf, 1 mech bdes).
1 Republican Guard Div (2 bdes).
2 indep armd bdes.
9 indep inf bdes.
2 airmobile, 1 para bdes.
12 arty bdes.
2 hy mor bdes.
6 ATGW bdes.
7 cdo gps.
2 SSM regts (1 with *FROG*-7, 1 with *Scud* B).
AFV: 800 T-54/-55, 600 T-62, some 350 AM-60 (M-60A3) MBT; 30 PT-76 lt tks; 300 BRDM-1/-2 scout cars; 200 BMP-1, 250 BMP-600P MICV; 2,500 OT-62, *Walid*, *Fahd*, BTR-40/-50/-60/-152, 550 M-113A2 APC.
Arty: 1,500 85mm, M-1955, 200 SU-100 SP 100mm, D-30 122mm, M-46 130mm, SU-152 SP 152mm and S-23 180mm guns; M-1938 122mm, M-1943 152mm how; 400 120mm, 160mm and 240mm mor; about 300 122mm (incl *Saqr* 30), 132mm, 140mm and 240mm MRL; 12 *FROG*-7, 12 *Scud* B SSM.
ATK: 900 57mm (incl SP), 76mm and 100mm guns; 900 82mm and B-11 107mm RCL; 1,000 *Sagger, Snapper, Swatter, Milan, Beeswing, Swingfire* and *TOW* ATGW.
AD: 350 ZSU-23-4 and ZSU-57-2 SP AA guns; 75 SA-6, SA-7/*as-Saqr*, SA-9, 16 *Crotale* SAM.
(On order: some 300 M-60A3 MBT; 350 BMR-600P, some 500 M-113A2 APC; M-109A2 155mm SP how; JPz SK-105 SP ATK guns, 52 M-901 SP *TOW* AFV; 100 M-106A2 and M-125A2 mor carriers; 200 *TOW* launchers, 4,000 msls (incl 2,500 *Improved TOW*), 2,000 *Swingfire* ATGW; *as-Saqr* (SA-7), *Skyguard* twin 35mm/*Sparrow* SAM AD systems, 4 *Crotale* SAM.)

RESERVES: about 300,000.

Navy: 33,000 (15,000 conscripts).[3]
12 subs: 8 *R*-class (4 Ch), 4 Sov *W*-class.
5 destroyers: 4 Sov *Skory* (1 with 1 × 2 *Styx* SSM), 1 Br Z-class.
5 frigates: 2 Spanish F-30 (*Descubierta*); 3 Br (1 *Black Swan*, 1 *Hunt*, 1 *River* (trg and sub spt ship)).
24 FAC(G): 6 *Ramadan*(with 4 *Otomat* SSM; 6 *October-6* (P-6)(with 2 *Otomat*; 8 Sov *Osa*-1 with 4 *Styx* SSM, SA-7 SAM; 4 *Komar* with 2 SS-N-2A SSM(.
22 large patrol craft: 12 Sov SO-1, 6 with 40 BM-21 122mm MRL, some with SA-7 SAM; 4 Ch *Hainan*, 6 *Timsah.*
14 Sov FAC(T): 2 *Shershen*, 8 P-6(, 4 P-4 with 1 × 8 122 mm MRL(.
14 Sov FAC with 1 BM-21 122mm MRL: 4 *Shershen* with SA-7 SAM; 12 P-6 with BM-21 or 1 × 12 BM-24 240mm MRL(.
12 Sov minesweepers: 10 ocean (6 T-43, 4 *Yurka*), 2 T-301 inshore.
3 SRN-6 hovercraft (may be minelayers).
3 Sov *Polnocny* LCT.
13 Sov LCU (9 *Vydra*, 4 SMB1).
1 ASW hel sqn with 6 *Sea King* Mk 47.
Coastal defence unit (Army manpower, Navy control): SSM-4-1 130mm guns, 30 *Otomat* and *Samlet* SSM.
(On order: 4 *Lüda* DDG; 6 *Cormoran* FAC(G); 6 *Shanghai* II FAC, 2 *Hainan*, 9 *Swift*, 12 *Timsah* patrol boats; 14 SRN-6 hovercraft; 16 *Harpoon, Otomat* SSM.)

Bases: Alexandria, Port Said, Mersa Matruh, Port Tewfig, Hurghada, Safaqa.

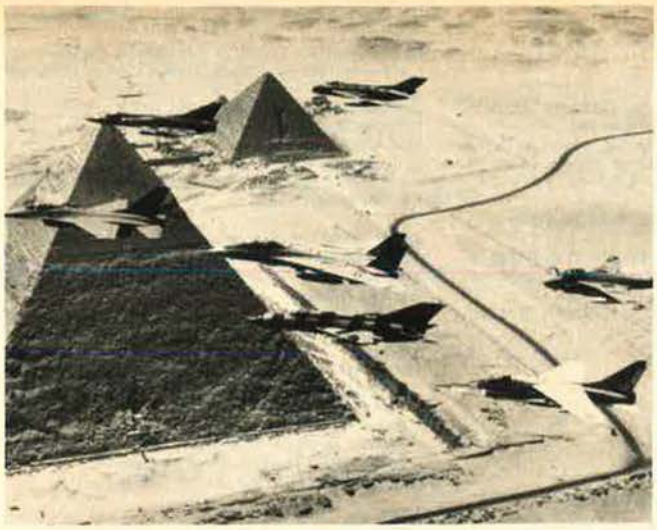
RESERVES: about 15,000.

Air Force: 27,000 (10,000 conscripts); 504 combat ac, 36 armed hel (incl AD comd).[3]
5 FGA regts: 2 with 33 F-4E, 44 Ch F-6; 2 with 50 MiG-17F (replacing with *Alpha Jet* MS-2 (6)), 36 Su-7BM; 1 with 53 *Mirage* 5SDE2.
2 recce sqns with 6 *Mirage* 5SDR, 12 MiG-21R/RF, 20 Su-7.
1 MR sqn with 5 Il-28.
ELINT ac: 2 EC-130H, 2 E-2C *Hawkeye.*
4 hel sqns with some 64 *Gazelle* (some 36 with *HOT* ATGW).
1 tpt bde of 5 sqns with 21 C-130H, 18 Il-14, 10 An-12, 4 *Falcon* 20 (VIP), 10 DHC-5D *Buffalo*, 1 Boeing 707, 1 Boeing 737.
8 utility hel sqns with 20 Mi-4, 40 Mi-8, 52 SA-342H, 4 SA-342K *Gazelle*, 25 *Commando* (2 VIP), 15 CH-47C.
Trainers incl F-7, F-6, MiG-21U/US, 11 *Alpha Jet* MS-1, 59 L-29 (being replaced), 60 *Gomhouria*, 36 Yak-18, *Wilga* 35/80, 4 FT-6, 6 *Mirage* 5SDD, 6 F-16B.
AAM: AA-2 *Atoll*, R-530, *Sparrow*, AIM-9P3, -9L, *Sidewinder.*
ASM: AS-1 *Kennel*, AS-5 *Kelt, Maverick, HOT.*
(On order: Some 55 Ch F-7 (MiG-21-type), 40 F-16C/D, 40 *Mirage* 2000, 16 *Mirage* 5E2 ftrs; 42 Ch F-6, some 33 *Alpha Jet* (11 MS-2 FGA, 9 MS-1 trg); 2 E-2C AEW; 6 C-130H tpt, 120 EMB-312 *Tucano* trg ac; 12 *Sea King* ASW, *Super Puma*, 24 *Cobra* with *TOW*, 15 CH-47, 18 UH-12E, 24 *Gazelle* (some 12 with *HOT* ATGW), 4 AS-61 hel; *Sparrow*, 150 *Sidewinder* AAM; *Exocet* AM-39, *Maverick* ASM.)

RESERVES: about 20,000.

Air Defence Command: 85,000 (50,000 conscripts): (230 combat ac).[3]
12 centres under construction.
2 AD divs: regional bdes.
100 msl and AA bns, radar bns; some 60 SA-2 (360 launchers), 50 SA-3 (200 launchers) sites. 360 SA-2, 200 SA-3, 75 SA-6, 12 *Improved HAWK* (36 msls), 16 *Crotale* SAM; 2,500 20mm, 23mm, 37mm, 40mm, 57mm, 85mm and 100mm AA guns; AN/TPS 63, AN/TS9-73, *Fan Song, Flat Face* P-15, *Spoon Rest* P-12, *Low Blow, Straight Flush* missile/gun and *Squint Eye, Long Track* EW radars.

[1] See p. 127 for footnotes.



Egyptian and US fighters fly over the Pyramids during Operation Bright Star. Pictured aircraft include (left to right) Egyptian F-4E, F-16, Mirage, US Navy F-14, Egyptian MiG-21, and MiG-19. The Egyptian Air Force flies American-, French-, and Soviet-built aircraft.

3 interceptor bdes: 235 combat ac.
5 sqns with 122 MiG-21F/PFS/FL/PFM/M/MF, 2 with 25 F-7; 2 with 34 F-16A, 54 *Mirage* 5SDE1.
(On order: Ch CSA-1, *Spada*, LPD-20 search radar; 8 btys totalling 96 launchers, 288 *Improved HAWK* SAM.)

Forces Abroad: Iraq, Oman, Sudan, Somalia, Zaire.

Para-Military Forces: 139,000: National Guard, 60,000; Frontier Corps, 12,000; Defence and Security, 60,000; Coast Guard, 7,000; 3 *Nisr*, 6 *Crestitalia*, 6 *Bertram* patrol boats, 34 rescue launches.

IRAN

Population: 42,500,000.
Military service: 24 months.
Total armed forces: 555,000 regular. Paramilitary forces recruited for specific offensives could add 200,000–250,000.
GDP 1981: rial 7,271 bn ($92.828 bn). 1982: 8,700.0 bn ($104.063 bn).
Est def exp 1982/3: rial 1,300 bn ($15.550 bn). 1983/4: 1,500 bn ($17.370 bn).
GDP growth: 5.6% (1981), 5.0% (1982).
Inflation: 23.0% (1982), 20% (1983).
Debt: $3.4 bn (1982).
$1 = rial 78.328 (1981), 83.603 (1982), 86.358 (1983).

Army: 250,000 (100,000 conscripts).
3 mech divs (each 3 bdes: 9 armd, 18 mech bns).
7 inf divs.
1 AB bde.
2 Special Forces divs.
Some indep armd, inf bdes.
12 SAM bns with *HAWK*.
Ground Forces Air Support units.
AFV: 100 T-54/-55, 50 T-62, 100 T-72, 300 *Chieftain* Mk 3/5, 200 M-47/-48, 250 M-60A1 MBT; 50 *Scorpion* lt tks; 130 EE-9 *Cascavel* armd cars, 180 BMP-1 MICV; about 280 M-113, 600 BTR-40/-50/-60/-152 APC.
Arty: some 1,000 M-116 75mm pack, M-1965 85mm, M-46 130mm towed, 30 M-107 175mm SP guns; M-101 105mm, M-109A1 SP 155mm, M-115 towed, 10 M-110 SP 203mm how; 65 BM-21 122mm MRL; 81mm, M-30 4.2-in. (107mm), 3,000 120mm mor.
ATK: 57mm, 75mm, M-40 106mm RCL; RPG-7 RL; some 120 ASU-85 SP guns; *ENTAC*, SS-11/-12, *Dragon*, *TOW* ATGW.
AD: 1,500 ZU-23 towed, ZSU-23-4 SP 23mm, 37mm towed, ZSU-57-2 SP 57mm, 85mm towed AA guns; *HAWK*/*Improved HAWK*, SA-7 SAM.[4]
Ac incl 46 Cessna (40 185, 6 310), 10 O-2A, 2 F-27, 5 *Shrike Commander*, 2 *Falcon*.[4]
Hel: AH-1 *Cobra*, CH-47C, (270 Bell 214A, 35 AB-205A, 15 AB-206 were also held).[4]

RESERVES: 350,000, ex-service volunteers. '*Quds*' bns.

Revolutionary Guard Corps *(Pasdaran):* 250,000; 8 div-sized formations, org in bns, serve indep or with Army; small arms, spt weapons from Army. Naval element; some Air.

Navy: 20,000, incl naval air and marines.[4]
3 destroyers with 4 *Standard* SSM; 1 Br *Battle* with 1 × 4 *Seacat* SAM; 2 US *Sumner* (in reserve).
4 *Saam* frigates with 1 × 5 *Seakiller* SSM, 1 × 3 *Seacat* SAM (1 probably non-operational).
2 US PF-103 corvettes.
10 *Kaman* (*La Combattante* II) FAC(G) with a total of 7 *Harpoon* SSM (?6 serviceable).
7 large patrol craft: 3 Improved PGM-71, 4 *Cape*; (5 lost?).
3 US coastal, 2 inshore minesweepers; (2 lost?).
10 SRN-6, BH-7 hovercraft.
2 landing ships, 1 US LCU.
2 fleet supply ships.
3 Marine bns.
(On order: 1 replenishment ship.)

Bases: Bandar Lengeh, Bandar Abbas, Bushehr, Kharg, Bandar-e-Anzali, Bandar-e-Khomeini.

NAVAL AIR: 2 combat ac, 12 combat hel (may be under Air Force control).[4]
1 MR sqn with 2 P-3F *Orion* | may have
1 ASW hel sqn with 10 SH-3D | combined.
1 MCM hel sqn with 2 RH-53D.
1 tpt sqn with 4 *Shrike Commander*, 4 F-27, 1 *Mystère* 20, 7 AB-212.

Air Force: 35,000; perhaps 95 serviceable combat ac.[4]
4 FGA sqns with some 35 F-4D/E.
4 FGA sqns with some 50 F-5E/F.
1 recce sqn (dets) with some 10 F-14A, 3 RF-4E.
2 tanker/tpt sqns with 12 Boeing 707, 7 747.
5 tpt sqns with 28 C-130E/H, 10 F-27, 2 *Aero Commander* 690, 4 *Falcon* 20.
Hel: 10 HH-34F, 10 AB-206A, 5 AB-212, 39 Bell 214C, 10 CH-47 *Chinook*, 2 S-61A4.
Trainers incl F33A/C *Bonanza*, T-33, 6 PC-7.
5 SAM sqns with *Rapier*, 25 *Tigercat*.
AAM: *Phoenix*, *Sidewinder*, *Sparrow*.
ASM: AS-12, *Maverick*.

Forces Abroad: Lebanon: some 650 Revolutionary Guard.

Para-Military Forces: Basidj 'Popular Mobilization Army' volunteers, mostly youths, small arms, ancillary to main field forces. Gendarmerie (5,000 incl border guard element); *Mostazafin* (Guards); *Hezbollahi* (Home Guard) 2,500,000; Border Tribal Militia. Cessna 185/310 lt ac, AB-205/-206 hel, patrol boats.[4]

IRAQ

Population: 14,900,000.
Military service: basic 21–24 months, extended for war.
Total armed forces: 642,500 (mostly conscripts).
Est GDP 1981: ID 9.4 bn ($31.832 bn). 1982/3: 10.324 bn ($34.600 bn).
Est def exp 1982: ID 2.40 bn ($8.043 bn). 1983: 3.20 bn ($10.296 bn).
GDP growth: −5.0% (1982), −7.4% (1983).
Inflation: 16% (1982), 18% (1983).
Est FMA: $25–35 bn (1981/3).
Debt: $6.2 bn (1982).[5]
$1 = dinar 0.2953 (1981), 0.2984 (1982), 0.3108 (1983).

Army: 600,000.[4]
4 corps HQ.
6 armd divs.
5 mech/mot inf divs.
5 inf divs.
4 mountain divs.
2 Republican Guard armd bdes.
3 special forces bdes.
9 Reserve bdes.
15 Peoples Army/Volunteer inf bdes.
AFV: 4,500 T-54/-55/-62/-72, 260 Ch T-69, 60 Romanian M-77 MBT; 100 PT-76 lt tks; about 3,200 AFV, incl BRDM, FUG-70, ERC-90, MOWAG *Roland*, 200 EE-9 *Cascavel*, EE-3 *Jararaca* armd cars, BMP MICV, BTR-50/-60/-152, OT-62/-64, 100 VCRTH (with *HOT* ATGW), Panhard M-3, EE-11 *Urutu* APC.
Arty: some 3,500 guns incl 75mm pack, 1,000 85mm, 50 SU-100 100mm SP, D-30 and ISU 122mm SP and M-46 130mm; 150 GHN-45 155mm gun/how; M-56 pack, M-102 105mm, M-1938, SP-74 122mm, M-1943, M-1955 towed, M-1973 SP 152mm, M-114, M-109 SP 155mm how; FGT 108-R (SS-06) 108mm, BM-21 122mm, BM-14 140mm MRL; 19 *FROG*-7, 9 *Scud* B, 15 SS-12 SSM; 120mm, 160mm mor.
ATK: SPG-9 73mm, B-10 82mm, 107mm RCL; 85mm, 100mm towed, 100 JPz SK-105 105mm SP guns; *Sagger*, SS-11, *Milan*, *HOT* ATGW.
AD: 4,000 23mm, ZSU-23-4 SP, M-1939 and twin 37mm, 57mm incl ZSU-57-2 SP, 85mm, 100mm and 130mm AA guns; SA-2/-3/-6/-7/-9, 30 *Roland* SAM.
(On order: 140 M-77, T-62 MBT; 100 EE-9 *Cascavel*, EE-3 *Jararaca* armd cars; 80 EE-11 *Urutu* APC; 85 155 GCT 155mm SP guns; SP-73 152mm SP how; 6 *Astros* MLRS; SS-11 ATGW; X-40, *Scud* B SSM; SAM.)
(Some captured Iranian eqpt, incl tks, AFV, arty, ATGW, has been taken into service.)

RESERVES: 75,000.

Navy: 4,500.[6]
1 frigate (trg).
10 Sov *Osa* FAC(G) with 4 *Styx* SSM.
5 Sov large patrol craft: SO-1, *Poluchat*((2 or 3 lost?).
12 Sov P-6 FAC(T)((7 lost?).
10 Sov coastal patrol craft: *Nyryat* II, PO 2, *Zhuk*((5 lost?).
5 minesweepers: Sov T-43 ocean, *Yevgenya*(inshore.
4 Sov *Polnocny* LCT (1 lost?).
1 spt ship.
(On order: 4 *Lupo* frigates, 6 Italian 650-ton corvettes.)

Bases: Basra, Umm Qasr.

Air Force: 38,000 incl 10,000 AD personnel; some 580 combat ac, some 150 armed hel.[6]
2 bbr sqns: 1 with perhaps 7 Tu-22, 1 with 8 Tu-16 (ex-Egypt).
11 FGA sqns: 4 with some 100 MiG-23BM; 6 with some 95 Su-7 and 80 Su-20; 1 with 12 (2?) *Hunter* FB-59/FR-10; 5 *Super Etendard*.
5 interceptor sqns with some 25 MiG-25, some 40 MiG-19, some 150 MiG-21, 45 *Mirage* F-1EQ, 4 F-1BQ.
1 recce sqn with 5 MiG-25.
2 tpt sqns with 10 An-2, 10 An-12, 8 An-24, 2 An-26, 9 Il-76, 2 Tu-124, 13 Il-14, 1 *Heron*.
11 hel sqns with 35 Mi-4, 15 Mi-6, 150 Mi-8, 40 Mi-24, 40 *Alouette* III (some with AS-12 ASM), 11 *Super Frelon* (some with *Exocet* AM-39 ASM), 50 (15?) *Gazelle* (some with *HOT*), 13 *Puma*, 30 BO-105 (some with SS-11), 7 *Wessex* Mk 52.
Trainers incl MiG-15/-21/-23U, Su-7U, *Hunter* T-69, 10 Yak-11, 50 L-29, 40 L-39, 48 AS-202/18A, 16 *Flamingo*, 50 PC-7 *Turbo-Trainer*.
AAM: *Magic* I, R-530, R-550, AA-1/-2/-6/-7/-8.
ASM: 360 *HOT*, AS-11/-12, *Swatter* ATGW, *Exocet* AM-39, AS-4 *Kitchen*, AS-5 *Kelt*.
(On order, status unclear: some 100 MiG-23/-25, 39 *Mirage* F-1 ftrs; 80 EMB-312 *Tucano* trg ac; 3 *Super Frelon*, 10 *Gazelle*, *Lynx*, 26 *Puma*, Mi-24, 6 AS-61TS, 8 AB-212 (ASW) hel; MPS-1, 20 *Exocet* AM-39 ASM; Super 530 AAM.)

Para-Military Forces: Frontier Guards; security troops 4,800; People's Army 650,000; Perhaps 10,000 volunteers from Arab countries.

ISRAEL

Population: 4,200,000.
Military service: men 39 months, women 24 months (Jews and Druze only; Christians may volunteer). Annual training for reservists thereafter up to age 54 for men, 34 (or marriage) for women.
Total armed forces: 141,000 (98,300 conscripts); mobilization to 500,000, of which 100,000 can report in about 24 hours.
GDP 1982: IS 557.613 bn ($22.978 bn). Est 1983: 1,350 bn ($24.015 bn).
Est def exp 1982: IS 200.0 bn ($8.242 bn). 1983: 280.0 bn ($4.981 bn). 1984: $4–8 bn.[7]
GDP growth: 1.2% (1982), 1.1% (1983).
Inflation: 120.4% (1982), some 150% (1983).
FMA: some $1.5 bn (1982), some $1.7 bn (1983).
Debt: $28 bn (1982).
$1 = shekels 24.267 (1982), 56.214 (1983).

Army: 104,000 (88,000 conscripts, male and female). 600,000 on mobilization, incl civil defence units.
11 armd divs.
33 armd bdes (3 tk, 1 mech inf bns).
10 mech inf bdes (5 para-trained).
12 territorial/border inf bdes with *Nahal* militia.
15 arty bdes (each 5 bns of 3 btys).
AFV: 3,600 MBT, incl 1,100 *Centurion*, 600 M-48, 1,210 M-60, 250 T-54/-55, 150 T-62, 250 *Merkava* I/II; about 4,000 AFV/recce incl *Ramta* RBY, BRDM-1/-2, *Shoet* Mk 2, M-2/-3; 4,000 M-113, OT-62, BTR-50P APC.[8]
Arty: M-46 130mm, 140 M-107 175mm SP guns; 70 M-101 105mm, 100 D-30 122mm, M-68/-71 155 mm towed, 300 Soltam L-33, M-50, M-72, 300 M-109 155mm, 48 M-110 203mm SP how; 122mm, 160mm, BM-24 240mm, MAR-290 290mm MRL; *Lance* SSM; 900 81mm, 120mm and 160mm mor (some SP).[8]
ATK: B-300 82mm RL; 106mm RCL; *TOW, Cobra, Dragon, Picket, Milan* ATGW.
AD: 2 btys with 24 *Vulcan/Chaparral* 20mm gun/msl systems, 900 20mm, ZSU-23-4 23mm SP, 30mm and 40mm AA guns; *Redeye* SAM.
(On order: 125 M-60 MBT; *Re'em* AFV; 800 M-113 APC; 200 M-109A1B SP 155mm how, M-107 175mm SP guns; *Lance* SSM; *TOW, Dragon* ATGW.)

Navy: 9,000 (3,300 conscripts), 10,000 on mobilization.
3 Type 206 subs.
4 *Aliya* (*Saar*-4.5) corvettes with 4 *Gabriel* and 4 *Harpoon* SSM, 1 Bell 206 ASW hel.
20 FAC(G): 8 *Reshef* (*Saar*-4) with 5 *Gabriel* III and 4 *Harpoon* SSM; 6 *Saar*-2 with 6 *Gabriel;* 6 *Saar*-3 with 5–8 *Gabriel.*
2 *Flagstaff* 2 hydrofoil FAC(G) with 2 *Gabriel* and 2 *Harpoon* SSM.
45 coastal patrol craft(: 37 *Dabur*, 2 *Dvora*, 6 *Hawk.*
3 LSM, 6 LCT, 3 LCU.
4 *Seascan* 1124N MR ac.
Naval cdo: (300).
(On order: 2 *Saar*-5 corvettes, 10 *Flagstaff* hydrofoils, 3 *Seascan* MR ac.)

Bases: Haifa, Ashdod, Eilat.

Air Force: 28,000 (2,000 conscripts, in AD), 37,000 on mobilization; some 555 combat ac (perhaps 90 stored), 60 armed hel.
15 FGA/interceptor sqns: 2 with 40 F/TF-15; 5 with 131 F-4E; 5 with 150 *Kfir* C1/C2/C7; 3 with 67 F-16A, 8 F-16B.
4 FGA sqns with 130 A-4N/J *Skyhawk.*
Recce: 13 RF-4E, 2 OV-1E; 4 E-2C AEW; 4 RU-21J, 2 C-130, 4 Boeing 707 ECM ac.
1 tpt wing: incl 7 Boeing 707 (2 tanker mods), 20 C-130E/H, 18 C-47, 2 KC-130H.
Liaison: 1 *Islander*, 5 Do-27, 14 Do-28D; 18 Cessna U-206C, 2 T-41D, 2 180; 12 *Queen Air* 80; 2 *Westwind;* 20 *Super Cub.*
Trainers incl 73 TA-4E/H, 50 *Kfir* (incl TC-2), 85 *Magister/Tzugit.*
Hel incl 30 AH-1S, 30 Hughes 500MD ATK, 8 *Super Frelon*, 33 CH-53A, 2 S-65E, 25 Bell 206, 60 Bell 212, 17 UH-1D hel.
Drones: *Mastiff* 2, *Scout*, Teledyne Ryan 124R.
15 SAM bns with *Improved HAWK.*
AAM: *Sidewinder*, AIM-7E/F *Sparrow, Shafrir, Python* III.
ASM: *Luz, Maverick, Shrike, Walleye, Bullpup, Gabriel* III (mod).
(On order: 11 F-15, 75 F-16 ftrs; 60 *Kfir*-C7 and TC-2 trg ac; 200 *Improved HAWK* SAM; 200 *Sidewinder* AAM.)

RESERVES (all services): 328,000.

Forces Abroad: Lebanon (10,000).

Para-Military Forces: Border Guards 4,500; BTR-152 APC. Arab Militia: small arms. Coastguard: 3 US PBR, 3 other patrol craft(.

JORDAN

Population: 2,555,000 (excluding West Bank).
Military service: voluntary; People's Army (militia): conscription, 2 years.
Total armed forces: 76,300.
GNP 1982: JD 1.343 bn ($3.813 bn). 1983: 1.487 bn ($4.098 bn).
Est def budget 1983: JD 196 m ($540.094 m). 1984: 205 m ($541.755 m).[9]
GDP growth: 6.0% (1982), 5.5% (1983).
Inflation: 7.4% (1982), 5.0% (1983).
Est FMA: some $800 m (1982).
Debt: $2.1 bn (1982).
$1 = dinar 0.3523 (1982), 0.3629 (1983), 0.3784 (mid-1984).

Army: 68,000.
6 armd bdes.
4 mech bdes.
1 indep Royal Guards bde.
1 Special Forces bde.
16 arty bns.
2 AA bdes.
AFV: 150 M-47/-48, 200 M-60, some 200 *Khalid*, 200 *Centurion* MBT; 850 M-113, 32 *Saracen* APC.
Arty: 17 M-59 155mm guns; 30 M-102 105mm, 38 M-114 towed, 20 M-44, 190 M-109A2 SP 155mm, 40 M-115 towed, 40 M-110 SP 203mm guns/how; 350 81mm, 107mm and 120mm mor.
ATK: 240 106mm and 120mm RCL; 250 *TOW*, 310 *Dragon* ATGW.
AD: 80 M-163 *Vulcan* 20mm, 16 ZSU-23-4, 200 M-42 40mm SP AA guns; 200 *Redeye*, 20 SAM-8, *Improved HAWK* SAM.
(On order: some 248 *Khalid*, 40 M-60A3 MBT; 78 M-113 APC; 200 GHN-45 155mm how.)

Navy (Coast Guard): 300.
9 armed patrol craft(.

Base: Aqaba.

Air Force: 8,000; 103 combat ac.
3 FGA sqns with 46 F-5E/F.
2 interceptor sqns with 35 *Mirage* F-1C/E.
2 OCU with 17 F-5A, 5 F-5B.
1 tpt sqn: 3 C-130B/H, 2 *Sabreliner* 75A, 2 C-212A.
1 VIP sqn: 1 Boeing 727, 3 *Falcon* 20, 1 T-39 ac, 4 S-76 hel.
1 hel sqn: 2 *Alouette* III, 7 S-76, 8 Hughes 500D hel.
Trainers: 12 T-37C, 15 Bulldog, 1 C-212 ac.
AAM: *Sidewinder.*
14 AD btys: 112 *Improved HAWK* SAM.
(On order: 24 AH-1Q *Cobra* hel with *TOW;* 6 *Maverick* ASM.)

RESERVES (all services): 35,000.

Para-Military Forces: 11,050; Civil Militia 7,500.

KUWAIT

Population: 1,750,000.
Military service: 18 months.
Total armed forces: 12,500.
GDP 1982: KD 5.728 bn ($19.903 bn).
Est def budget 1982/3: KD 330.0 m ($1.147 bn).[10] 1983/4: 399 m ($1.360 bn).[10]
GDP growth: −7.6% (1982), 4% (1983).
Inflation: 7.7% (1982), 4.7% (1983).
$1 = dinar 0.2878 (1982), 0.2915 (1983), 0.2934 (mid-1984).

Army: 10,000.
1 armd bde.
2 mech inf bdes.
1 SSM bn.
70 Vickers Mk 1, 10 *Centurion*, 160 *Chieftain* MBT; 100 *Saladin* armd, 60 *Ferret* scout cars; 175 M-113, 100 *Saracen* APC; 20 AMX Mk F-3 155mm SP how; *FROG*-7 SSM; 81mm mor; *HOT, TOW, Vigilant* ATGW; SA-7 SAM.
(On order: *Scorpion* lt tks, 188 M-113 APC, 56 M-113 SP *TOW* veh, 4,800 *Improved TOW* ATGW.)

Navy: 500 (coastguard).
6 Lürssen TNC-45 FAC(G) with 4 *Exocet* MM-40 SSM.
2 Lürssen FPB-57 FAC.
47 coastal patrol craft((15 armed).
6 landing craft.
(On order: 6 SRN-6 hovercraft; SA-365N *Dauphin* II hel; *Exocet* MM-40 SSM.)

Air Force: 2,000;[11] 49 combat ac.
2 FB sqns with 30 A-4KU.
1 interceptor sqn with 17 *Mirage* F-1C, 2 F-1B.
Tpts: 2 DC-9; 2 L-100-20, 4 L-100-30 (used also in civil role).
3 hel sqns with 23 SA-342K *Gazelle*, 12 SA-330 *Puma.*
Trainers incl 9 *Strikemaster.*
1 SAM bn with *Improved HAWK.*
AAM: R-550 *Magic*, Super 530, *Sidewinder.*
(In store; 12 *Lightning*, 9 *Hunter.*)
(On order: 24 *Mirage* F-1C ftrs; 12 *Hawk* COIN/trg ac; 6 SA-332F *Super Puma* hel; 12 *Exocet* AM-39 ASM; AD radar and command system.)

Para-Military Forces: National Guard: Palace, border guard.

LEBANON

Population: 2,700,000.
Military service: conscription, term unknown.
Total armed forces: 20,300.
Est GDP 1981: £L 17.0 bn ($3.941 bn). 1982: 12.30 bn ($2.593 bn).
Def budget 1982: £L 770 m ($162.327 m). Est exp 1983: 6.0 bn ($1.325 bn).[12] Budget 1984: 2.030 bn ($349.488 m).
GDP growth: −2.5% (1982), −6% (1983).
Inflation: 20% (1982), 17% (1983).
FMA: $150 m (1982).
Debt: $350 m (1982).
$1 = £L 4.3139 (1981), 4.7435 (1982), 4.5282 (1983), 5.8085 (mid-1984).

Army: 19,000 (all units below strength).[13]
1 mech inf bde (1 armd recce, 3 inf bns).
5 inf bdes.
1 armed recce bn, 9 inf bns, 3 arty bns } below strength.
AA bns.
142 M-48A5 MBT (storage); 13 AMX-13 lt tks; 100 *Saladin*, 30 *Ferret* armd cars; 480 M-113, *Saracen*, 35 VAB APC; 10 122mm, 36 155mm guns; 18 105mm how; 200 81mm, 83mm RPG-7 85mm, 88mm RL; 106mm RCL; *ENTAC*, 18 *Milan, TOW* ATGW; 20mm, ZU-23 23mm, 30mm towed, M-42 40mm SP AA guns.
(On order: 355 M-113A2 APC, 12 155mm how.)

Navy: 300.
4 patrol craft(: 1 37 metre, 3 *Byblos* coastal.

Air Force: 1,000; 3 combat ac, 4 armed hel.
1 sqn with 3 *Hunter* F-70.
1 hel sqn with 11 *Alouette* II/III, 11 AB-212, 6 *Puma*, 4 *Gazelle* with SS-11/-12 ASM.
Trainers: 6 *Bulldog*, 5 *Magister.*
Tpts: 1 *Dove*, 1 *Turbo-Commander* 690A.
(On order: 6 *Gazelle* hel.)

Para-Military Forces: Internal Security Force 7,500: 30 *Chaimite* APC. Border Guard (forming, to be 20,000). Customs: 5 *Aztec* patrol craft.

Private militias (strengths are estimates only):
Maronite Christian:
Lebanese Forces Militia *(Phalange)* (6,000). 21 M-4, T-54/-55 MBT, 50 155mm how, 3 patrol boats.
Marada Brigade (1,000).
National Liberation Party (few hundred).
Christian (some Shia):
South Lebanon Army (formerly under Haddad now under Maj.-Gen. Lahad) (2,500).
'Partisans of the Army' (Tyre area).
'Forces of Kerbala' village militia.
Druze:
Militia: 5,000.
Popular Socialist Party (Jumblatt) (1,500).
T-34/-54 MBT.
Sunni:
Islamic Coalition (few hundred).
Mourabitoun Militia (underground; 1,500).
Shia:
Amal (3,500).

LIBYA

Population: 3,490,000.
Military service: selective conscription; term varies.
Total armed forces: 73,000.
GDP 1981: LD 9.192 bn ($31.044 bn). Est 1982: 8.445 bn ($28.520 bn). 1983: 7.728 bn ($26.100 bn).
Est def exp 1981: LD 165.0 m ($557.244 m). 1982: 210.0 m ($709.22 m).[14]
GDP growth: −2.0% (1982), −2.0% (1983).
Inflation: 6% (1982), 9.0% (1983).
Debt: $1.7 bn (1982).
$1 = dinar 0.2961 (1981/3).

Army: 58,000.
1 tk, 1 mech inf div HQ.
20 tk bns.
30 mech inf bns.
1 National Guard bn.
10 arty, 2 AA arty bns.
2 special forces gps.
3 AD regts.
2 SSM bns.
6 AD regts with SA-2, SA-3, SA-6; 9 div SAM bns with SA-6, SA-8, SA-9/-13.
AFV: 2,500 T-54/-55/-62, 300 T-72 MBT; 200 BRDM-2, 300 EE-9 *Cascavel* armd cars; 700 BMP MICV; 900 BTR-50/-60, OT-62/-64, 100 EE-11 *Urutu*, Fiat 6614, 160 M-113A1 APC.
Arty: 360 130mm guns; some 60 M-101 105mm, 330 D-30, 60 D-74 122mm towed, 78 M-1974 122mm SP, 48 M-1973 152mm SP, 200 *Palmaria*, 18 M-109 155mm SP how; 450 81mm, 120mm, 160mm and 240mm mor; some 600 BM-11 107mm, BM-21/RM-70 122mm and M-51 130mm MRL; 48 *FROG*-7, 70 *Scud* B SSM.

ATK: 200 106mm RCL; 3,000 *Vigilant, Milan* and *Sagger* ATGW.
AD: 450 23mm incl ZSU-23-4 SP, 30mm incl M-53/59 SP, 57mm AA guns; 72 SA-2, 144 SA-3, 350 SA-6, SA-7/-8/-9/-13 SAM.[15]
(On order: Fiat 6616, EE-9 armd cars; 100 *Urutu* APC; *Astros* II SS-40 MRLS.)

Navy: 6,500.
6 Sov F-class subs.
1 Vosper Mk 7 frigate with 4 *Otomat* SSM, 4 *Albatros/Aspide* SAM.
8 corvettes: 4 *Assad* with 4 *Otomat* SSM, 1 with 1 × 4 *Aspide* SAM; 3 Sov *Nanuchka* II with 4 SS-N-2C SSM, 1 × 2 SA-N-4 SAM; 1 Vosper 440-ton.
25 FAC(G): 12 Sov *Osa*-II with 4 SS-N-2C SSM; 3 *Susa* with 8 SS-12M SSM; 10 *Beir (La Combattante)* with 4 *Otomat* SSM.
8 patrol craft: 4 *Garian*, 3 *Benina*, 1 coastal.
6 Sov *Natya* minesweepers.
1 LSD (log spt/HQ ship); 2 PS-700 LST; 3 *Polnocny*, 3 C-107 LCT.
1 tpt, 1 Thornycroft repair ship.
50 drone craft.
(On order: 4 *Assad* corvettes, 1 *Benina* patrol craft; 16 C-107 LCT.)

Bases: Tarabulus, Benghazi, Darnah, Tubruq, Bandiyah.

Air Force: 8,500; some 535 combat ac, 42 armed hel.[15]
1 bbr sqn with 7 Tu-22 *Blinder* A.
3 interceptor sqns and 1 OCU: some 26 *Mirage* F-1ED, 6 F-1BD, 143 MiG-23 *Flogger* E, 50 MiG-25 *Foxbat* A, 55 MiG-21, 5 MiG-25U.
5 FGA sqns and 1 OCU: 45 *Mirage* 5D/DE, 13 5DD, 14 *Mirage* F-1AD, 18 MiG-23BM *Flogger* F, 14 MiG-23U, some 100 Su-20/-22 *Fitter* E/F/J.
1 COIN sqn with 30 J-1 *Jastreb*.
1 recce sqn with 7 *Mirage* 5DR.
2 tpt sqns: 18 An-26 *Curl*, 8 C-130H, 1 Boeing 707, 12 G-222, 2 *Mystère-Falcon*, 4 C-140 *Jetstar*, 2 CL-44, 17 Il-76, 1 *Corvette* 200, 2 *King Air*, 8 F-27-600, 3 LET-410.
7 hel sqns: 2 with 30 Mi-24 *Hind*, 2 Mi-8; 1 with 12 Mi-14 *Haze* (ASW); 1 with 8 *Super Frelon* (SAR); 1 with 10 *Alouette* III; 1 with 19 CH-47C; 1 with 5 AB-206, 2 AB-212.
Other hel incl: 9 AB-47, 1 AS-61A.
4 trg sqns: 2 with 61 *Galeb* ac; 2 with 20 Mi-2 *(Hoplite)* hel.
Trainers incl 2 Tu-22 *Blinder* D, 100 L-39ZO, 12 *Magister*, 119 SF-260WL.
3 SAM bdes with 30 *Crotale* (60 systems).
AAM: AA-2 *Atoll*, R-550 *Magic*.
ASM: *Swatter* ATGW.
(On order: MiG-25, MiG-23, some 40 *Mirage* F-1 ftrs; 10 *Twin Otter* tpts; 25 EMB-121 *Xingu*, 70 SF-260 trg ac; *Gazelle*, 2 A-109 hel; Super 530 AAM.)

RESERVES: People's Militia, some 40,000.

Forces Abroad: Chad: up to 7,000, Lebanon: 'Volunteers' (800).

Para-Military Forces: Pan-African Legion some 10,000: 1 armd, 1 inf, 1 para/cdo bdes; some 75 T-54/-55, MBT; EE-9 MICV; BTR-50/-60 APC (army inventory). Customs/coastguard: 2 SAR-33 Lürssen-type FAC with SSM/SAM, 3 *Jihan* patrol craft. Muslim Youth. People's Cavalry Force parade unit.

MOROCCO

Population: 23,350,000.
Military service: 18 months.
Total armed forces: 144,000.
GDP 1982: MD 88.520 bn ($14.697 bn).
Est def exp 1982: MD 8.0 bn ($1.328 bn). 1983: 7.80 bn ($1.097 bn).
GDP growth: 5.6% (1982), 0.6% (1983).
Inflation: 10.6% (1982), 7.0% (1983).
Est FMA: $115.0 bn (1982).
Debt: $10.8 bn (1982).
$1 = dirham 6.0230 (1982), 7.1113 (1983), 8.7228 (mid-1984).

Army: 125,000.
4 mech inf bdes.
1 lt security bde.
1 para bde.
1 AA gp.
10 mech inf regts.
9 arty groups.
7 armd bns.
1 Royal Guard bn.
5 camel corps bns.
2 desert cav bns.
1 mountain bn.
3 cdo bns.
4 engr bns.
4 armd car sqns.
AFV: 120 M-48, 40 AMX-13 lt tks; 50 EBR-75, 15 AMX-10RC, 162 AML-90, 250 *Eland* 90mm, 150 AML-245, 40 M-8, 364 M-113, 200 VAB, 70 UR-416, 80 *Ratel*, 56 M-3, Steyr 4K-7FA APC.
Arty: 20 M-101 105mm, 36 105mm lt, 12 M-46 130mm, 152mm, 52 AMX-F-3 SP 155mm guns; 20 M-114 155mm towed, 42 M-1950, 22 105mm SP, 56 M-109 155mm SP how; 300 60mm, 600 81mm, 70 82mm, 320 120mm mor; BM-21 122mm MRL.
ATK: 20 M-56 90mm, 121 *Kuerassier* 105mm SP ATK guns; 75mm, 106mm RCL; STRIM-89 RL, *Dragon, Milan, TOW* ATGW.
AD: 100 20mm, 37mm, 57mm and 100mm towed, 40 M-163 *Vulcan* 20mm SP AA guns; SA-7, 30 *Chaparral* SAM.
(On order: 108 M-60 MBT; AML-90, 76 AMX-10RC armd cars; 126 VAB APC.)

Navy: 6,000 incl naval infantry.
1 *Descubierta* frigate with 4 *Exocet* MM-38 SSM, 1 × 8 *Aspide* SAM.
4 *Lazaga* FAC(G) with 4 *Exocet* MM-38.
2 PR-72 FAC.
4 *Murene* large patrol craft.
9 coastal patrol craft(.
1 minesweeper.
4 landing ships (3 *Batral*).
1 naval inf bn (600).
(On order: 2 PR-72 FAC.)

Bases: Casablanca, Safi, Agadir, Kenitra, Tangier.

Air Force: 13,000; 106 combat ac.
5 FGA sqns: 3 with 22 *Mirage* F-1E, 18 F-1C; 2 with F-5 (5 A, 14 E, 3 B, 4 F, 12 RF-5A).
1 COIN/recce sqn with 22 *Magister*, 6 OV-10 *Bronco*.
1 tpt sqn with 12 C-130H, 3 KC-130H, 1 *Gulfstream*, 1 *Falcon* 50, 8 *King Air*, 3 Do-28D.
33 AB-205A, 5 AB-206, 13 hel incl AB-212, 27 *Puma*, 4 HH-43B SAR, 8 CH-47C.
Trainers: 11 T-34C, 11 AS-201/18 *Bravo*, 28 SF-260M, 24 *Alpha Jet*.
AAM: *Sidewinder*, R-550 *Magic*.
(On order: 7 Do-28D tpt, 25 *Gepal* Mk IV trg ac; 24 *Gazelle*, 19 AB-206 hel; 381 *Maverick* ASM.)

Forces Abroad: Equatorial Guinea: 300.

Para-Military Forces: 30,000 incl 11,000 *Sureté Nationale:* 2 *Rallye* ac; 5 *Alouette* II/III, 3 *Lama*, 6 *Gazelle*, 6 *Puma*, 6 A-109 hel.

OMAN

Est population: 1,000,000–1,600,000.
Military service: voluntary.
Total armed forces: 21,500.[16]
GDP 1981: RO 2.148 bn ($6.219 bn). 1982: 2.488 bn ($7.203 bn). 1983: 2.625 ($7.600 bn).
Def budget 1983: RO 612 m ($1.772 bn). 1984: 677 m ($1.960 bn).
GDP growth: 4.9% (1982), 5.5% (1983).
Inflation: 2.8% (1982), −2.0% (1983).
Debt: $800m (1982).
$1 = rial 0.3454 (1981–4).

Army: 16,500.
2 bde HQ.
1 Royal Guard bde.
1 armd regt (3 armd car, 2 tk sqns).
2 fd arty regts, 2 med arty btys, 1 lt AA bty.
1 recce bn.
8 inf 'regts' (bns).
1 special force.
1 sigs regt.
1 fd engr regt (2 sqns).
1 para regt.
6 M-60A1, some *Quayid Al Ardh (Chieftain)* MBT; 30 *Scorpion* recce; 24 25-pdr (88mm), 39 105mm, 12 M-1946, 12 59-1 130mm guns; 60mm, 81mm mor; *Milan* ATGW; *Blowpipe* SAM.
(On order: some 15 *Chieftain* MBT being delivered.)

RESERVES: National Volunteer Reserve Force.

Navy: 2,000.
1 Royal Yacht.
4 FAC(G) with *Exocet* SSM: 3 *Province* (2 with 8, 1 with 6 MM-40), 1 Brooke Marine with 2 MM-38.
4 Brooke Marine FAC.
4 inshore patrol craft(.
1 log spt ship (amph).
4 LCM.
1 trg ship.
(On order: 1 log spt amph ship.)

Bases: Muscat, Raysut, Ghanam (Goat) Island; (Wadam Alwi, under construction).

Air Force: 3,000; 52 combat ac.
2 FGA sqns with 20 *Jaguar* S(O) Mk 1, 4 T-2.
1 FGA/recce sqn with 12 *Hunter* FGA-6, 4 T-7.
1 COIN/trg sqn with 12 BAC-167.
3 tpt sqns: 1 with 3 BAC-111, 1 *Falcon* 20; 2 with 7 *Defender*, 15 *Skyvan*, 3 C-130H.
Royal flt with 1 *Gulfstream*, 1 DC-8, 1 VC-10 tpts; 2 AS-202 *Bravo* trainers; 4 AB-212, 2 *Super Puma* hel.
2 hel sqns with 20 AB-205, 3 AB-206, 5 AB-214B.
2 AD sqns with 28 *Rapier* SAM.
(On order: 1 C-130H, 2 DHC-5D tpts; 6 Bell 214ST hel; *Exocet* AM-39 ASM; 28 *Blindfire* radars.)

Para-Military Forces: tribal Home Guard *(Firqats)* 3,500. Police Coastguard: 19 coastal patrol craft(; 7 landing craft(. Air Wing: 1 *Learjet*, 2 Dornier 228-100, 2 *Merlin* IVA, 2 *Buffalo* ac; 5 AB-205, 3 AB-206 hel.

QATAR

Population: 270,000.
Military service: voluntary.
Total armed forces: 6,000.
Est GDP 1981: QR 24.888 bn ($6.839 bn). 1982: 28.758 bn ($7.903 bn).
Est def exp 1981/3: QR 3.260 bn ($896 m).[17] 1983/4: 604 m ($165.98 m).[18]
GDP growth: −9.4% (1982), −16% (1983).
Inflation: 11.5% (1982), 4% (1983).
$1 = rial 3.639 (1981/3).

Army: 5,000.
1 Royal Guard regt.
1 tk bn.
5 inf bns.
1 arty bty.
1 SAM bty with *Rapier*.
24 AMX-30 MBT; 10 *Ferret* scout cars; 30 AMX-10P MICV; 25 *Saracen*, 136 VAB APC; 8 25-pdr guns (88mm), 6 Mk F-3 155mm SP how; 81mm mor; *Rapier* SAM.
(On order: 8 *Commando* Mk 3 APC; *Blowpipe* SAM.)

Navy: 700 incl Marine Police.
3 *La Combattante* FAC(G) with 8 *Exocet* MM-40 SSM.
6 Vosper Thornycroft large patrol craft.
36 coastal patrol craft((2 75-ft, 2 45-ft, 7 P-1200 type, 25 *Spear*).
2 *Interceptor* fast assault/SAR craft.
3 *Exocet* MM-40 coast defence systems.

Base: Doha.

Air Force: 300; 11 combat ac; 2 armed hel.
3 *Hunter* FGA-6, 1 T-79, 8 *Alpha Jet* FGA/trg ac, 1 *Islander*, 1 Boeing 727, 2 707 tpt ac.
2 SA-342 *Gazelle*, 2 *Whirlwind*, 4 *Commando*, 3 *Lynx* hel.
SAM: 5 *Tigercat*.
(On order: 14 *Mirage* F-1C ftrs, SA-330, *Puma* hel.)

Para-Military Forces: Police: 3 *Lynx*, 2 *Gazelle* hel.

SAUDI ARABIA

Est population: 8–12,000,000.
Military service: conscription, males aged 18–35.
Total armed forces: 51,500.
GDP 1982: SR 524.73 bn ($153.099 bn). 1983: 414.45 bn ($119.967 bn).
Def budget[19] 1983/4: SR 75.733 bn ($21.952 bn). 1984/5: 79.900 bn ($22.731 bn).
GDP growth: 1.7% (1982), −10.8% (1983).
Inflation: 1.0% (1982), 0.1% (1983).
$1 = rial 3.4274 (1982), 3.4547 (1983), 3.5150 (mid-1984).

Army: 35,000.
3 armd bdes (1 more to form).
2 mech bdes.
2 inf bdes (1 to be mech).
1 AB bde (2 para bns, 3 special forces coys).
1 Royal Guard regt (3 bns).
5 arty bns.
18 AA arty btys.
14 SAM btys: 12 with *Improved HAWK* (216 msls); 2 with 12 *Shahine* (48 msls) and AMX-30SA 30mm SP AA guns.
AFV: 300 AMX-30, 150 M-60A1 MBT; 200 AML-60/-90 armd cars; 350 AMX-10P (some with *HOT*), some 20 VCC-1 (with *TOW*) MICV; 800 M-113, Panhard M-3 APC.
Arty: Model 56 105mm pack, 100 M-101/-102 105mm, 29 FH-70, 18 M-198 towed, M-109 and GCT 155mm SP how; 81mm, M-30 107mm mor.
ATK: 75mm, 90mm, 106mm RCL; *TOW, Dragon, HOT* ATGW.

AD: M-163 *Vulcan* 20mm, AMX-30SA 30mm, 200 35mm, M-42 40mm SP AA guns; *Redeye, Shahine, Improved HAWK* SAM.
(On order: 100 M-60A3 MBT; 150 M-60A3 conversion kits; 60 AMX-10P, 140 BMR-600, some 180 VCC-1 *TOW* MICV (1984); *Urutu* APC; 43 FH-70 155mm how; some 400 JPz SK-105 SP ATK guns; *TOW* ATGW; 100 *Shahine*, 200 *Stinger* SAM.)

Navy: 2,500.
2 Fleet HQ.
1 F-2000 frigate with 8 *Otomat* SSM, 1 × 26 *Crotale* SAM, 1 SA-365 hel.
4 PCG-1 corvettes with 2 × 4 *Harpoon* SSM.
9 PGG-1 FAC(G) with 2 × 2 *Harpoon* SSM.
1 large patrol craft (US coastguard cutter).
3 *Jaguar* (Lürssen) FAC(T).
4 MSC-322 coastal minesweepers.
4 US LCU, 8 US LCM-6 LCM, 4 LCVP.
24 AS-365N *Dauphine* 2 hel (4 SAR, 20 with AS-15TT ASM).
(On order: 3 F-2000 frigates; 2 log spt ships; 2 *Atlantic* II MR ac; 8 BH-7 hovercraft, *Otomat* coast defence SSM, 200 AS-15TT ASM.)

Bases: Jiddah (Western Fleet), Al Qatif/Jubail (Eastern Fleet), Ras Tanura, Damman, Yanbu, Ras al Mishab.

Air Force: 14,000; 203 combat ac.
3 FGA sqns with 65 F-5E.
4 interceptor sqns: 1 with 15 *Lightning* F-53, 2 T-55; 3 (1 forming) with 62 F-15.
4 E-3A airborne warning and control ac.
2 OCU with 24 F-5F, 16 F-5B, 15 TF-15D.
3 tpt sqns with 50 C-130E and C-130H, 8 KC-130H, 2 *Jetstar.*
2 hel sqns with 12 AB-206B, 14 AB-205, 10 AB-212.
Trainers: 40 BAC-167.
AAM: *Red Top, Firestreak, Sidewinder,* AIM-7F *Sparrow.*
ASM: *Maverick.*
(In reserve: 17 *Lightning* F-53/T-55.)
(On order: 5 F-5E ftrs; 1 F-5F trainer; 10 RF-5E recce; 1 E-3A *Sentry* AWACS; 1 Boeing 747, 4 CN-235, 40 C-212-200 tpts; 8 Boeing KE-3 (KC-707) tankers; 2 ECM ac; 22 AB-212, 8 KV-107 hel; 1,000 AIM-7F *Sparrow,* 1,177 *Sidewinder* AAM; 1,600 *Maverick* ASM.)

Para-Military Forces:
National Guard (25,000): Bde HQ; 4 all-arms, 16 regular inf, 24 irregular inf bns, 1 ceremonial cav sqn, spt units; 240 V-150 *Commando* APC, M-102 105mm how, 81mm mor; 106mm RCL, *TOW* ATGW, 20mm *Vulcan,* 90mm AA guns. (On order: 489 *Commando* incl V-300 APC, V-150 SP 20mm AA, SP *TOW,* 90mm armed AFV.)
Foreign contract military personnel: 10,000.
Ministry of Interior:
Counter-terrorist unit with hel.
Frontier Force and Coastguard 8,500: 184 coastal, incl 16 SRN-6 hovercraft, 300 small patrol craft. (On order: 8 BH-7 hovercraft.)
General Civil Defence Administration units. 10 Kawasaki hel.

SUDAN

Population: 23,250,000.
Military service: voluntary; conscription legislated but not yet implemented.
Total armed forces: 58,000.
Est GDP 1982: £S 5.909 bn ($6.300 bn). 1983: 9.230 bn ($7.100 bn).
Est def exp 1982: £S 220 m ($234.54 m). 1983: 300 m ($230.77 m).
GDP growth: 4.6% (1982), −2.7% (1983).
Inflation: 26% (1982), 31% (1983).
FMA: $100 m (1982).
Debt: $4.5 bn (1982).
$1 = £E 0.5349 (1981), 0.9380 (1982), 1.300 (1983).

Army: 53,000 (incl AD).
6 Regional Commands.
4 div HQ.
2 armd bdes.
7 inf bdes.
1 para bde.
3 arty regts.
1 engr regt.
Air Defence (3,000):
2 AA arty bdes.
1 SAM bde with 3 btys of SA-2.
AFV: 53 T-55, 20 M-60A3 MBT; 55 M-41, 78 Ch Type-62 lt tks; 6 AML-90, 48 *Saladin* armd, 55 *Ferret,* BRDM-1/-2 scout cars; 20 Panhard M-3, 50 BTR-50/-152, 30 OT-62/-64, 35 V-100 *Commando,* 30 M-113, 40 *Walid* APC.
Arty: 30 D-44 85mm, 55 25-pdr (88mm), 25 100mm, 20 Ch 130mm guns; 18 105mm pack, 64 D-30 122mm, 6 F-3 SP 155mm how; 30 120mm mor.
ATK: 20 D-48 85mm ATK guns: *Swingfire* ATGW.
AD: ZU-23-2 23mm, 100 37mm, 80 40mm, 100mm towed guns; 20 SA-2, SA-7 SAM.
(On order: 24 M-163 *Vulcan* 20mm SP AA guns.)

Navy: 2,000.
1 Yug *Kraljevica,* 4 Yug PBR large, 3 70-ton coastal patrol craft.
2 Yug DTK-221 LCT, 1 DTM-231 LCU(.

Base: Port Sudan.

Air Force: 3,000; 34 combat ac.
1 FGA/interceptor sqn: 2 F-5EF, 8 MiG-21.
1 FGA sqn with 8 Ch F-5, 6 Ch F-6, 10 MiG-17.
1 COIN sqn with 3 *Strikemaster* (forming).
1 tpt sqn with 6 C-130H, 1 *Mystère-Falcon,* 4 DHC-5D, 8 *Turbo-Porter,* 6 EMB-110P2.
1 hel sqn with 9 *Puma,* 10 BO-105, 5 Bell 212.
Trainers incl 3 *Jet Provost* Mk 55, 3 MiG-15UTI, 2 MiG-21U, 2 Ch FT-5, 2 Ch FT-6.
AAM: AA-2 *Atoll.*
(On order: 10 F-5E, 6 Ch F-6 ftr, 7 *Strikemaster* Mk 90 *(Jet Provost)* COIN, 6 C-212, 2 C-130 tpt ac; 6 Bell 212 hel.)

Para-Military Forces: 3,500: National Guard (500); Republican Guard (500); Border Guard (2,500).

Opposition: Southern People's Liberation Movement: est 3,000.

SYRIA

Population: 10,400,000.
Military service: 30 months.
Total armed forces: 362,500 (some 140,000 conscripts).
GDP 1981: £S 66.492 bn ($16.941 bn), 1982: 72.484 bn ($18.467 bn).
Def budget[20] 1983: £S 11.073 bn ($2.821 bn). 1984: 12.600 bn ($3.210 bn).
GDP growth: 6.9% (1982), 7.3% (1983).
Inflation: 14.3% (1982), 7.5% (1983).
Est FMA: $3.1 bn (1982).
Debt: $3.2 bn (1982).
$1 = £S 3.9250 (1981/4).

Army: 240,000 (120,000 conscripts, 50,000 reservists).
4 armd divs (each 2 armd, 1 mech bdes; 1 is Presidential Guard unit).
4 mech divs (each 1 armd, 2 mech bdes).
3 indep armd bdes.
4 indep mech bdes.
5 arty bdes.
9 para/cdo regts.
3 SSM regts: 1 × *Scud,* 1 × *Frog,* 1 × SS-21.
102 SAM btys with SA-2/-3/-6/-8.
AFV: 1,800 T-54/-55, 1,200 T-62, 1,100 T-72 MBT; 200 BRDM recce/ATK vehs; 400 BMP MICV; 1,600 BTR-40/-50/-60/-152, OT-64 APC.
Arty: 2,700 122mm (incl ISU-122 and M-1974 SP), M-46 130mm, M-1976 152mm and S-23 180mm guns; M-38, D-30 122mm, 152mm how incl M-1943 and M-1973 SP; BM-21 122mm, 140mm, 240mm MRL; 18 *FROG-7,* 12 SS-21, 18 *Scud* SSM; 120mm, 160mm, 240mm mor.
ATK: 57mm, 85mm, 100mm guns; 1,300 *Sagger, Spigot* and *Milan* ATGW.
AD: 23mm, 37mm, 57mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-2/-3/-6/-7/-8/-9 SAM.

AIR DEFENCE COMMAND: 50,000 (Army comd, Army and Air Force manning).
63 SAM btys with SA-2/-3; 31 with SA-6; 8 with some 48 SA-5 (2 Soviet-manned sites); AA arty, and radar.

RESERVES: 460,000: 175,000 active (being reorganized); 9 mech and inf bdes.

Navy: 2,500.
2 Sov *Petya* I frigates.
20 Sov FAC(G) with *Styx* SSM: 6 *Osa*-I, 8 *Osa*-II; 6 *Komar*(.
8 Sov P-4 FAC(T)(.
1 Fr CH large patrol craft.
4 Sov minesweepers: 1 T-43 ocean, 2 *Vanya* coastal, 1 *Yevgenya* inshore.
3 Sov *Zhuk* coastal patrol craft.
(On order 1981: 4 *Nanuchka* II corvettes.)

Bases: Latakia, Tartus, Minet el-Baida.

RESERVES: 2,500.

Air Force: 70,000; some 503 combat ac; some 90 armed hel.[21]
11 FGA sqns: 4 with 85 MiG-17; 1 with 18 Su-7; 2 with 40 Su-20; 4 with 70 MiG-23BM *Flogger* F.
12 interceptor sqns: 2 with 50 MiG-25 *Foxbat* A; 10 with 200 MiG-21PF/MF, 40 MiG-23 *Flogger* E.
2 tpt sqns with 3 An-24, 4 An-26, 4 Il-76, 8 Il-14, 4 Il-18, 2 *Mystère* 20F.
Trainers incl 40 L-39, 60 L-29, 10 MiG-15UTI, 50 MBB-223 *Flamingo.*
Hel incl 10 Mi-2, 95 Mi-8, 30 Mi-24, 4 Ka-25 (ASW), 45 *Gazelle* (35 with ATGW).
AAM: AA-2 *Atoll.*
ASM: AT-2 *Swatter* ATGW.
(On order: 12 *Gazelle,* 18 AB-212, 21 *Super Frelon* hel; AAM.)

Forces Abroad: Lebanon: 57,000, (3 divs); 800 MBT.

Para-Military Forces: 38,600: Defence Companies 25,000: 4 armd bdes. Gendarmerie 8,000, Desert Guard (Frontier Force) 1,800. 2 Palestine Liberation Army bdes of 6,000 with some Syrian officers (nominally under PLO); 90 T-54/-55 MBT; 105mm, 122mm, 152mm how; MRL; AT-3 *Sagger* ATGW; SA-7 SAM. Workers Militia (People's Army).

TUNISIA

Population: 7,000,000.
Military service: 12 months selective.
Total armed forces: 35,100 (13,000 conscripts).
GDP 1982: TD 4.670 bn ($7.906 bn). 1983: 5.263 bn ($7.757 bn).
Def budget[22] 1983: TD 764.18 m ($1,126 m). 1984: 339.64 m ($454.307 m).
GDP growth: 0.3% (1982), 4.5% (1983).
Inflation: 13.7% (1982), 9.0% (1983).
FMA: $250 m (1982).
Debt: $3.7 bn (1982).
$1 = dinar 0.4938 (1981), 0.5907 (1982).

Army: 30,000 (12,000 conscripts).
2 combined arms bdes (each with 1 armd, 2 mech inf bns).
1 Sahara bde.
1 para-cdo bde.
1 armd recce regt.
3 fd, 2 AA arty regts.
1 engr regt.
AFV: 14 M-48 MBT; 40 AMX-13, 10 M-41 lt tks; 20 *Saladin,* 30 EBR-75, 10 AML-60 armd cars; 50 M-113A1, 18 EE-11 *Urutu* APC.
Arty: 6 25-pdr (88mm), 48 M-101A1 105mm towed, 12 M-114A1 155mm how; 60mm, 81mm, 82mm, 107mm mor.
ATK: 54 JPz SK-105 105mm SP ATK guns; STRIM-89 RL; *TOW, Milan,* SS-11 ATGW.
AD: 45 37mm and 40mm AA guns; RBS-70, 62 MIM-72 *Chaparral* SAM.
(On order: 54 M-60A3 MBT; 12 M-106A2 (with 4.2-in. (107mm) mor), 20 M-113A2 (with *TOW*) APC; 19 M-109 155mm SP how; 800 *TOW* ATGW.)

Navy: 2,600 (500 conscripts).
1 US *Savage* frigate.
2 FAC(G): 5 *La Combattante* III with 8 *Exocet* MM-40 SSM; 3 P-48 with 8 SS-12 SSM.
4 Fr large patrol craft: 1 *Le Fougeux,* 3 P-48.
2 Vosper Thornycroft 103-ft FAC(P).
2 Ch *Shanghai*-II FAC.
2 US *Adjutant* coastal minesweepers.
12 coastal patrol boats(.
(On order: 1 *La Combattante* FAC(G), 2 23-metre FAC.)

Bases: Tunis, Susa.

Air Force: 2,500 (500 conscripts); 8 combat ac.
1 COIN sqn with 5 MB-326K, 3 MB-326L.
Trainers: 17 SF-260, 7 MB-326B, 12 T-6, 12 *Safir.*
Liaison: 4 S-208M ac.
1 hel wing: 7 *Alouette* II, 5 *Alouette* III, 4 UH-1H, 1 *Puma,* 18 AB-205, 6 Bell 205-A1, 6 AS-350B *Ecureuil.*
(On order: 8 F-5E FGA, 6 F-5F trg, 1 C-130H tpt ac.)

Para-Military Forces: Gendarmerie 5,000: 3 bns; 110 Fiat 6614 APC. National Guard 3,500.

UNITED ARAB EMIRATES (UAE)

Population: 1,300,000.
Military service: voluntary.
Total armed forces: 43,000.[23]
GNP 1982: Dh 128.403 bn ($34.978 bn).
Def budget[24] 1983: Dh 8.892 bn ($2.422 bn). 1984: 6.855 bn ($1.867 bn).
GDP growth: −5% (1982), −7% (1983).
Inflation: 10% (1982), 0% (1983).
$1 = dirham 3.6710 (1982/4).

Army: 40,000.
3 regional commands: Western (Abu Dhabi), Central (Dubai), Northern (Ras al Khaimah).
1 Royal Guard 'bde'.

1 armd/armd car bde.
2 inf bdes.
1 arty, 1 AD bde (each 3 bns).
100 AMX-30, 18 OF-40 Mk 1 *(Lion)* MBT; 60 *Scorpion* lt tks; 90 AML-90, VBC-40 armd cars; AMX-10P MICV; 30 AMX VCI, VCRTT, 300 Panhard M-3, VAB APC; 50 105mm guns; M-56 105mm pack, 20 AMX 155mm SP how; 81mm mor; 84mm RCL; *Vigilant* ATGW; *Rapier, Crotale,* RBS-70 SAM.
(In store: 70 *Saladin* armd, 60 *Ferret* scout cars; 12 *Saracen* APC.)
(On order: 18 OF-40 Mk 2 MBT; 20 *Scorpion* lt tks; 66 *Urutu* APC with *TOW*; 54 *TOW* ATGW; 42 *Improved HAWK* SAM; 343 msls.)

Navy: 1,500.
6 Lürssen TNC-45 FAC(G) with 2 × 2 *Exocet* MM-40 SSM.
6 Vosper Thornycroft large patrol craft.
3 Keith Nelson coastal patrol craft(.
2 Cheverton spt tenders(.

Base: Abu Dhabi.

Air Force (Police Air Wing & Contral Air Force): 1,500; 43 combat ac, 7 armed hel.
2 interceptor sqns with 25 *Mirage* 5AD, 3 5RAD, 2 5DAD.
1 FGA sqn with 3 *Alpha Jet.*
1 COIN sqn with 10 MB-326KD/LD.
Tpts incl 2 C-130H, 1 L-100-30, 1 Boeing 720-023B, 1 G-222, 4 C-212, 5 *Islander,* 9 DHC-5D, 1 Cessna 182.
Hel incl 7 *Alouette* III with AS-11, 8 AB-205, 6 AB-206, 3 AB-212, 9 *Puma,* 4 AS-332F *Super Puma,* 10 *Gazelle.*
Trg ac: some 2 *Hawk,* 6 SF-260TP.
AAM: R-550 *Magic.*
ASM: AS-11/-12.
(On order: 18 *Mirage* 2000 ftrs (3 recce, 3 trg), 3 *Alpha Jet* FGA/trg, 1 G-222, 1 C-130H-30 tpt, 4 MB-339, some 24 *Hawk* (8 Mk 61, 16 Mk 63) trg ac; 4 AS-332F *Super Puma, Lynx* hel; *Skyguard* AD system with twin 35mm guns.)

Para-Military Forces: Coastguard: 47 coastal patrol boats/craft.

YEMEN ARAB REPUBLIC (NORTH)

Population: 7,500,000.
Military service: conscription, 3 years.
Total armed forces: 36,550.
Est GDP 1981: YR 13.120 bn ($2.875 bn). 1982: 14.637 bn ($3.208 bn).
Est def exp 1981: YR 2.025 bn ($443.836 m). 1982: 2,404 bn ($526.904 m).
GDP growth: 5.3% (1982), 4.2% (1983).
Inflation: 2.9% (1982), 5.0% (1983).
Debt: $1.3 bn (1982).
$1 = rial 4.5625 (1981/2).

Army: 35,000.
1 armd bde.
1 mech, 5 inf bdes.
1 Special Forces bde.
1 para/cdo bde.
1 central guard force.
3 arty bdes.
3 AA arty, 2 AD bns (1 with SA-2 SAM).
AFV: 100 T-34, 500 T-54/-55, 64 M-60 MBT; 50 *Saladin* armd, *Ferret* scout cars; BMP MICV; 90 M-113, 300 BTR -40/-60/-152 APC.
Arty: 200 M-1942 76mm, M-102 105mm, M-38 122mm and M-115 155mm towed how; 30 SU-100 SP guns; 200 82mm and 120mm mor; 65 BM-21 122mm MRL.
ATK: 75mm, 82mm RCL; *LAW* RL; 20 *Vigilant, TOW,* 24 *Dragon* ATGW.
AD: ZU-23 23mm, 37mm, 57mm, 85mm towed, 40 ZSU-23-4, 72 M-163 *Vulcan* 20mm (20 SP) AA guns; SA-2/-7 SAM.

Navy: 550.
4 Sov P-4 FAC(T)(.
6 patrol craft(: 3 US *Broadsword;* 3 Sov (2 *Zhuk,* 1 *Poluchat*).
2 T-4 LCM.

Base: Hodeida.

Air Force: 1,000; 76 combat ac.[25]
5 ftr sqns: 2 with 40 MiG-21; 1 with 10 MiG-17F; 1 with 11 F-5E; 1 with 15 Su-22.
Tpts: 2 C-130H, 2 C-47, 2 *Skyvan,* 1 Il-14, 1 An-24, 3 An-26.
Trainers: 4 F-5B, 4 MiG-15UTI.
Hel: 20 Mi-8, 6 AB-206, 5 AB-212, 2 *Alouette.*
1 AD regt with 12 SA-2 SAM.
AAM: AA-2 *Atoll,* AIM-9 *Sidewinder.*

Para-Military Forces: Ministry of National Security Force 5,000; tribal levies at least 20,000.

YEMEN: PEOPLE'S DEMOCRATIC REPUBLIC (SOUTH)

Population: 2,200,000.
Military service: 2 years.
Total armed forces: 27,500 (18,000 conscripts).
GDP 1981: YD 364.4 m ($1.055 bn). 1982: 318.8 m ($923 m).
Def exp 1981: YD 56.044 m ($162.258 m). 1982: 55.06 m ($159.409 m).
GDP growth: 2% (1982), 1.0% (1983).
Inflation: 15% (1982), 10.0% (1983).
Debt: $762 m (1982).
$1 = dinar 0.3454 (1981/3).

Army: 24,000.
1 armd bde.
1 mech bde.
10 inf 'bdes' (regts) (some being mechanized).
1 arty bde.
10 arty bns.
1 SSM bde with *FROG* and *Scud* B.
450 T-54/-55/-62 MBT; BRDM-2 scout cars; some 100 BMP MICV; 300 BTR-40/-60/-152 APC; 350 M-1945 85mm, M-1955 100mm, M-46 and coastal 130mm guns; M-38 and D-30 122mm how; BM-21 122mm MRL; 120mm, 160mm mor; 12 *FROG*-7, 6 *Scud* B SSM; 200 ZU-23-2 23mm, 37mm, 57mm towed and ZSU-23-4 SP AA guns; 6 SA-2, 3 SA-3, SA-6/-7 SAM.[26]

Navy: 1,000.
1 Sov corvette (converted T-58 minesweeper).
8 Sov *Osa* FAC(G) with 4 *Styx* SSM.
2 Sov SO-1 large patrol craft.
2 Sov P-6 FAC(T)(.
2 Sov *Zhuk* FAC(P)(.
1 Sov *Ropucha* LST; 3 Sov *Polnocny* LCT; 3 Sov T-4 LCA.

Bases: Aden, Perim Island.

Air Force: 2,500; 103 combat ac, some 15 armed hel.[26]
4 FGA sqns: 2 with 30 MiG-17F; 1 with 12 MiG-21; 1 with 25 Su-20/-22.
3 interceptor sqns with 36 MiG-21F.
1 tpt sqn with 3 An-24.
1 hel sqn with 15 Mi-24, 30 Mi-8.
1 SAM regt with 48 SA-2.
Trainers: 3 MiG-15UTI.
AAM: AA-2 *Atoll.*
ASM: AT-2 *Sagger.*

Para-Military Forces: People's Militia 15,000. Public Security Force: 30,000 (increasing). 1 *Tracker* 2, 4 *Spear,* 1 *Interceptor* patrol craft.

---

1 Excl eqpt expenditure.

2 Excl BD 21.4 m (1982) and 9.7 m (1983) defence and security development budget.

3 Most Soviet equipment now in reserve. Incl 1,200 MBT, 269 combat aircraft. Some shown as Soviet have been refurbished with Western, Chinese and domestically produced components.

4 Losses and resupply system make estimates very tentative.

5 Excl debt to Gulf states.

6 Losses make eqpt estimates very tentative.

7 Total war costs reported as an additional $1.5–2 bn. High inflation rates and continued occupation costs make defence expenditure estimates highly unreliable, and thus meaningless in shekel terms.

8 Does not include captured PLO equipment reported as some 120 T-34, T-54 APC, 130mm guns, BM-21 MRL, 2 SU-23-4 AA guns, SA-9 SAM.

9 Incl internal security.

10 Incl National Guard.

11 Excluding expatriate personnel.

12 Plus £L 3 bn ($955 m) spread over 10 years to rebuild the armed forces (most already spent in 1983).

13 Army divided on sectarian lines: perhaps 10,000 pro-Gemayel Christian (3 bdes); 2 + bdes half pro-Sunni Muslim, half Christian; 1 bde pro-Shia.

14 Costs of Libya's military involvement in Chad unknown.

15 Some eqpt, incl 1,400 MBT, 450 combat ac (Tu-22, MiG-21/-23/-25, Su-22) in storage. Soviet, Syrian, Pakistani, N. Korean and Palestinian pilots also reportedly fly Libyan ac; expatriates form a large proportion of the technical support staff.

16 Including some 3,700 foreign personnel.

17 18-month transition budget about half for military aid to Iraq.

18 Excl capital exp, est at QR 600 m, and military aid to Iraq.

19 Includes budget for National Guard.

20 Incl internal security budget of £S 613 m (1983), £S 635 m (1984). Additional def exp financed through supplementary support.

21 Some aircraft believed to be in storage. Casualties and reinforcements of Lebanon during June 1982 are difficult to estimate.

22 Incl equipment budgets.

23 The Union Defence Force and the armed forces of the United Arab Emirates (Abu Dhabi, Dubai, Ras al Khaimah and Sharjah) were formally merged in 1976; Abu Dhabi and Dubai still maintain a degree of independence. Perhaps a third of the force is drawn from non-nationals.

24 Excl defence expenditure by Dubai.

25 Some 15 ac in storage.

26 Some eqpt believed in storage; some ac believed flown by Soviet and Cuban crews.

Sub-Saharan Africa

Bilateral External Agreements

The US has had mutual defence and assistance agreements with Ethiopia (1975), Ghana (1972), Kenya (1980), Liberia (1972), Mali (1972), Niger (1962), Senegal (1962) and Zaire (1972); most may now be in abeyance. Agreements with Somalia and Kenya allow limited US access to naval and air facilities; Somalia has received some military aid.

The Soviet Union has Treaties of Friendship and Cooperation with Angola (October 1976), Mozambique (March 1977) and Ethiopia (November 1978, ratified April 1979). Relations with the Congo Republic are close

but no such agreement is known to exist. Military aid has been given to Angola (under additional Military Co-operation Agreements, including one signed in May 1983), Ethiopia, Guinea, Guinea-Bissau, Mali, Mozambique, Nigeria, Somalia, Uganda and Zambia (1980). The Soviet Navy has facilities in the Dahlak Islands, Ethiopia. Reports of a Soviet facility in São Tomé and Príncipe have been received.

China has military assistance agreements with Cameroon, Equatorial Guinea, Guinea, Mali and Tanzania, and provided aid to Mozambique and Zaire (under a 1982 sales credit).

Britain maintains overflying, training and defence agreements with Kenya, helps Zimbabwe form and train her forces, and heads a Commonwealth Training Team (Australia, Britain, Canada, Guyana, Jamaica, Kenya, Sierra Leone and Tanzania) which is helping to rebuild the Ugandan defence forces.

France has signed defence and/or military co-operation agreements with Benin, Cameroon (February 1974), the Central African Republic, Congo, Djibouti (1977, including permission to deploy forces), Gabon (1974), Ivory Coast, Madagascar, Mali (since terminated), Mauritania, Niger, Senegal (March 1974), Togo, Upper Volta and Zaire. The agreement with Chad has led to a French military presence defending the government from Libyan-backed insurgents.

Belgium has a military co-operation agreement with Zaire.

Spain has a military agreement with Equatorial Guinea (1981) and is providing training and some equipment.

Cuba has some 19,000 men in Angola, training the Angolan armed forces and assisting with internal security, and 3,000 in Ethiopia. Cuban, Soviet and East German advisers are present in a number of other African countries.

Some military links exist between South Africa and Israel, between Zaire and Israel, and between both Mozambique and Angola on the one hand, and East Germany, Bulgaria, Romania (1982), and Yugoslavia (1982) on the other. Hungary signed a Friendship Treaty with Ethiopia and with Mozambique in September 1980. North Korea signed a Treaty of Friendship and Co-operation with Togo in October 1981; she also had a 100-man training team with Zimbabwe's elite armoured brigade and a smaller team in Uganda; Ethiopia signed a Treaty of Friendship with Libya and South Yemen in 1981.



Multilateral Regional Agreements

The Organization of African Unity (OAU), constituted in May 1963 to include all internationally recognized independent African states except South Africa, has a Defence Commission responsible for defence and security co-operation and the defence of the sovereignty, territorial integrity and independence of its members. In 1979 this approved in principle an African Intervention Force and ordered planning for its formation, funding and equipping. Little progress has been reported. It did agree in 1981 on an Inter-African Force for Chad, with troops from Nigeria, Senegal and Zaire. OAU financing was inadequate; the Force was withdrawn in June 1982.

In 1961 the Central African Republic, Chad, the Congo, and Gabon formed the Defence Council of Equatorial Africa, with French help. Chad's present position in relation to the Council is unclear.

In May 1981 the Economic Community of Western African States (ECOWAS) adopted a Protocol on Mutual Assistance on Defence Matters calling for a joint Defence Commission, comprising Defence Ministers and their Chiefs of Defence Staff, and a Defence Council of the Heads of State. It is intended to create a joint force, using assigned units of the national armies, which could serve as an intervention or peace-keeping force. Of the then 16 ECOWAS members (Benin, Cape Verde, The Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo and Upper Volta), 12 have signed, Cape Verde, Guinea-Bissau and Mali declined, and Mauritania signed only after the Protocol was amended to call for the withdrawal of foreign troops once ECOWAS could guarantee mutual defence.

Bilateral Regional Arrangements

Kenya signed a defence agreement with Ethiopia in November 1963 and a Treaty of Friendship and Co-operation in January 1979; Kenya and Somalia agreed in 1981 to control border incursions. Sierra Leone and Guinea signed a Defence Agreement in 1971 and a Mutu-

al Defence Pact in August 1981. In December 1981 Senegal and The Gambia signed a confederation pact which united the two countries as Senegambia. Although they stated their intent to integrate their armed forces, the Protocols still have not been signed. Djibouti signed a Friendship Treaty with Ethiopia and with the Somali Republic in early 1981. Nigeria and Benin signed a military co-operation agreement in January 1983 providing for joint exercises and unspecified 'other things'. Mozambique trains Tanzanian and Zimbabwe troops; the agreement providing this facility is unknown. Tanzania provides instructors for Uganda under a defence pact signed in August 1981. In March 1984 South Africa signed one agreement with Mozambique mutually to curb insurgency and another with Angola providing for disengagement by South African forces and neutral supervision of guerrilla activity.

The only country in the area with an indigenous arms industry is South Africa, which builds equipment both under licence and of her own design.

ANGOLA

Population: 7,800,000.
Military service: 2 years.
Total armed forces: 43,000[1] (perhaps 27,000 conscripts).
Est GDP 1981: K 100 bn ($4.0 bn).
Est def exp 1981: K 20.0 bn ($800 m).
Debt: $2.5 bn (1982).
$1 = kwanza 25.0 (1981).

Army: 40,000.
6 Military Regions.
5 div HQ.
2 mot inf bdes (each of 1 tk, 2 inf bns).
17 inf bdes.
4 AA arty bdes.
10 tk bns.
6 arty bns.
10 SAM btys.
175 T-34, 150 T-54, 120 T-62 MBT; some 50 PT-76 lt tks; 200 BRDM-1/-2, AML armd cars; 150 BTR-60/-152 APC; 200 guns/how, incl 76mm, 85mm, 100mm, SU-100 SP, 122mm, 130mm, 152mm; 460 82mm, 40 120mm mor; 50 BM-21 122mm MRL; 2,000 75mm, 82mm and 107mm RCL; *Sagger* ATGW; ZPU-4 14.5mm, ZU-23 23mm, 37mm towed, ZSU-23-4, 40 ZSU-57-2 SP AA guns; 72 SA-6, SA-7, 48 SA-8 SAM.[2]

Navy: 1,500.
4 *Osa*-II FAC(G) with 4 SS-N-2 SSM.
4 Sov *Shershen* FAC(T).
5 Port *Argos* large patrol craft.[3]
8 coastal patrol craft(: 3 Sov (1 *Zhuk*, 2 *Poluchat*); 5 Port (1 *Jupiter*, 4 *Bellatrix*).[3]
4 LCT: 3 Sov *Polnocny*, 1 Port *Alfange*.[3]
5 Sov T-4 LCM.

Bases: Luanda, Lobito, Moçâmedes.

Air Force: 1,500; 64 combat ac, some 10 armed hel.[2]
2 FGA sqns with 38 MiG-21MF, 25 MiG-17F ftrs.
MR ac: 1 F-27MPA.
2 tpt sqns: 6 *Noratlas*, 2 L-100-20, 3 C-47, 6 An-2, 18 An-26, 4 *Turbo-Porter*, 8 *Islander*, 10 Do-27, 1 F-27-400M, 1 FH-227.
2 hel sqns: some 10 Mi-24, 35 Mi-8, 27 *Alouette* III and IAR-316B, 27 SA-365N *Dauphin*.
Trainers incl 1 MiG-15UTI, 6 Yak-11, 6 PC-7.
AAM: AA-2 *Atoll*.
SAM: 20 SA-3 *Goa*.
(On order: some 6 PC-7 *Turbo-Trainer* ac.)

Para-Military Forces: Militia 10,000; 11+ inf bns; 'Organization of Popular Defence': 500,000.

Opposition: UNITA, some 15,000 'regulars', 20,000 spt militia; BM-21 122mm MRL, 82mm mor, 75mm RCL, 12.7mm hy machine guns.

CAMEROON

Est population: 9,400,000.
Total armed forces: 7,300.
GDP 1981/2: fr CFA 2,038 bn ($6.869 bn).
Def budget 1982/3: fr CFA 27.796 bn ($78.376 m). 1983/4: 34.912 bn ($84.934 m).
Debt: $2.5 bn (1982).
$1 = francs CFA 296.68 (1981/2), 354.65 (1982/3), 411.05 (1983/4).

Army: 6,600.
1 armd car bn.
1 para/cdo bn.
4 inf bns.
1 engr bn.
5 fd, 6 AA arty btys.
HQ regt, spt units.
M-8 armd, *Ferret* scout cars; some 38 *Commando*, M-3 half track APC; 6 75mm pack, 16 M-101 105mm how; 60mm, 20 81mm, 16 120mm mor; 13 57mm ATK guns; 89mm ACL-STRIM RL; 40 106mm RCL; *Milan* ATGW; 18 Type-58 14.5mm, 18 twin 35mm, 18 Type-63 37mm, 18 40mm AA guns.
(On order: some 17 V-150 *Commando* APC.)

Navy: 350.
3 FAC(G): 2 P-48S *Combattante* with 8 *Exocet* MM-40 SSM, 1 PR-48 with 8 SS-12.
2 Ch *Shanghai*-II FAC.
9 coastal patrol craft(.
2 LCM, 5 LCVP, 1 LCU, 6 lt assault craft.
(On order: 1 PR-48 large patrol craft.)

Bases: Douala, Port Gentil.

Air Force: 350; 12 combat ac, 2 armed hel.
1 mixed sqn.
1 Presidential flt.
6 *Alpha Jet* FGA, 4 *Magister* COIN, 2 Do-128D-6 (liaison), 3 C-47, 1 DHC-4, 4 DHC-5D, 3 C-130, 2 HS-748, 7 *Broussard*, 1 Boeing 727-20 tpts; 1 *Puma*, 3 *Alouette* II/III, 4 *Gazelle* (2 with *HOT* ATGW), 1 SA-365 *Dauphin* II hel.

Para-Military Forces: 5,000. Gendarmerie: 7 Regional groups.

CONGO

Est population: 1,700,000.
Total armed forces: 8,700.
Est GDP 1982: fr CFA 590.0 bn ($1.796 bn).
Def budget 1983: fr CFA 26.289 bn ($68.987 m). 1984: 21.597 bn ($51.117 m).
Debt: $1.7 bn (1981).
$1 = francs CFA 328.62 (1982), 381.07 (1983), 422.50 (mid-1984).

Army: 8,000.
1 armd bn (5 sqns).
2 inf bns.
1 arty gp.
1 engr bn.
1 para/cdo bn.
35 T-54/-55, 15 T-59 MBT; 14 Ch T-62, 3 PT-76 lt tks; 25 BRDM-1/-2 scout cars; M-3, 20 BTR-50, 20 BTR-60, 44 BTR-152 APC; 6 M-116 75mm pack, 8 M-1942 76mm, 10 M-1944 100mm, 8 M-1938 122mm how; 8 BM-21 MRL; 82mm, 10 120mm mor; 5 57mm ATK guns; 57mm RCL; 28 37mm AA guns (some T-34 MBT in store).

Navy: 200.
1 Sov *Shershen* FAC(T).
3 Ch *Shanghai* FAC.
3 13-metre ARCO Type 43, 2 11.4-metre Type 38, 3 *Piraña* coastal, 4 Ch *Yulin* river patrol craft(.

Air Force: 500; 21 combat ac.
1 MiG-15, 20 MiG-17 FGA.
1 F-28, 5 An-24, 5 Il-14, 3 C-47, 1 *Frégate*, 2 *Broussard* tpts.
4 L-39 trg ac.
1 *Puma*, 4 *Alouette* II/III hel.

Para-Military Forces: 3,000.

ETHIOPIA

Est population: 32,000,000–40,000,000.
Military service: conscription, 30 months, incl police, border guard.
Total armed forces: 306,000.[4]
GDP 1982/3: EB 9.794 bn ($4.731 bn).
Def budget 1981/2: EB 910 m ($439.61 m).[5]
GDP growth: 0% (1982).
Inflation: 15–20% (1982).
$1 = birr 2.07 (official).

Army: (incl People's Militia): 300,000.
1 armd div.
23 inf divs (3 mot, 2 mountain, 3 lt) with some 20 tk bns.
4 para/cdo bdes.
30 arty bns.
30 AD bns.
40 M-47, 150 T-34, 800 T-54/-55, 30 T-62 MBT; 40 M-41 lt tks; 100 BRDM-1/-2 scout cars, 40 BMP-1 MICV; about 70 M-113, 600 BTR-40/-60/-152, V-150 *Commando* APC; some 700 guns/how, incl M-116 75mm pack, 52 M-101 105mm, 250 122mm (incl SP), M-1954 130mm, M-1955/D-20 152mm, 12 towed, 12 M-109 SP 155mm; 60mm, 81mm, 82mm, 100 M-38 120mm, 280 M-2/-30 4.2-in. (107mm), 120mm mor; BM-21 122mm MRL; M-1955 100mm ATK guns; *Sagger* ATGW; ZU-23 23mm, 37mm towed, ZSU-23-4 23mm, M-1950, ZSU-57-2 57mm SP AA guns; SA-2/-3/-6/-7 SAM.[6]

Navy. 2,500.[6]
2 Sov *Petya* frigates.
7 Sov *Osa*-II FAC(G) with 4 SS-N-2A.
2 large patrol craft: 1 Yug *Kralievica*, 4 US PGM, 4 Swiftship 105-ft.
3 coastal patrol craft: 1 Sov *Poluchat*, 2 *Zhuk*.
1 Sov *Polnocny* LSM.

Bases: Massawa, Assab.

Air Force: 3,500; some 160 combat ac; 24 armed hel.[6]
10 FGA sqns: 1 with 10 MiG-17; 6 with 100 MiG-21; 2 with 38 MiG-23; 1 with 12 Sukhoi.
1 tpt regt with 14 An-12, 4 An-22, 14 An-26, 1 Il-14.
Trainers incl MiG-21U.
Hel incl 32 Mi-8, 24 Mi-24.

RESERVES: All citizens 18–50 do 6 months trg. Assigned to Army, Police and Border Guard.

Para-Military Forces: 169,000. Mobile emergency police force (9,000). Border Guard.

Opposition: Eritrean Liberation Front (ELF) some 6,500; (14 'bdes'); Eritrean Liberation Front-People's Liberation Forces (ELF-PLF) some 10,000; People's Liberation Front Revolutionary Guard (PLFRG) some 5,000; Eritrean People's Liberation Front (EPLF) some 12,000; Tigray People's Liberation Front (TPLF) 5,000; Western Somali Liberation Front. Captured eqpt incl T-54/55 MBT; APC; 76mm, 85mm, 120mm 130mm arty; BM-21 MRL, 23mm, 37mm, 40mm AA guns.

GHANA

Population: 13,000,000.
Military service: voluntary.
Total armed forces: 12,600.
GDP 1981: C 76.655 bn.[7]
Def exp 1980: C 426.0 m.
GDP growth: −2.8% (1981).
Inflation: 220% (1981).
Debt: $1.8 bn (1982).
$1 = cedi 2.7502 (1980/1 off.).

Army: 10,000.
2 bdes (6 inf bns and spt units).
1 recce bn.
1 para bn.
1 mor bn.
1 fd engr bn.
1 sigs bn.
1 AB coy.
25 *Saladin* armd cars; 100 MOWAG *Piranha* APC; 81mm, 28 Tampella 120mm mor; 50 *Carl Gustav* 84mm RCL; SA-7 SAM.

Forces Abroad: Lebanon (UNIFIL): 1 bn (705).

Navy: 1,200.
2 *Kromantse* ASW corvettes.
4 FAC: 2 FPB-57, 2 FPB-45.
4 large patrol craft: 2 *Dela*, 2 Br *Ford*.

1 See p. 132 for footnotes.

4 *Spear* II coastal patrol craft.

Bases: Sekondi, Tema.

Air Force: 1,400; 10 combat ac.
1 COIN sqn with 10 MB-326F/KB.
1 tpt sqn with 6 *Skyvan* 3M.
1 comms/liaison sqn with 5 F-27, 1 F-28.
Hel: 2 *Alouette* III, 2 Bell 212.
1 trg sqn with 11 *Bulldog*.
(On order: 8 SF-260TP COIN/trg ac.)

Para-Military Forces: Border Guard 5,000; 3 bns. People's Militia.

GUINEA

Est population: 5,550,000.
Total armed forces: 9,900.
Est GDP 1981: Sy 34.987 bn ($1.635 bn).
Est def exp 1981: Sy 1.710 bn ($79.91 m).
$1 = sylis 21.399 (1981).

Army: 8,500.
1 armd bn.
5 inf bns.
1 arty bn.
1 engr bn.
1 cdo bn.
1 special force bn.
1 AD bn.
45 T-34/-54 MBT; 20 PT-76 lt tks; 25 BRDM-1/-2 armd cars; 40 BTR-40/-50/-60/-152 APC; 76mm, 85mm, 105mm, 122mm guns/how; 20 M-1938/43 120mm mor; 57mm ATK guns; 37mm, 57mm, 100mm AA guns; SA-7, SA-8, 24 SA-6 SAM.

Navy: 600.
6 Ch *Shanghai*-II FAC.
2 Sov *Shershen*, 6 P-6 FAC(P)(.
7 coastal patrol craft(, incl 5 Sov (3 *Poluchat*, 2 MO-6).
1 T-58 minesweeper; 2 LCU.

Bases: Conakry, Kakanda.

Air Force: 800; 6 combat ac.
6 MiG-17F FGA (serviceability questionable).
4 Il-14, 4 An-14, 2 Il-18, 2 C-119, 1 Yak-40 tpts.
1 Reims F-337 lt ac.
Trg ac: 2 MiG-15UTI, 5 Yak-18, 3 L-29.
Hel: 1 Bell 47G, 1 *Puma*, 1 *Gazelle*, 1 UH-12B.

Para-Military Forces: 9,000; People's Militia: 7,000; *Gendarmerie* (1,000); Republican Guard 1,000.

GUINEA-BISSAU

Est population: 610,000.
Total armed forces: 6,050.
Est GDP 1981: pG 8.963 bn ($235 m).
Def exp 1981: pG 307.9 m ($8.073 m).
$1 = Guinean pesos 38.14 (1981).

Army: 5,700.
4 inf bns.
1 engr unit.
1 tk sqn.
10 T-34 MBT; BTR-40/-50/-60/-152, 20 Ch Type-56 APC; 85mm, 105mm, 122mm guns; 8 120mm mor; 89mm RL; 75mm RCL; 23mm, 57mm AA guns; SA-7 SAM.

Navy: 275.
6 FAC(P): 2 Ch *Shantou*, 2 Sov (1 *Shershen*, 1 P-6(.
6 coastal patrol craft(, incl 1 Sov *Poluchat*.
2 T-4 LCVP, LCU.
(On order: 4 coastal patrol craft(.)

Base: Bissau.

Air Force: 75.
2 Do-27, 2 Yak-40 tpts, 1 Reims FTB-337 lt ac.
1 *Alouette* II, 2 *Alouette* III, 1 Mi-8 hel.

Para-Military Forces: 5,000.

KENYA

Population: 18,900,000.
Military service: voluntary.
Total armed forces: 13,650.
GDP 1983: K Sh 82.206 bn ($6.793 bn).
Est def exp 1981/2: K Sh 2.010 bn ($197.796 m). 1982/3: 2.900 bn ($239.630 m).
GDP growth: 2.0% (1982), 3.5% (1983).
Inflation: 22.0% (1982), 25% (1983).
Est FMA: $40 m (1983).
$1 = shillings 10.162 (1981/2), 12.102 (1982/3).

Army: 13,000.
2 bdes (1 with 2, 1 with 3 inf bns).
2 armd bns.
1 armd recce bn.
2 arty bns.
2 engr bns.
1 indep air cav bn.
6 inf bns (cadre).
1 para bn.
76 Vickers Mk 3 MBT; 30 AML-60, 38 -90, 8 *Shorland* armd cars; 50 UR-416, 12 Panhard M-3 APC; 40 lt, 16 pack 105mm guns; 12 M-109 155mm SP how; 20 81mm, 10 120mm mor; 50 *Carl Gustav* 84mm, *Wombat* 120mm RCL; *Milan*, 8 *Swingfire* ATGW; 32 Hughes hel (15 500 *Scout*, 15 500MD with *TOW* ATGW, 2 500D trg).

Navy: 650.
4 Brooke Marine FAC(G): (1 37.5-metre, 3 32.6-metre), 2 with *Gabriel* SSM.
3 Vosper 31-metre *(Simba)* large patrol craft.
(On order: 5 patrol boats; *Gabriel* SSM.)

Base: Mombasa.

Air Force: disbanded 1982.
Inventory 28 combat ac: 9 F-5E, 2 F-5F FGA, 5 BAC-167 *Strikemaster*, 12 *Hawk* T-52 COIN, 5 DHC-4 *Caribou*, 6 DHC-5D *Buffalo*, 7 Do-28D, 1 Nord 262, 1 *Turbo Commander*, 1 *Navajo* lt tpt, 14 *Bulldog* 103 trg ac; 10 *Puma*, 2 Bell 47G hel; *Sidewinder* AAM; *Maverick* ASM.
Being re-formed under Army.

Para-Military Forces: Police (General Service Unit) 1,800: Police Air Wing, 7 Cessna lt ac, 3 Bell hel.

MADAGASCAR

Population: 9,700,000.
Military service: 18 months.
Total armed forces: 21,100.
GDP 1982: fr M 1,046 bn ($2.991 bn).
Def budget 1983: fr M 29.0 bn ($67.371 m). 1984: 31.730 bn ($55.729 m).
Debt: $1.4 bn (1983).
$1 = Malagasy francs 349.71 (1982), 430.45 (1983), 569.36 (mid-1984).

Army: 20,000.
2 bn gps.
1 engr regt.
1 sigs regt.
1 service regt.
7 construction regts.
12 PT-76 lt tks; 8 M-8 armd, M-3A1, 10 *Ferret*, BRDM-2 scout cars; M-3A1 half-track APC; 12 ZIS-3 76mm guns; 12 122mm how; 81mm mor; 106mm RCL; 50 ZPU-4 14.5mm AA guns.

Navy: 600 (incl 150 marines).
1 PR-48 large patrol craft.
1 *Batram* landing craft with 8 SS-12 SSM.
7 LCM: 4 N. Korean *Nampo*, 3 US.
1 marine coy.

Air Force: 500; 12 combat ac.
1 FGA sqn with 4 MiG-17, 8 MiG-21FL.
1 tpt sqn with 1 HS-748 (VIP); 4 An-26, 1 Yak-40, 1 C-53D, 5 C-47, 1 *Defender*, An-12, 1 *Aztec*, 3 *Super Skymaster*, 5 lt ac.
1 hel sqn with 1 Bell 47, 3 *Alouette* II/III, 2 Mi-8.

Para-Military Forces: Gendarmerie 8,000, incl maritime police with 5 patrol craft.

MAURITANIA

Est population: 1,800,000.
Total armed forces: 8,470.
GDP 1981: OM 34.504 bn ($716.79 m).
Est def exp 1982: OM 3.500 bn ($67.326 m).
GDP growth: 4.0% (1982), 2.0% (1983).
Inflation: 12.6% (1982), 1.0% (1983).
Debt: $1 bn (1982).
$1 = Ouguiyas 48.137 (1981), 51.986 (1982).

Army: 8,000.
1 inf bn.
1 arty bn.
1 Camel Corps.
3 armd recce sqns.
1 AA bty.
1 engr coy.
1 para coy.
15 EBR-75 hy, 39 AML-60, 14 -90 armd cars; 40 M-3 half-track, 4 M-3 APC; 81mm, 120mm mor; 57mm, 75mm, 106mm RCL; 14.5mm, ZU-23-2, 6 37mm AA guns; SA-7 SAM.

Navy: 320.
8 patrol craft: 1 Fr *Rapière*, 3 *Barcelo*, 4(.

Bases: Port Etienne, Nouadhibou.

Air Force: 150; 9 combat ac.
5 *Defender*, 4 Cessna 337 COIN.
4 *Cheyenne* MR.
1 DHC-5D, 1 *Caravelle*, 2 *Skyvan*, 2 *Islander* tpts.

Para-Military Forces: 2,500.

MOZAMBIQUE

Est population: 12,000,000.
Military service: conscription (selective): 2 years (incl women).
Total armed forces: 15,650.[8]
Est GNP 1981: m 86.10 bn ($2.950 bn).
Est def exp 1982: m 6.0 bn ($196.721 m).
$1 = metiça 29.19 (1981), 30.50 (1982).

Army: 14,000 (perhaps 75% conscripts).
1 tk bde (Presidential Guard).
7 inf bdes (each 1 tk, 3 inf, 2 mech, 2 arty, 1 AD bns, spt units).
195 T-34, some 90 T-54/-55 MBT; 35 BRDM-1/-2 scout cars; 200 BTR-60/-152 APC; 250 M-1942 76mm, M-1945 85mm, M-1955 100mm, M-1938-63 122mm and LM-1946/-1954 130mm guns; M-101 105mm how; BM-21 122mm MRL; 325 60mm, 82mm and 120mm mor; 75mm, B-10 82mm, B-11 107mm RCL; *Sagger* ATGW; 300 20mm, ZU-23 23mm, 37mm, 57mm towed and ZSU-23-4 SP AA guns; 30 SA-3, SA-7, 10 SA-8 SAM.

Navy: 650.
14 coastal patrol craft(: 4 Sov (3 *Zhuk*, 1 *Poluchat*), 6 Port (1 *Antares*, 3 *Jupiter*, 2 *Bellatrix*), 4 Neth.
1 Port *Albarda* LCT.

Bases: Maputo, Beira, Nacala, Pemba, Metangula.

Air Force: 1,000; 35 combat ac.
3 FGA sqns with 35 MiG-17.
1 hel sqn with 4 Mi-8.
1 tpt sqn with 1 Tu-134, 4 An-26, 6 *Noratlas*, 4 Cessna 182.
Trg ac: L-39, 7 Zlin, 3 MiG-15.

Para-Military Forces: Border Guard 6,000: 4 bdes. Provincial, People's Militias, Local Militias (village self-defence force).

Opposition: National Resistance Movement of Mozambique (MNR): perhaps 6,000 trained, 3,000 reserve.

NIGERIA

Population: 82,000,000.
Military service: voluntary.
Total armed forces: 133,000.
GDP 1982: N 44.884 bn ($66.673 bn).
Def exp 1983: N 1.050 bn ($1.451 bn). Revised def budget 1984: 928.2 m ($1.240 bn).
GDP growth: −2.2% (1982), −5% (1983).
Inflation: 25% (1982/3).
Debt: $14.8 bn (1983).
$1 = naira 0.6732 (1982), 0.7234 (1983), 0.7486 (mid-1984).

Army: 120,000.
1 armd div (4 armd, 1 mech bdes).
1 composite div (incl 1 AB, 1 air portable, 1 amph bdes).
2 mech divs (each 3 mech bdes).
1 Guards bde (1 armd recce, 3 inf bns).
4 arty bdes, 4 engr bdes, 4 recce bns } organic to divs (1 each).
40 T-55, 25 Vickers Mk 3 MBT; 50 *Scorpion* lt tks; 20 *Saladin*, 90 AML-90 armd, 55 *Fox* scout cars; 10 *Saracen*, 6 M-3 VPC, 4 AMX VTT, 26 Steyr 4K-7FA APC; 76mm, 200 D-30/-74 122mm, M-46 130mm guns; 200 M-56 105mm pack how; 200 81mm mor; 20mm, 40mm towed, 30 ZSU-23-4 SP AA guns; *Blowpipe*, 16 *Roland* SAM.
(On order: 11 Vickers Mk 3 MBT; 70 4K-7FA APC; 25 Bofors FH-77B 155mm, 25 *Palmaria* 155mm SP how; *Swingfire* ATGW; *Blowpipe*, 16 *Roland* SAM.)

Navy: 4,000.
2 ASW frigates: 1 *Meko* 360 with 2 × 4 *Otomat* SSM, 1 × 8

Aspide SAM, 1 *Lynx* hel; 1 *Nigeria* (trg).
4 corvettes: 2 Vosper Thornycroft Mk 9 *(Hippo)* with 2 × 3 *Seacat* SAM; 2 Mk 3 (may not be operational).
6 FAC(G): 3 Lürssen Type-57 with 4 *Otomat* SSM; 3 *La Combattante* III with 2 × 2 *Exocet* MM-38.
8 large patrol craft: 4 Brook Marine, 4 Abeking & Rasmussen.
48 coastal patrol boats.
2 RoRo 1300 *(Crocodile)* LST.
Hel: 3 *Lynx* Mk 89 MR, SAR.
(On order: 1 MCM vessel, 9 coastal patrol launches, 2 LCT.)

Bases: Apapa (Lagos; Western Command), Calabar (Eastern Command).

Air Force: 9,000; 42 combat ac.
3 FGA/interceptor sqns: 1 with 16 *Alpha Jet;* 2 with 18 MiG-21MF; 8 *Jaguar.*
1 SAR sqn with 2 F-27MPA MR ac; 20 BO-105C/D hel.
2 tpt sqns with 9 C-130H-30, 4 F-27, 1 F-28 (VIP), 1 *Gulfstream* III (VIP), 1 Beech *Super King Air.*
3 service sqns with 13 Do-28D, some 8 Do-128-6.
Hel incl 14 *Puma.*
Trg: 2 MiG-21U, P-149D, 25 *Bulldog* ac; 15 Hughes 300 hel.
AAM: AA-2 *Atoll.*
(On order: 10 *Jaguar,* 8 *Alpha Jet* FGA; 5 G-222 tpt; some 10 Do-128-6 utility; 12 MB-339 trg ac; 5 CH-47 *Chinook* hel.)

Para-Military Forces: Coastguard (forming); 3 landing craft, 27 launches. Police: 4 hel, 18 launches, 7 hovercraft (5 AV *Tiger*).

SENEGAMBIA

(Senegal and The Gambia signed and ratified a Confederation Pact in December 1981, and action to combine their forces continues. The pre-Confederation organizations and inventories are shown separately below; a Gambian Army has formed but Gambia's other Services are civilian-manned.
(In December 1983 a defence confederal budget of fr CFA 3.451 bn was introduced.)

SENEGAL

Est population: 6,300,000.
Military service: conscription; selective.
Total armed forces: 9,700.
GDP 1981: fr CFA 689.4 bn ($2.324 bn).
Est def exp 1982/3 fr CFA: 18.0 bn ($50.754 m). 1983/4: 22.0 bn ($53.522 m).
GDP growth: −4.5% (1981).
Inflation: 12% (1982), 15% (1983).
Debt: $150 m (1983).
$1 = francs CFA 296.68 (1981/2), 354.65 (1982/3), 411.045 (1983/4).

Army: 8,500.
4 Military Zone HQ.
5 inf bns.
1 engr bn.
1 trg bn.
1 Presidential Guard (horsed).
1 recce sqn.
1 arty bty.
1 AA arty bty.
2 para coys.
3 construction coys.
10 M-8, 4 M-20, 54 AML-60/-90 armd cars; 40 Panhard M-3, 12 VXB-170, M-3 half-track APC; 6 M-116 75mm pack, 6 M-101 105mm how; 8 81mm, 8 120mm mor; STRIM-89 RL; *Milan* ATGW; 21 M-693 20mm, 40mm AA guns.

Navy: 700.
9 patrol craft: 1 PR-72M, 3 P-48 large, 5 coastal(.
1 LCT, 2 LCM.

Base: Dakar.

Air Force: 500.
MR/SAR: 1 EMB-111, 1 DHC-6.
1 tpt sqn with 1 Boeing 727-200, 1 *Caravelle* (VIP); 5 C-47, 6 F-27-400M, 2 *Broussard.*
Trg ac incl 7 *Rallye* 235G, 1 Reims Cessna F-337 lt, 2 *Magister.*
Hel incl 1 *Gazelle,* 1 *Puma,* 2 *Alouette* II.

Forces Abroad: Lebanon (UNIFIL): 1 bn (559).

Para-Military Forces: 6,800; 12 VXB-170 APC.

THE GAMBIA

Est population: 670,000.
Military service: voluntary.
Total armed forces: 475.
GDP 1981/2: D 491.40 m ($225.651 m).
$1 = dalasi 2.1777 (1981/2).

Army (Field Force): 400.
1 coy.
8 *Ferret* scout cars: 4 M-20 3.5-in. (89mm) RL.

Navy: (50).
2 coastal patrol boats: 1 31-ton *Tracker,* 1 17-ton *Lance.*

Base: Banjul.

Air: (25).
1 *Skyvan* 3M, 1 *Defender* tpts.

SOMALI REPUBLIC

Est population: 6,000,000.
Military service: conscription (males 18–40) 2 years.
Total armed forces: 62,550.
Est GDP 1982: S Sh 15.0 bn ($1.395 bn). 1983: 20.0 bn ($1.267 bn).
Def budget 1983: S Sh 1,933 bn ($122.435 m). 1984: 2,602 bn ($148.211 m).
GDP growth: 9.0% (1982), 4.0% (1983).
Inflation: 24.0% (1982), 45.0% (1983).
Est FMA 1983: $40 m.
Debt: $1 bn (1982).
$1 = Somali Shillings 10.750 (1982), 15.788 (1983), 17.556 (mid-1984).

Army: 60,000.
3 corps, 8 div HQ.
3 tk/mech bdes.
20 inf bdes.
1 cdo bde.
1 SAM bde.
13 fd, 10 AA arty bns.
55 T-34, 45 T-54/-55, 100 M-47, 40 *Centurion* MBT; 50 BRDM-2 recce, AML-90 armd cars, BTR-40/-50/-60, 100 BTR-152, V-150 *Commando,* 44 M-113 (24 -113A1 with *TOW*), 300 Fiat 6614/6616 APC/AFV; about 150 76mm, M-1945 85mm and M-1955 100mm, 60 122mm guns/how; 81mm, 250 120mm mor; 400 STRIM-89 RL; 106mm RCL; 60 *TOW,* 100 *Milan* ATGW; 250 14.5mm, ZU-23 23mm, 37mm, 57mm and 100mm towed, 12 *Vulcan* 20mm, 10 ZSU-23-4 SP AA guns; 6 SA-2, 6 SA-3, some SA-6 SAM.[9]
(On order: 100 M-47 MBT, 40 *Centaure* twin 20mm AA guns.)

Navy: 550.[9]
2 Sov *Osa*-II FAC(G) with *Styx* SSM.
8 Sov FAC(T): 4 *Mol,* 4 P-6(.
5 Sov *Poluchat* large patrol craft(.
1 Sov *Polnocny* LCT, 4 Sov T-4 LCM(.

Bases: Berbera, Mogadishu, Kismayu.

Air Force: 2,000; 64 combat ac.[9]
3 FGA sqns with 9 MiG-17, 10 *Hunter* FGA-76, 2 T-77.
3 ftr sqns with 7 MiG-21MF, 30 Ch F-6.
1 COIN sqn with 6 SF-260W.
1 tpt sqn with 5 *Islander,* 2 An-24/-26, 3 C-47, 4 G-222, 4 P-166-DL3 recce/tpt.
1 hel sqn with 4 Mi-4, 2 Mi-8, 1 AB-204, 4 AB-212 (2 VIP).
Trainers incl 6 P-148, 2 MiG-15UTI.
Other ac: 8 SF-260W.
AAM: AA-2 *Atoll.*
(On order: SIAI S-211 COIN, 6 C-212 tpt ac; 4 Augusta Bell hel.)

Para-Military Forces: 29,500. Police (8,000), 2 Do-28 ac; Border Guards (1,500); People's Militia (20,000).

SOUTH AFRICA

Population: 26,800,000 (excl 'homelands').
Military service: 24 months, 8 camps totalling up to 240 days, then reserve commitment to age 65.
Total armed forces: 83,400 (53,300 conscripts; total mobilizable strength 404,500).
GDP 1982: R 78.611 bn ($70.936 bn). 1983: 87.911 bn ($76.578 bn).
Est def exp 1983/4: R 3.100 bn ($2.700 bn).[10] Def budget 1984/5: 3.755 bn ($2.940 bn).[10]
GDP growth: −1.2% (1982), −2.9% (1983).
Inflation: 14% (1982), 11% (1983).
Debt: $15.5 bn (1982).
$1 = rand 1.1082 (1982/3), 1.1480 (1983/4), 1.2770 (mid-1984).

Army: 67,400 (10,000 White, 5,400 Black and Coloured regulars, 2,000 women, 50,000 conscripts); 9 territorial commands.
2 div HQ (1 armd, 1 inf).
1 armd bde (2 tk, 2 MICV-borne inf bns).[11]
1 mech bde (1 tk, 3 MICV-borne inf bns).[11]
4 mot bdes (each 3 inf bns, 1 armd car bn).[11]
1 para bde (3 para[8] bns).[11]
1 special recce regt.
9 fd, 4 med, 7 lt AA arty regts.[11]
1 AA missile regt (3 *Crotale,* 3 *Tigercat* btys).
15 fd engr sqns.[11]
3 sigs regts, 3 sigs sqns.
Some 250 *Centurion/Olifant* MBT; 1,400 *Eland* 90 armd cars; 1,200 *Ratel* MICV (20mm/60mm/90mm gun); 500 lt APC incl *Buffalo, Hippo, Rhino;* 65 25-pdr (88mm), 75 5.5-in. (140mm) towed, 50 *Sexton* 25-pdr SP, 40 G-5 towed, G-6 SP 155mm how; *Valkiri* 127mm SP MRL; 81mm, 200 120mm mor; 900 6-pdr (57mm) and 17-pdr (76mm), M-67 90mm ATK guns; 84mm, 106mm RCL; SS-11, 120 *ENTAC* ATGW; 20mm, 55 K-63 twin 35mm, 25 D76 40mm, 15 3.7 in. (94mm) AA guns; 54 *Cactus (Crotale),* 54 *Tigercat* SAM.

RESERVES: Active Reservists serve in the Citizen Force for 12 years, in which they spend 720 days in uniform. They then serve 5 years in the Citizen Force Reserve and may be allocated to the Commando Force, where they serve 12 days a year up to age 55.

Navy: 6,000, incl 900 marines, 2,300 conscripts.
3 *Daphne* subs.
1 *President* (Br Type-12) ASW frigate with 1 *Wasp* hel (trg).
8 *MOD (Minister of Defence) (Reshef*-type) FAC(G) with 6 *Skerpioen* (*Gabriel*-type) SSM.
3 FAC(G) with 2 *Skerpioen* SSM.
4 Br *Ford,* 2 mod *Ton* large patrol craft.
6 Br *Ton* minesweepers, 2 *Ton* minehunters.
1 fleet replenishment ship.
30 *Namacurra* armed harbour patrol craft.
1 ocean, 1 inshore hydrographic ships.
(On order: 4 *MOD,* 3 *Dvora*-type FAC(G).)

MARINES: (900; 600 conscripts); 9 local harbour defence units.

Bases: Simonstown, Durban.

RESERVES: 2,000 Citizen Force.

Air Force: 10,000 (1,000 conscripts); 304 combat ac (incl 93 with Citizen Force), at least 10 armed hel.
Main Threat Area Command:
2 lt bbr sqns: 1 with 5 *Canberra* B(I)12, 3 T-4; 1 with 6 *Buccaneer* S-50.
4 FGA sqns: 1 with 32 *Mirage* F-1AZ; 3 with 82 MB-326 M/K *Impala* I/II.
2 FGA/interceptor/recce sqns: 1 with 21 *Mirage* IIICZ/EZ, 6 RZ/R2Z; 1 with 13 F-1CZ.



A Mirage III aircraft of the South African Air Force. The Mirage F-1AZ and III aircraft make up a sizable portion of the Main Threat Area Command inventory.

4 hel sqns with 3 *Super Frelon*, 35 *Puma*, 40 *Alouette* II.
3 tpt sqns: 1 with 7 C-130B, 9 Transall C-160Z; 1 with 7 DC-4, 12 C-47; 1 with 4 HS-125 *Mercurius*, 1 *Viscount* 781.
3 liaison sqns with 15 AM-3C *Bosbok*, 25 C-4M *Kudu*.
Southern Air Command:
2 MR sqns with 18 Piaggio P-166S-DL3MAR *Albatross*.
2 attack sqns with 25 *Impala* I/II.
1 ASW hel sqn with 10 *Wasp* HAS-1.
2 utility hel sqns with 7 *Super Frelon*, 13 *Puma*, 27 *Alouette* III.
1 tpt sqn with 12 C-47B.
Western Air Command:
Namibia; no integral operational sqns.
Training Command:
6 trg schools with 100 T-6G *Harvard*; 60 *Impala* I/II; 26 *Mirage* III (some 10 EZ, some R2Z, some 10 D2Z); 12 C-47 ac; 30 *Alouette* II/III hel.
AAM: R-530, R-550 *Magic*, *Sidewinder*, *Kukri* V-3 (*Sidewinder*-type).
ASM: AS-20/-30.

RESERVES: Citizen Force 25,000. 93 *Impala* COIN ac. 15 L-100 *(Hercules)* in civil airline service.

South West Africa Territory Force (SWATF):
14,000: Formed 1 Aug 1980. Separate force. South African control. Conscription: 24 months (all race groups), selective, with Citizen Force (Reserve) commitment. Four Area Commands. (Northern, Eastern, Central and Southern) comprising 26 *Area Force* units organized similarly to the Commandos in South Africa, 1 engr, 1 sigs bns. Air element (one sqn) with lt ac manned by Citizen Force. Northern sector has six Regular SWATF lt inf bns, one mounted Specialist unit.
Mobile Reserve: 1 mot inf bde (3 mot inf bns, 1 armd car regt, 1 arty regt, spt units). 1 mot inf bn regulars, rest Citizen Force.
Para-military: Industrial Defence units.

Para-Military Forces: Commandos 90,000: inf bn-type protective units in formations of 5+; 12 months initial, 19 days annual trg. 13 Air Commando sqns with private ac. South African Police 35,500 (19,500 White, 16,000 Non-white). Police Reserves 20,000. Coastguard to form; 7 MR ac planned.

Opposition: South West African People's Organization (SWAPO) (some 8,000); possibly 7 field bns: T-34/-54 MBT; BTR APC; RPG-7 ATGW; SA-7 SAM.

TANZANIA

Population: 20,500,000.
Military service: voluntary.
Total armed forces: 40,350.
GDP 1981/2: T Sh 47.853 bn ($5.503 bn).
Est def exp 1981/2: T Sh 2.745 bn ($315.662 m). 1982/3: 3.0 bn ($307.314 m).
GDP growth: −4% (1982), −5% (1983).
Inflation: 35% (1982), 40% (1983).
Debt: $2.9 bn (1983).
$1 = shillings 8.696 (1981/2), 9.762 (1982/3).

Army: 38,500.
2 div HQ.
8 inf bdes.
1 tk bn.
2 fd arty bns, 2 AA arty bns (6 btys).
2 mor bns.
1 SAM bn with SA-3, SA-6.
2 ATK bns.
2 sigs bns.
30 Ch Type-59 MBT; 30 Ch Type-62, 36 *Scorpion* lt tks; 20 BRDM-2 scout cars; 50 BTR-40/-152 APC; 40 ZIS-3 and Ch Type-54 76mm, 200 122mm, 50 130mm guns; 350 82mm and 120mm mor; 540 Ch Type-52 M-20 75mm RCL; 50 BM-21 122mm MRL; 280 ZPU-2/-4 14.5mm, 40 ZU-23, 120 Ch Type-55 37mm AA guns; 9 SA-3, 12 SA-6, 40 SA-7 SAM.

Navy: 850.
10 FAC(G): 6 Ch *Shanghai*-II, 4 GDR P-6(.
4 Ch *Huchwan* hydrofoil FAC(T).
12 coastal patrol craft(: 2 GDR *Schwalbe*, 2 GDR 50-ton, 4 Ch *Yulin*; 4 Vosper Thornycroft 75-ft in Zanzibar.
2 Ch LCM.

Bases: Dar es Salaam, Zanzibar.

Air Force: 1,000; 29 combat ac.
3 ftr sqns (Ch ac): 11 F-7, F-6, F-4.
1 tpt sqn: 1 HS-125-700, 1 An-2, 3 HS-748, 6 DHC-5D.
Trainers: 2 MiG-15UTI, 6 *Cherokee*, 6 Cessna 310, 2 404.
Hel: 2 Bell 47G, 5 AB-205, 6 AB-206.
(On order: An-26, An-32 tpt ac.)

Forces Abroad: Mozambique, trg team, 200; Seychelles: 120.

Para-Military Forces: Police Field Force; 1,400, Police Marine Unit; Citizen's Militia; 50,000.

UGANDA

Population: 14,500,000.
Total armed forces: 18,000.
Est GNP 1981: U Sh 177.980 bn ($3.556 bn).
Est def exp 1981: U Sh 5.600 bn ($111.884 m).
$1 = shillings 50.052 (1981).

Army: 18,000 (20,000 planned).
3 bde HQ.
Some 18 inf bns.
10 T-34/-54/-55, 3 M-4 MBT; 150 BTR-40/-152, OT-64 and *Saracen* APC; 60 76mm, 20 122mm guns; 40 *Sagger* ATGW; 40 23mm, 40mm AA guns; SA-7 SAM.[12]

Air Force: (100; part of Army).
6 AS-202B trg ac.

Para-Military Forces: Armed Police Special Force: 3,000. People's Militia: perhaps 20,000.

ZAIRE

Population: 32,000,000.
Military service: voluntary.
Total armed forces: 26,000.
GDP 1981: Z 23.603 bn ($5.384 bn). 1982: 31.296 bn ($5.443 bn).
Def exp 1980: Zaires 419.0 m ($149.643 m).
GDP growth: −2% (1982), 1% (1983).
Inflation: 35% (1982), 50% (1983).
Est FMA: $20 m (1983).
Debt: $5.5 bn (1983).
$1 = zaires 2.800 (1980), 4.384 (1981), 5.750 (1982).

Army: 22,000.
3 Military Regions.
1 inf div:
1 armd bde.
2 inf bdes (each 3 inf bns, 1 spt bn).
1 Special Forces div:
1 para bde (3 para bns, 1 spt bn).
1 special force (cdo) bde.
1 Presidential Guard bde.
60 Ch Type-62 lt tks; 95 AML-60, 60 AML-90 armd cars; 12 M-113, K-63, 60 M-3, BTR-152, M-3 half-track APC; 120 75mm pack, 122mm, 130mm guns/how; 82mm, 4.2-in. (107mm), 120mm mor; *Blindicide* 83mm, 107mm, RL; 57mm ATK guns; 57mm, 75mm, 106mm RCL; 37mm, 40mm AA guns.
(On order: 120mm mor.)

Navy: 1,500 incl marines.
4 Ch *Shanghai* II FAC.
51 patrol craft(: 4 *Huchwan* hydrofoils, 6 Sewart, 3 N. Korean P-4, 8 US, 30 others.

MARINES: (600).

Bases: Banana, Matadi (coast), Kinshasa (river), Kalémié (lake).

Air Force: 2,500; 39 combat ac.
1 ftr sqn with 7 *Mirage* 5M/5DM.
3 COIN sqns with 20 Reims Cessna FTB-337; 6 MB-326K; 6 AT-6G.
1 tpt wing with 6 C-130H, 2 DC-6, 2 DHC-4A, 2 *Buffalo*, 8 C-47, 4 C-54, 2 MU-2, 1 *Falcon*-20.
1 hel sqn: 3 *Alouette* III, 4 *Puma*, 1 *Super Frelon* (VIP).
Trg ac incl 27 Cessna (15 310, 12 150), 13 MB-326GB, 9 SF-260MC.
(On order: S-211 COIN/trg, 4 F-27-500 tpt ac.)

Forces Abroad: Chad: 2,000, para units (inf), 6 combat ac.

Para-Military Forces: Gendarmerie 22,000; 40 bns.

ZAMBIA

Population: 6,600,000.
Military service: voluntary.
Total armed forces: 14,300.
GDP 1982: K 3.564 bn ($3.840 bn). 1983: 4.222 bn ($3.375 bn).
Est def exp 1981: K 283 m ($325.887 m).
GDP growth: 3.6% (1982), 1% (1983).
Inflation: 11% (1982), 20% (1983).
$1 = kwacha 0.8684 (1981), 0.9282 (1982), 1.251 (1983).

Army: 12,500.
1 armd regt (incl 1 armd recce bn).
6 inf bns.
3 arty btys, 2 AA arty btys.
1 engr bn, 2 sigs sqns.
4 T-34, 30 T-54/55 and Type-59 MBT; 130 BRDM-1/-2 armd cars; 13 BTR-60 APC; 76mm, 35 130mm guns; 18 105mm pack, 25 122mm how; 50 BM-21 122mm MRL; M-18 57mm, *Carl Gustav* 84mm RCL; *Sagger* ATGW; 50 M-75 triple 20mm, 40 37mm, 55 57mm, 16 85mm AA guns; SA-7 SAM.

Air Force: 1,800; 44 combat ac.
2 FGA sqns: 1 with 12 Ch F-6; 1 with 14 Sov MiG-21.
1 COIN/trg sqn with 18 MB-326GB.
2 tpt sqns: 1 with 10 Do-28, 3 C-47; 1 with 6 DHC-2, 5 DHC-4, 5 DHC-5D.
1 VIP flt with 3 Yak-40, 1 HS-748.
Trainers incl 8 SF-260MZ, 20 *Safari*, 2 Ch BT-3, 5 *Jastreb*/*Galeb*.
1 hel sqn with 3 AB-205A, 3 AB-206, 2 AB-212, 2 Bell 47G, 11 Mi-8.
1 SAM bn; 3 btys with 12 *Rapier*; 3 *Tigercat*, SA-3 *Goa*.

Para-Military Forces: 1,200. Police Mobile Unit (PMU) 700; 1 bn of 4 coys. Police Para-Military Unit (PPMU) 500; 1 bn of 3 coys.

ZIMBABWE

Population: 8,300,000.
Military service: voluntary.
Total armed forces: 41,300.
GDP 1982: $Z 5.005 bn ($US 5.775 bn).
Def exp 1982/3: $Z 291.2 m ($US 336.026 m). Def budget 1983/4: 418.0 m ($US 458.585 m).
GDP growth: 2% (1982), −4% (1983).
Inflation: 15% (1982), 20% (1983).
Debt: $US 2.5 bn (1983).
$US 1 = $Z 0.8666 (1982/3), 0.9115 (1983/4).

Army: 40,000.
6 bde HQ (incl 1 Presidential Guard).
1 armd regt.
35 inf bns.
1 arty regt.
1 cdo bn, 1 para bn.
7 engr, 6 sigs sqns.
10 T-34, 18 T-54, 20 Ch T-59 MBT; 90 EE-9 *Cascavel*, 28 AML-90 *Eland* armd, 15 *Ferret*, BRDM-2 scout cars; 20 BTR-152, UR-416, *Buffalo*, *Hippo*, *Hyena*, *Leopard*, *Crocodile* APC; 18 25-pdr (88mm), M-56 105mm pack, 8 122mm, 8 5.5-in. (140mm) guns/how; 81mm mor; 106mm RCL; 8 SA-7 SAM.

Air Force: 1,300; some 35 combat ac.
1 lt bbr sqn with 5 *Canberra* B-2, 2 T-4.
1 FGA sqn with 7 *Hunter* FGA-9/T-7.
1 ftr sqn with 7 *Hawk* T-54.
1 COIN/recce sqn: 9 Cessna 337 (O-2) *Lynx*.
2 trg/recce/liaison sqn with 17 SF-260W/C *Genet*.
1 tpt sqn with 6 C-212-200 (VIP), 12 C-47, 6 *Islander*.
2 hel sqns with 26 *Alouette* II/III, 10 Bell/AB 205A.
2 AA arty sqns: 14.5mm, 20mm, 23mm, 37mm.
2 security sqns.
(On order: 12 Ch F-6, 12 F-7, 5 *Hunter* ftrs; 10 SIAI S-211 COIN/trg, 5 SF-260TP trg ac; 2 AB-412 (VIP) hel.)

Forces Abroad: Mozambique: 600.

Para-Military Forces: Zimbabwe Republic Police Force, incl Air Wing, 10,000. Police Support Unit 3,000. National Militia 20,000.

---

1 Some 19,000 Cuban and 450 E. German military operate ac and hy eqpt. There are also Portuguese and some 700 Soviet advisers and technicians.

2 Delivery data incomplete; eqpt totals uncertain.

3 Serviceability uncertain.

4 Some 1,400 Soviet, 3,000 Cuban and about 250 E. German technicians and advisers operate ac and hy eqpt. Some S. Yemeni troops may also serve.

5 Incl public security budget.

6 War situation makes equipment data suspect; US equipment probably not now serviceable.

7 Continuing economic crisis, hyper-inflation and the introduction of multiple exchange rates make meaningful dollar conversions impossible at present.

8 Cuban, East German and Soviet advisers reported.

9 Spares are in short supply and much equipment is unserviceable.

10 Excl internal intelligence and security force budgets.

11 Cadre formations completing the 2 divs when brought to full strength on Citizen Force mobilization.

12 Serviceability doubtful.

Armed Forces of Other African States

Country	Est population (000)	Est GDP 1982 ($m)	Est def exp 1982 ($m)	Total armed forces	Army		Navy	Air Force	Para-military forces
					Manpower and formations	Equipment	Manpower and equipment	Manpower and equipment	
Benin	**3,800**	**1,061**	**23.6** (1981)	**3,300**	**3,000** 3 inf bns 1 para/cdo bn 1 engr bn 1 service bn 1 armd sqn 1 arty bty	10 PT-76 lt tks; 7 M-8, M-20 armd cars; 8 BRDM-2 recce vehs; 4 M-101 105mm how; 60mm, 81mm mor	**200** 4 *Zhuk* patrol boats (2 P-6, 1 Fr, 1 more *Zhuk* inoperable)	**100** 2 C-47, 2 An-26, 1 F-27, 3 An-2, 1 *Falcon* 20, 1 Aero *Commander*, 1 *Corvette* 200, 2 *Broussard* tpts; 1 Reims 337 lt ac; 1 Bell 47, 1 *Alouette* II hel	**1,100**
Botswana	**920**	**1,071** (1983)	**26.6** (1981)	**3,000***	**2,850*** 1 inf bn gp	*Shorland*, 20 Cadillac Gage armd cars; 30 BTR-60 APC; 81 mm, 10 120mm mor; 84mm *Carl Gustav* RCL; SA-7 SAM	—	**150*** 5 *Defender* COIN; 2 *Skywan* tpts; 2 Cessna 152, 6 *Bulldog* lt ac	**1,260** (Police)
Burundi	**4,680**	**1,110**	**40.0**	**5,200***	**5,000*** 2 inf bns 1 para bn 1 cdo bn 1 armd car coy	6 AML-60, 12 -90, *Shorland* armd cars; 9 M-3, 20 BTR-40, *Walid* APC; 15 75mm RCL; 83mm *Blindicide* RL; 18 82mm mor; 15 quad 14.5mm AA guns	**50*** 3 *Lambro* patrol boats (2 in reserve)	**150*** 3 SF-260W COIN; 3 DC-3, 2 Do-27 tpts; 2 *Gazelle*, 3 *Alouette* III hel	**1,500**
Cape Verde	**360**	**150** (1980)	**15.0** (1980)	**1,100**	**1,000** 4 inf coys Spt elms	8 BRDM-2 recce vehs; mor; 3.5-in (89mm) RL	**75** 2 *Shershen* FAC; 2 *Zhuk* coast patrol craft	**25** 2 An-26 tpt ac	—
Central African Republic	**2,500**	**650**	**35.0** (1981)	**2,300**	**2,000** 1 regt HQ 1 mech bn (forming) 1 inf bn 1 engr coy 1 sigs coy 1 tpt coy	4 T-55 MBT; 22 BRDM-2, 10 *Ferret* scout cars; 4 BTR-152 APC; 81 mm, 4 120mm mor, 14 106mm RCL; 9 river patrol craft	—	**300** 10 AL-60, 2 *Guerrier* lt ac; 1 DC-4, 4 DC-3/C-47, 1 *Caravelle*, 1 *Corvette*, 6 *Broussard*, 2 *Skymaster* tpts; 1 *Alouette* II, 4 H-34 hel	**1,500**
Chad†	**4,850**	**550** (1981)	**51.7** (1983)	**4,200**	**4,000** 3 inf bns (incl 5 para coys) Pres Guard 2 arty btys 1 recce coy	10 AML-60, 16 -90 armd cars; 90mm, 122mm guns; 81mm, 120mm mor; 68mm, 89mm RL; *APILAS* 112mm, *Milan*, 106mm RCL; 20mm, 30mm AA guns; *Redeye* SAM	—	**200** 10 AL-60, 1 C-54, 3 C-130, 9 C-47, 1 *Noratlas*, 1 *Caravelle*, 1 C-212, 1 F-27, 1 F-28, 2 PC-6, 2 *Broussard* tpts; 4 Reims 337 lt ac, 11 *Alouette* II/III, 4 *Puma* hel	**6,000**
Djibouti	**370**	**355**	**25.0**	**2,700***	**2,600*** 1 inf regt 1 armd sqn 1 spt bn 1 border cdo bn 1 para coy	12 BRDM-2, 2 AML-60, 8 AML-90 armd cars; 12 BTR-60 APC; 105mm pack how; 81 mm, 4 120mm mor; 89mm RL; 106mm RCL	**20*** 3 coast patrol boats	**80*** 1 *Rallye* 235; 1 *Mystère* 20, 2 *Noratlas* tpts; 1 Cessna 206G lt ac; 1 *Alouette* II hel	**2,100**
Equatorial Guinea	**400**	**140**	**6.0** (1981)	**1,550**	**1,400** 1 inf bn Spt unit	10 BRDM-2 recce vehs; 10 BTR-152 APC; 81 mm mor	**100** 1 P-6 FAC; 1 *Poluchat*, 4 other patrol craft	**50** 2 MiG-17, 1 Reims 337, 2 C-212, 1 Yak-40 ac; 2 *Alouette* III hel	**2,000** (Police)
Gabon	**580**	**3,603**	**88.8** (1981)	**4,880**	**3,900** Pres Guard bn gp (recce/armd coy, arty, AA btys) 8 inf coys 1 engr coy 1 para coy 1 service coy	16 *Cascavel*, 24 AML-90, 12 EE-3 *Jararaca* armd cars; 12 EE-11 *Urutu*, 6 *Commando*, M-3, 12 VXB-170 APC; 4 M-101 105mm how; 140mm MRL; 81 mm, 120mm mor; 106mm RCL; 10 37mm, 2 40mm AA	**180** 1 FAC(G) with 4 SS-12 SSM; 4 FAC; 2 patrol craft (; 1 LST, 3 LCM	**800** 9 *Mirage* 5G/DG FGA; 1 EMB-111 P1 MR ac; 5 *Hercules*, 3 C-47, 1 DC-8-63, 4 EMB-110, 1 *Gulfstream* III (VIP), 1 *Falcon*, 1 YS-11A, 3 Nord 262, 4 *Broussard* tpts; 2 Reims 337, 2 *Magister*, 4 T-34C lt ac; 4 *Puma*, 3 *Alouette* III hel	**5,300**
Ivory Coast	**9,160**	**7,586**	**92.5** (1982)	**6,000**	**4,500** 3 inf bns 1 armd sqn 1 arty bty 1 AA arty bty 1 engr coy 1 HQ coy 1 spt coy 1 para coy	5 AMX-13 lt tks; 7 ERC-90, 10 AML-60 armd cars; 16 M-3 APC; 4 105mm how; 81mm, 16 120mm mor; 89mm STRIM RL; 4 M-3 VDA 20mm SP, 10 20mm, 5 40mm towed AA guns	**700** 2 *Vigilant*, 4 *Patra* patrol boats (with 4 *Exocet* MM-40); 4 patrol craft (; 1 *Bantral* lt tpt, 1 LCVP; 2 assault boats; 1 trg ship	**800** 5 *Alpha Jet* FGA; 3 F-27, 2 F-28, 6 F-33C, 1 *Merlin*, 2 Reims F-337, 1 Cessna 421, 1 *King Air*, 2 RC-150, 1 *Falcon*, 1 *Gulfstream* tpts; *Rallye* 160 and 235 lt ac; 3 *Puma*, 2 *Alouette* III, 4 *Dauphin* hel	—

Armed Forces of Other African States (cont.)

Country	Est population (000)	Est GDP 1982 ($m)	Est def exp 1982 ($m)	Total armed forces	Army: Manpower and formations	Army: Equipment	Navy: Manpower and equipment	Air Force: Manpower and equipment	Para-military forces
Liberia	**2,300**	**841** (1981)	**27.2‡**	**5,600**	**4,900** 1 Guard bn 5 inf bns 1 arty bn 1 engr bn 1 service bn	12 M-3A1 scout cars; 75mm pack, 8 105mm how; 20 60mm, 10 81mm, 4.2-in. mor; 3.5-in. RL; 57mm, 106mm RCL	**450** 3 50-ton, 2 38-ton, 1 11-ton Swiftships coast patrol craft	**250** 2 C-47 tpts; 14 Cessna lt ac (2 172, 1 185, 1 207, 10 337)	**1,750**
Malawi	**6,660**	**1,330**	**23.0** (1983)	**4,650***	**4,500*** 3 inf bns 1 spt bn (incl 1 recce sqn)	10 *Fox*, 10 BRDM-2 scout cars; 9 105mm guns; 81mm mor; 3.5-in. RL; 57mm RCL; 14 *Blowpipe* SAM	**100*** 1 *Spear*, 3 lake patrol boats (	**50*** 6 Do-27, 8 Do-28, 1 BN-2T tpts; 3 *Puma*, 1 *Alouette* III hel	**1,000**
Mali	**7,700**	**1,200**	**40.0** (1982)	**4,950**	**4,600** 1 tk bn 3 inf bns 1 arty bn 1 engr bn 1 para bn 1 special force bn 2 AA arty coys 1 SAM bty	21 T-34 MBT, 12 Type-62 lt tks; 20 BRDM-2 recce; 30 BTR-40, 10 BTR-152, BTR-60 APC; 6 85mm, 6 100mm, 8 D-30 122mm guns; 2 BM-21 122mm MRL; 81mm, 30 120mm mor; 37mm, 57mm AA guns; 6 SA-3 SAM	**50** 3 river patrol craft (	**300** 5 MiG-17 FGA; 2 C-47, 3 An-2, 2 An-24, 2 An-26, 1 *Corvette* 200 tpts; 1 MiG-15UTI, 6 Yak-11/-18 trg ac; 2 Mi-4, 1 Mi-8 hel	**5,000**
Niger	**6,000**	**2,100**	**14.0**	**2,220**	**2,150** 2 armd recce sqns 6 inf coys 1 engr coy 1 para coy 1 log/spt coy	10 M-8, 30 ERC-60-20 armd cars; 14 M-3 APC; 60mm, 81mm, 15 120mm mor; 57mm, 75mm RCL; 10 M-3 VDA 20mm SP AA guns	—	**70** 2 C-47, 2 C-130H, 1 Boeing 737 (VIP), 2 *Noratlas*, 3 Do-28D, 1 Aero *Commander* tpts; 1 Reims F-337 lt ac	**2,550**
Rwanda	**5,500**	**1,280**	**30.0**	**5,150***	**5,000*** 1 cdo bn 1 recce sqn 8 inf coys 1 engr coy	12 AML-60/-90 armd cars; M-3 APC; 6 57mm ATK guns; 8 81mm mor; 83mm *Blindicide* RL	—	**150*** 2 *Defender*, 2 SF-260W COIN; 1 *Caravelle* (VIP), 2 C-27, 2 *Rallye* 235 G tpts; 3 AM-3C liaison, 1 *Magister* trg ac; 6 SA-342L, 2 *Alouette* III hel.	**1,200**
Seychelles	**67**	**150** (1981)	**8.3§**	**1,200***	**1,000*** 1 inf bn 2 arty tps Spt coy	6 BRDM-2, *Shorland* recce; 3 122mm guns; BM-21 MRL; 6 82mm mor; RPG-7 RL; SA-7 SAM	**100*** 1 *Sirius*, 1 lt 42-metre, 2 *Zhuk* large, 1 coast patrol craft (; 1 LCT	**100*** 1 *Defender*, 1 *Merlin* MR, 1 *Islander*, 2 *Rallye* ac; 2 *Alouette* III hel	**900**
Sierra Leone	**3,840**	**1,278**	**22.0** (1982)	**3,100**	**3,000** 2 inf bn 2 arty btys 1 engr sqn	4 *Saladin* armd cars; 10 MOWAG *Pirhana* APC; 10 25-pdr guns/how 60mm, 81mm mor; M-20 3.5-in. RL; *Carl Gustav* 84mm RCL; SA-7 SAM	**100** (coastguard) 1 *Tracker* patrol boat	1 Bo-105 (VIP) hel	**800**
Togo	**2,850**	**815**	**22.3** (1981)	**5,080***	**4,000*** 2 inf regts 1 Pres Guard cdo regt 1 para cdo regt 1 fd, 2 AA arty btys 1 log/tpt engr bn	7 T-34, 2 -54/-55 MBT; 6 M-8, 3 M-20, 3 AML-60, 7 -90, 36 EE-9 *Cascavel* armd cars; 4 M-3A1, 30 UR-416 APC; 4 HM-2 105mm guns; 20 81/82mm mor; 5 ZIS-2 57mm, 12 Type-52/-56 75mm, Type-65 82mm RCL; 38 ZPU-4 14.5mm, 5 M-39 37mm AA guns	**80*** 2 coastal patrol craft (	**250*** 6 EMB-326GB COIN; 5 *Alpha Jet* COIN/trg; 1 Boeing 727, 2 DHC-5D, 1 F-28 tpts; 5 *Magister* trg, 2 lt ac; 2 *Alouette* II, 1 *Puma*, 2 *Lama* hel	**750***
Upper Volta	**6,800**	**1,080**	**32.8**	**3,775***	**3,700*** 3 inf regts (bns) 1 recce sqn 1 arty bty 1 para coy	15 AML-60/-90, 10 M-8, 4 M-20 armd cars, 30 *Ferret* scout cars; 13 M-3 APC; M-101, M-56 pack 105mm how; 60mm, 81mm mor; Type-63 107mm MRL; M-20 3.5-in. RL; Type-52 75mm RCL; RPG-7 RL; SA-7 SAM	—	**75*** 2 C-47, 2 Nord 262, 2 HS-748, 1 Aero *Commander*, 3 *Broussard*, 2 *Super Skymaster*, 1 Cessna 172 tpts	**900**

* All services form part of the Army.
† Politico-military conditions make data suspect. 50% of defence budget externally financed.
‡ Including 'public order' budget.
§ Official budget title: 'Youth and Defence Ministry'.



TO EXPLORE NEW TECHNOLOGIES for WEAPON SYSTEM SUPPORT

The Integrated Diagnostic Support System termed "IDSS" represents a major technological achievement for the next generation of test systems. This new concept incorporates methods of collecting knowledge about the weapon system and processes it in a way that resembles human reasoning. Once established, the IDSS knowledge base is used to detect and diagnose weapon systems failures.

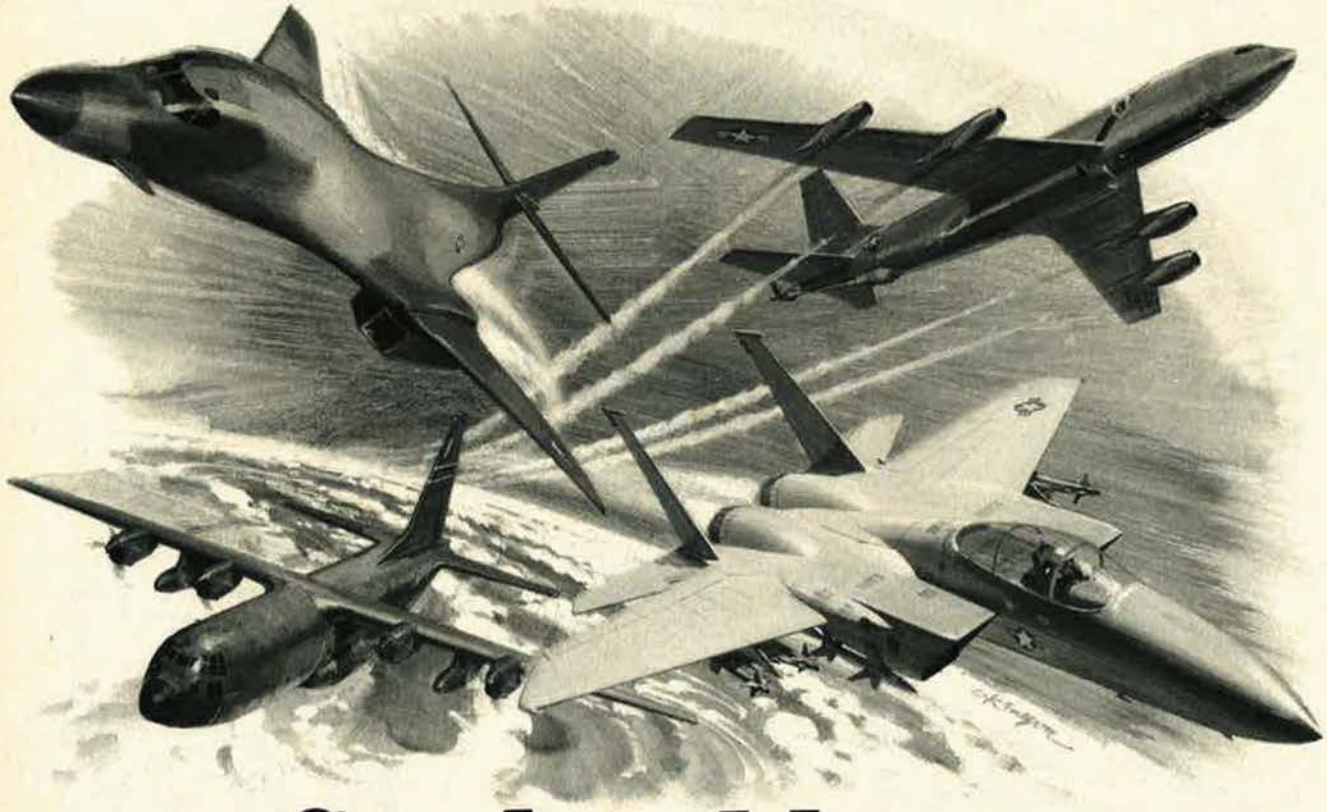
Harris is consistently exploring new and innovative ways of improving test technology, IDSS is just one example.

HARRIS

Harris Corporation, Government Support Systems Division,
6801 Jericho Turnpike, Syosset, Long Island, NY 11791. 516-364-0400.

For your information, our name is Harris.

USAF has selected the Collins ARC-190.



So should you.



The United States Air Force has selected the ARC-190 as the HF radio for the aircraft they fly including the C-130, KC-135, F-15 and B-1B. Today, the mil-spec ARC-190 is fully qualified and operational on a global basis.

The ARC-190 operates with our exclusive SELSCAN™ adaptive communications system, which combines receiver scanning and selective calling with microprocessor control to monitor preset channels. Together with an internal link quality analysis, the SELSCAN™ processor provides automatic selection of optimum channels between stations without operator intervention.

Optional equipment includes a digitally tuned preselector and a variety of digitally tuned antenna couplers. The ARC-190 is designed to retrofit most Collins 618T, ARC-58 and ARC-105 systems using existing wiring. Retrofit kits are available for other applications.

The ARC-190 is in full production and available immediately. So choose the HF radio selected by the USAF, and put more than 50 years of Collins experience to work for you. Start by contacting your nearest Collins representative, or Collins Defense Communications Division, Defense Electronics Operations, Rockwell International, Cedar Rapids, Iowa 52498. USA phone 319/395-2690. TELEX 464-435.

COLLINS DEFENSE COMMUNICATIONS DIVISION

DEFENSE ELECTRONICS OPERATIONS

Rockwell International

...where science gets down to business

CHINA

Chinese defence policy has long maintained a balance, at times uneasy, between two concepts: nuclear force to deter strategic attack and People's War—mass mobilization of the population to deter or repel conventional invasion. Despite changes in the political leadership, there remain many supporters of the strategic concept that mass manpower is still the primary deterrent. The need to modernize the forces has been recognized. Programmes to re-equip, reorganize and enhance their military effectiveness are being implemented, but slowly.

The conventional arms inventory of the People's Liberation Army (PLA), technically much less advanced than that of wealthier nations, is being gradually updated by replacing Soviet and Soviet-type equipment with indigenous designs and some Western technology. The United States has agreed in principle to sell logistic and dual-purpose equipment and technology. China has obtained computers and radars and is negotiating the sale of a wide range of defensive and non-combat military equipment. Britain has sold aircraft engines, artillery and fire control equipment and radar. France has sold helicopters and radar. But the current phase of economic readjustment has meant a succession of cuts in the defence budget between 1980 and 1983, and the pace of modernization will be quite slow.

Nuclear Weapons

The research programme continues, but no nuclear test has been recorded since 1980. At least 26 tests have been made since 1964. A nuclear force capable of reaching large parts of the Soviet Union and Asia is operational.

A multi-stage ICBM with a limited range of 6,000–7,000 km was first tested in 1976. Two types of ICBM are now deployed, one with a range of some 13,000 km, the other some 10,000 km. No indication has been received of the deployment of multiple warheads, but a missile has been successfully used (and thus tested) as a launcher for three space research satellites. Deployment continues of an IRBM with an estimated 5,500 km range. Deployment of an MRBM with a range of some 1,800 km may be complete. China's first SSBN—the *Daqingyu* or *Xia* class—is reported still to be on trials; her SLBM is reported as the CSS-NX-3, a variant of the DF-3 IRBM. Four more of these boats are said to be under construction and as many as twelve may be planned. Two *Han*-class nuclear-powered submarines with six missile tubes are now in service; the cruise missile they are said to carry has been tested to a reported range of 1,600 km. So far all ballistic missiles have been liquid-fuelled. Solid propellants being developed are reported to have powered the 1980 ICBM test vehicle and may power the DF-5 ICBM. The missile forces are manned by the Second Artillery, which is directly controlled by the Ministry of Defence. There are no reports of tactical nuclear munitions (artillery, rockets, mines). If such munitions are available, fighter aircraft could be used for tactical delivery, and for longer ranges there are some 120 B-6 medium bombers, with a combat radius of up to 3,000 km.

Conventional Forces

The PLA embraces all arms and services, including naval and air elements. Essentially a defensive force, the PLA lacks facilities and logistic support for protracted large-scale operations at any significant distance outside Chinese borders. China is organized in 11 Military Regions (MR) with 28 Military Districts (MD). The field army's Main Force (MF) divisions are commanded by the Ministry of National Defence, although command is being transferred to the MR in which they are stationed and which are already responsible for their administration. They are available for operations in any region. Extensive reorganization of the Local Forces (LF), Border and Internal Defence forces and para-military units intended to defend their own Provinces is taking place. The field army strength is declining as transfers to the regional forces continue.

Artillery, engineer and railway units are controlled by the Ministry of National Defence. Infantry units account for most of the ground-force manpower and 119 of the some 158 MF line divisions; there are only 12 armoured divisions.

The naval and air elements of the PLA have only about one-fifth of the total manpower, compared with about a quarter for their counterparts in the Soviet Union, but naval strength is increasing. The naval force is organized in three fleets, two of them controlled by the Northern Naval Region. The naval air arm is shore-based, and there is an independent Coast Defence Force. The air component is organized into 8 Regions and 3 minor geographic commands; combat organization is similar to the Soviet system, with air armies of divisions of three regiments each with some 45 aircraft.

Major weapons systems include Type-59 MBT, Type-60/-63 amphibious and Type-62 light tanks and Type-531 APC; modified *R*- and *W*-class medium-range diesel submarines, SSM destroyers, frigates, fast patrol boats, amphibious transports and landing craft; J-6/-7 and Q-5 fighters, SA-2-type SAM. Production rates for this equipment are, at best, broad estimates only. Actual rates may be considerably lower than many such estimates suggest.

There is a mutual defence agreement with North Korea, dating from 1961, and an agreement to provide free military aid. There are friendship and non-aggression pacts with Afghanistan, Burma, Nepal (1960) and Kampuchea *(Khmer Rouge).* Chinese military equipment and logistic support have been offered to a number of countries. Major recipients include Albania, Egypt, Iraq, Pakistan and Tanzania.

Gross National Product and Defence Expenditure

Official Chinese sources claim a GNP figure of 989.4 bn yuan for 1982 and 1,105.2 bn for 1983, an increase of 11.7%. National income is reported by the IMF to be 424.7 bn yuan for 1982 and 467.3 bn for 1983. (GNP figures include the service and other sectors.) Western estimates of GNP have varied greatly, from $260 bn to $600 bn in 1982, and it is difficult to choose from a range of figures, variously defined and calculated.

Since 1981 the Chinese government has released official defence budget figures. In 1983 the defence budget amounted to 17.713 bn yuan ($8.959 bn), while for 1984 the figure of 17.870 bn yuan ($8.189 bn) was reported. These figures are not comparable to Western defence estimates, since they exclude a number of items, notably pay and allowances for the troops. Chinese budgetary practices are not known in detail, but they are certainly different from those in the West. Because of the differences, the official budget figure must be considered as an indicator of proportion, rather than a clear measurement of actual costs.

CHINA

Population: 1,039,000,000.
Military service: conscription; Army, 3 years; Navy/Air 4 years. Technical volunteers can serve 8–12 more years to maximum age 35.
Total regular forces: 4,000,000.[1]
GNP and defence expenditure: see note above.
Debt 1982: $4.7 bn.
$1 = 1.887 yuan (1982), 1.9772 (1983), 2.1821 (mid-1984) (official rate).

Strategic Forces:
OFFENSIVE:
(a) *Missiles:*
ICBM: 2 DF-5 *(Dong Feng; = East Wind):* range 13,000 km; 5 MT warhead. 4 DF-4: range 10,000 km; 3 MT.
IRBM: 60 DF-3: range 5,500 km; 2 MT.
MRBM: 50 DF-2: range 1,800 km; 20 KT.
(b) *Submarines:*
1 *Daqingyu (Xia)* SSBN with 12 CSS-NX-3 (mod DF-3, range perhaps 2,800 km—possibly 1 × 2 MT warhead) in development.
(On order: 4 *Daqingyu* SSBN reported.)

DEFENSIVE:
(a) Tracking stations in Xinjiang (cover central Asia) and Shanxi (northern border) and a limited shipborne capability.
(b) Ballistic missile EW phased-array radar complex.
(c) Air Force AD system with over 4,000 naval and air force fighters, about 100 *Honggi-2 (Red Flag;* SA-2-type) SAM units and over 16,000 AA guns; capable of limited defence of key urban and industrial areas, military installations and weapons complexes.
(d) A civil defence shelter/evacuation/local defence system in Beijing and other key cities.

Army[1]: 3,160,000.
Main Forces (Field Army):
11 Military Regions, 27 Military Districts, 1 indep MD, 3 Garrison Commands.
Some 35 Armies (46,300 men), each normally of 3 divs, 1 arty regt and spt tps (some have 1 indep tk regt, some have 1 arty, 1 AA regts), comprising:
13 armd divs.
118 inf divs.
Some 17 field arty divs.
16 AA arty divs.
Some indep arty, AA regts.
Some 21 sigs, CW regts; 20 indep recce, engr, sigs, chemical bns (Army tps).
50 indep engr regts.
Local Forces (29 provinces; being reorganized).
73 divs (70 LF (border/internal defence), 3 garrison).
140 indep regts.
AFV: 11,450 Sov IS-2 hy (trg), T-34 (trg), T-54, Ch Type-59 and T-69 (mod Type-59) MBT; Type-62 lt and Type-60/-63 lt amph tks; 2,800 Type 531, Type-55/-56 (BTR-40/-152)/-63 APC.
Arty: 12,800 Type-56 85mm (fd/ATK), (Type-59?) 100mm, Type-60 122mm, Type-59 130mm towed, ISU-122/-152 SP (trg?) guns; Type-66 152mm towed gun/how; Type-54 122mm and Type-56 152mm towed, 122mm SP how (Type-531 chassis); 4,500 Type-63 12 × 107mm, 40 × 122mm, Type-63 19 × 130mm (incl SP), BM-13-16 16 × 132mm, BM-14-16 16 × 140mm, 10 × 180mm and 10 × 320mm MRL; 14,000 Type-53 82mm, Type-55 120mm and Type-56 160mm mor.
ATK: 40mm, 57mm, 90mm RL; 7,800 57mm, 175mm and 82mm RCL; Type-55 57mm, Type-54 76mm guns; *Sagger*-type ATGW.
AA: 15,000: Type-63 37mm (incl twin SP), Type-59 57mm, Type-56 85mm and Type-59 100mm guns.

DEPLOYMENT:
Excl arty and engrs, MF and LF divs may be:
North-East: Shenyang MR (Heilongjiang, Jilin, Liaoning MD): 4 armd, 19 inf; 13 LF.[2]
North: Beijing MR (Beijing, Tienjiang Garrison Commands; Hebei, Nei Monggol, Shanxi MD): 4 armd, 25 inf; 13 LF.
North-West: Lanzhou MR (Gansu, Ningxia, Qinghai, Shaanxi MD): 1 armd, 8 inf; 2 LF.[2]
West: Ürümqi MR (North and South Xinjiang MD): 5 inf; 7 LF.[2]
South-West: Chengdu MR (Sichuan, Xizang MD): 8 inf; 4 LF.[2]
South: Kunming MR (Guizhou, Yunnan MD): 7 inf. Guangzhou MR (Guangdong, Hunan, Guanxi MD, Hainan (an MD-equivalent)): 11 inf; 8 LF.[2]
Centre: Wuhan MR (Henan, Hubei MD): 2 armd, 10 inf, 3 AB (Air Force); 6 LF.
East: Jinan MR (Shandong MD): 1 armd, 9 inf; 6 LF. Nanjing MR (Shanghai Garrison Command; Anhui, Jiangsu, Zhejiang MD): 1 armd, 10 inf; 9 LF. Fuzhou MR (Fujian, Jiangxi MD): 6 inf; 5 LF.

Navy[1]: 350,000 incl Naval Air Force and Coast Defence Forces: 2 SSN, 100 diesel attack subs; 36 major surface combat ships.
2 *Han* SSN.
100 diesel subs (1 *Golf* missile (trials), 76 *R-*, 21 *W*-class, 2 *Ming* trg).
14 GW destroyers: 10 O-51 *Lüda (Kotlin*-type) with 2 × 3 HY-2 *(Hai Ying; = Sea Eagle; Styx*-type) SSM; 4 *Anshan* (ex-Sov *Gordy*) with 2 × 2 HY-2.
22 frigates: 17 GW (11 O-37 *Jianghu* with 2 × 2 HY-2, 2 *Jiangdong* with 2 × 2 SAM; 4 *Chengdu* (ex-Sov *Riga*) with 1 × 2 HY-2); 5 *Jiangnan* (*Riga*-type).
8 patrol escorts: 6 ex-Jap, 1 ex-Br, 1 ex-Aus.
216 FAC(G) with HY-2: 116 *Osa/Huangfen* (4 msls), *Hola* (2 msls), 98 *Hoku*, 1 *Homa* hydrofoil (2 msls).
48 patrol craft: 28 *Hainan*, 20 *Kronshtadt.*
341 FAC: 10 *Shanghai* I, 295 *Shanghai* II/III/IV/V, 3 *Haikou*, 30 *Swatow;* 3 *Shandong* hydrofoils.
290 FAC(T): 140 *Huchwan* I/II hydrofoils; 70 P-6, 80 P-4.
About 120 coastal and river patrol craft.
23 T-43 ocean minesweepers.
18 LST incl ex-US 511-1152, 35 LSM, 6 inf landing ships, 320 LCU, 150 LCM; some 61-ton hovercraft.
7 sub, 6 other spt, 10 supply ships; 23 tankers.
(On order (reports tentative): 4 *Han* SSN; 4 *Lüda* DDG; 8 *Jianghu* (4 mod), 2 *Jiangdong* FFG; *Huangfen, Hoku* FAC(G); 3 LST.)

Coastal Defence Forces: (38,000): indep arty regts deployed near naval bases, offshore islands, and other vulnerable points; 85mm, 100mm, 130mm guns; HY-2 ('CSSC-2') land-based SSM.

DEPLOYMENT AND BASES:
North Sea Fleet: about 500 vessels (over half (), incl 2 sub sqns; from the Yalu River to south of Lianyungang. Qingdao (HQ), Lüda, Lüshun, Huludao, Weihai, Chengshan.
East Sea Fleet: about 750 vessels (about 400() with air, AD and coastal missile units; from south of Lianyungang to Dongshan. Ningbo (HQ), Zhoushan, Taohua Dao, Heimen, Wenzhou, Fuzhou.
South Sea Fleet: about 600 vessels (some half(), incl 25 subs, 200 FAC, amph; from Dongshan to Vietnamese frontier. Zhanjiang (HQ), Shantou, Guangzhou, Haikou, Yulin, Beihai.
Some 800 ocean-going vessels and several thousand junks could augment the existing limited sealift capacity.

NAVAL AIR FORCE: (38,000); about 800 shore-based combat aircraft,[3] org in 3 bbr, 6 fighter divs, incl some H(Hong; = bomber)-6, about 100 H-5 torpedo-carrying and 50 Il-28 lt bbrs; some 600 fighters, incl J(Jian; = ftr)-5/-6/-7 interceptors; H-5 recce, 8 ex-Sov Be-6 MR/ASW ac; 40 Z(Zhi; = helicopter)-5, 12 *Super Frelon* ASW hel; some 60 lt tpt ac. Naval fighters are integrated into the national AD system.

Air Force[1]: 490,000, incl strategic forces and 220,000 AD personnel, some 5,300 combat ac.[3]
8 Military Air Regions, 3 minor regional comds, HQ Beijing; combat elms org in Armies of varying numbers of air divs (each with 3 regts of 3 sqns of 3 flts of 4–5 ac, 1 maintenance unit, some tpt and trg ac). Tpt ac in regts only.
Med bbrs: 120 H-6.
Lt bbrs: some 500 H-5.
FGA: some 500 J-4 and Q(Qiang = attack)-5.
Ftrs: some 4,000, incl 400 J-5, some 60 regts with about 3,000 J-6/B/D/E, 200 J-7, 30 J-8.
Recce: Some 130 JZ-6, HZ-5 ac.
Tpts: Some 550 fixed-wing, incl some 300 Y(Yun = transport)-5/An-2, some 10 Y-7 (An-24), Y-8 (An-12), some 75 ex-Sov Li-2, Il-14, Il-18 (to be retired), 18 *Trident.* (These could be supplemented by some 400 ac, incl some 150 hy tpts, from Civil Aviation Administration.)
Hel: 400: incl Z-5/-6; Z-9 (Fr SA-365N *Dauphin*), *Alouette* III, SA-321 *Super Frelon.*
Trainers: incl CJ-5/-6, MiG-15UTI, JJ-4/-5/-6, HJ-5.
AAM: PL-2 *Atoll*-type.
Airborne tps: 1 corps of 3 divs, 1 indep div: 82mm, 120mm mor; 82mm RCL; 37mm AA guns.
20 AA arty divs, 28 indep AD regts (100 SAM units) with CSA-1 SAM, 16,000 57mm, 85mm and 100mm guns.

RESERVES: ex-Service to age 45. Perhaps 5,000,000 with service in the past 5 years.

Para-Military Forces: Some 12,000,000.
Militia. *Basic Militia:* some 4.3 million; men and women aged 18–28 who have had, or will have, military service, grouped in the Armed Militia; serve with the Regulars for 30–40 days per year; organized into about 75 cadre divisions and 2,000 regts and a Naval (Maritime) Militia with armed trawlers. *Ordinary Militia:* up to 6 million (ages 18–35), including the Urban Militia, receive some basic training but are generally unarmed. Some play a local AD role; all support the security forces.
People's Armed Police Force (Ministry of Security): ex-soldiers and personnel transferred from some 4 LF divs; Internal Defence divs and 30 indep regts; border security, patrol and internal security duties; small arms only.

1 The term 'People's Liberation Army' comprises all services; the Ground, Naval and Air components of the PLA are listed separately for purposes of comparison.

2 There are 2–3 divs worth of border tps in these MR.

3 Many Chinese aircraft designs stem from Soviet types. Using Chinese terms, H-5 = Il-28, H-6 = Tu-16, J-5 = MiG-17, J-6 = MiG-19, Q-5 = MiG-19, J-7 = MiG-21, J-8 = MiG-23, Y-5 = An-2, Y-7 = An-24, Y-8 = An-12 ac; Z-5 = Mi-4, Z-6 = Mi-8 hel. In export models the J is generally read as F.

Other Asian Countries and Australasia

Bilateral Agreements

The United States has mutual co-operation and security treaties with Japan (1960), the Republic of Korea (1954) and the Philippines (1951, 1983); military co-operation agreements with Australia (1951, 1963, 1974 and 1980); and a military aid agreement with Thailand. That with Taiwan lapsed on 1 January 1980; arms supply and production arrangements continue under the 1979 Taiwan Relations Act. Washington also provides continuing military aid to Indonesia, South Korea, Malaysia, Pakistan, the Philippines, and Thailand. There are major US bases in Japan, South Korea, and the Philippines (agreement renewed 1983), and air (B-52) and naval refuelling facilities in north and west Australia.

In 1965 Britain purchased the Chagos Archipelago, which included Diego Garcia and three other islands, from Mauritius for $3 m and established it as the British Indian Ocean Territory. A joint US/British base was constructed on Diego Garcia, and a small British naval contingent was deployed there. Agreements in 1966, 1972 and 1976 provided for the development of a major US naval and air support facility with a 50-year tenure. The three small islands have since been turned over to the Seychelles. Britain has a Defence Agreement with Sri Lanka (1974) and one with Brunei which provides Gurkha troops and a British Forces training area.

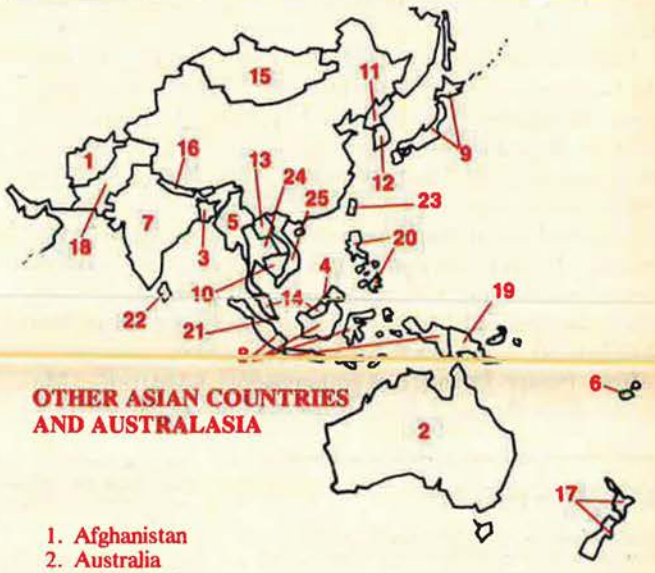
The Soviet Union has Treaties of Friendship, Co-operation and Mutual Assistance with Afghanistan (1978), India (1971), Mongolia (1966), North Korea (1961), and Vietnam (1978). She concluded a Stationing of Forces Agreement with Afghanistan in April 1980. An agreement with India in December 1982 provides for collaboration on design and manufacture of naval vessels; other co-production arrangements are reported. Bulgaria has Friendship Treaties with Cambodia (1960), Laos (1979), Mongolia (1967), and Vietnam (1979), as have Czechoslovakia with Laos and Vietnam (1980) and Afghanistan (1981), Hungary with Afghanistan (1982), and East Germany with Vietnam (1977), Kampuchea (1980), and Afghanistan (1982).

The People's Republic of China has Friendship and Non-Aggression Treaties with Afghanistan, Burma, and Nepal.

Cuba and Vietnam signed a Treaty of Friendship and Co-operation on 5 October 1982. Libya and North Korea signed a Treaty of Alliance or Friendship and Co-operation in November 1982, which is to permit exchanges of military data, specialists and supplies. North Korea and Tanzania have an agreement covering aspects of defence and security.

Australia has an agreement and subsidiary arrangements for the development of and assistance to the Papua New Guinea Defence Force, and some 135 personnel are on loan to it. She has supplied defence equipment to the Philippines, Malaysia, Singapore, Thailand, Indonesia, and most of the smaller Pacific island states under a number of arrangements.

In July 1977 Vietnam and Laos signed a series of agreements which contained military provisions and a border pact, and may have covered the stationing of Vietnamese troops in Laos. A similar series of agreements seems to have been negotiated between Vietnam and the Heng Samrin regime in Kampuchea in February 1979 and December 1982.



OTHER ASIAN COUNTRIES AND AUSTRALASIA

1. Afghanistan
2. Australia
3. Bangladesh
4. Brunei
5. Burma
6. Fiji
7. India
8. Indonesia
9. Japan
10. Kampuchea/Cambodia
11. Korea: Democratic People's Republic (North)
12. Korea: Republic of (South)
13. Laos
14. Malaysia
15. Mongolia
16. Nepal
17. New Zealand
18. Pakistan
19. Papua New Guinea
20. Philippines
21. Singapore
22. Sri Lanka
23. Taiwan
24. Thailand
25. Vietnam

Multilateral Agreements

In 1951 Australia, New Zealand, and the United States signed a tripartite treaty (ANZUS), which came into effect on 29 April 1952 and is of indefinite duration. 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.

The Manila Pact, signed on 8 September 1954 by Australia, Britain, France, New Zealand, Pakistan, the Philippines, Thailand, and the United States, remains in force, though France and Pakistan subsequently withdrew, and the South East Asia Treaty Organization (SEATO), set up to implement it, was disbanded in 1977. The Pact calls for action by each Party to meet the common danger posed by armed aggression, and for consultation if any other threat is posed to the territory, sovereignty or political independence of any Party. Since 1962 the US commitment to Thailand has been based on this Pact.

The Association of South East Asian Nations (ASEAN), set up in 1967 by Indonesia, Malaysia, Philippines, Singapore, and Thailand and joined by Brunei in 1984, is intended to foster regional economic development, not military co-operation. Under the rubric of the promotion of regional peace and security it has become concerned with the Vietnamese presence in Kampuchea. It supports the Kampuchean resistance movements politically, but reported arms transfers to the rebels are believed to be national initiatives rather than multilateral.

Five-Power Defence Arrangements (Australia, Malaysia, New Zealand, Singapore, and Britain), relating to the defence of Malaysia and Singapore, came into effect on 1 November 1971. 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 in March 1976, but New Zealand troops remain in Singapore, as do Australian air units in Malaysia and Singapore, with a small army component attached. Australian and New Zealand naval units visit Malaysia and Singapore regularly.

Economic Factors

After showing exceptionally low growth rates in 1982, the Asian economies recovered well in 1983. Regional average growth in real GNP/GDP amounted to some 4%, compared with some 1–2% in 1982. Singapore, the two Koreas and Taiwan led the recovery, while Australia, New Zealand, Indonesia, and the Philippines continued to stagnate. Unlike those of Latin America and Africa, all Asian countries were able to control their inflation rates, the highest rates being those of the Philippines and Sri Lanka (10% and 14% respectively). The same two countries, plus South Korea and New Zealand, also faced serious debt problems: the Philippines' debt-to-GNP ratio exceeded 70%, while those of the other three were in the 40–50% range.

AFGHANISTAN

Est population: 14–17,000,000 (including exiles).
Military service: conscription 15–55; 3 years + (non-combatants, 4 years).
Total armed forces: 46,000.[1]
Est GDP 1981/2: Afs 121.44 bn ($2.40 bn).
Est def exp 1980: Afs 10.500 bn ($207.510 m). 1981: 16.500 bn ($326.087 m).
Est FMA: $300 m (1960/1).
Debt: $1.0 bn (1981).
$1 = afghanis 50.60 (1980/4).

Army: 40,000 (mostly conscripts).[1]
3 corps HQ.
11 inf divs, 3 armd divs } (under strength bdes.)
1 mech inf bde.
2 mountain inf regts.
1 arty bde with 3 arty regts.
3 cdo regts.
50 T-34, 300 T-54/-55, 100 T-62 MBT; 60 PT-76 lt tks; 40 BMP-1 MICV; 400 BTR-40/-50/-60/-152 APC; 900 76mm, M-1944 100mm guns and M-30 122mm, D-1 152mm how; 82mm, 100 120mm, 160mm mor; 50 BM-13-16 132mm MRL; SPG-9 73mm, 82mm RCL; 76mm, 100mm ATK guns; 350 23mm, 37mm, 57mm, 85mm and 100mm towed, 20 ZSU-23-4 SP AA guns.

RESERVES: No formal reserve force identified; call-up from ex-servicemen, Youth League and regional tribes from age 20 to age 40.

Air Force: 6,000 (incl Air Defence Comd); perhaps 150 combat ac, some 20 armed hel.[1]
1 lt bbr sqn with some 15 Il-28 (status unclear).
12 FGA sqns: 4 with some 40 MiG-17, 3 with 35 MiG-21 *Fishbed*, 4 with 48 Su-7B *Fitter* A, 1 with 12 Su-17 *Fitter* C.
1 OCU with MiG-15/-17/-19/-21/-23UTI/U, Il-18U.
2 attack hel sqns with some 20 Mi-24.
4 tpt sqns: 1 VIP with 2 Il-18D, 4 An-24 *Coke*; 3 with some 10 An-2, 10–15 An-26.
1 tpt hel regt (4 sqns) with some 12 Mi-4, up to 40 Mi-8.
1 flying school with Yak-18, L-39C.
1 AD div: 2 SAM bdes (each 3 bns) with 120 SA-2, 115 SA-3; 1 AA bde (2 bns) with 37mm, 85mm, 100mm guns; 1 radar bde (3 bns).

Para-Military Forces: Gendarmerie 30,000. Border Force. Ministry of Interior: *Khad* (secret police); *Sarandoy* 'Defence of the Revolution' forces, largely ex-military to age 55 org in provincial regts. Regional militias incl 'Revolution Defence Groups' (Civil Defence), Pioneers, Afghan Communist Party Guards, *Khalqi* Youth, tribal.

Opposition: Perhaps 90,000 guerrillas (possibly 20,000 intermittently active) supported by some 15 exile political groups (6 active). Eqpt: small arms, T-55 MBT; BMP MICV, BTR-60 APC; D-30 122mm how; AGS-17 30mm grenade launchers; 2-in. (51mm), 60mm, M-41 82mm mor; RPG-7 RL; SPG-9, 3 75mm, 82mm RCL; 12.7mm, 14.5mm AA machine guns, ATK mines; some SA-7 SAM.

AUSTRALIA

Population: 15,410,000.
Military service: voluntary.
Total armed forces: 72,345.

GDP 1981/2: $A 155.170 bn ($US 171.458 bn). 1982/3: 169.880 bn ($US 159.422 bn).
Def exp 1982/3: $A 4.942 bn ($US 4.638 bn). 1983/4: 5.446 bn ($US 4.945 bn).
GDP growth: −2% (1982), 1.8% (1983).
Inflation: 10% (1982), 11% (1983).
$US 1 = $A 0.9050 (1981/2), 1.0656 (1982/3), 1.1014 (1983/4).

Army: 32,680.
1 inf div with 3 bdes of 2 inf bns.
1 armd regt.
2 cav regts.
4 arty regts (1 med, 2 fd, 1 AD); 1 locating bty.
1 fd engr, 1 construction, 1 fd survey regts.
5 sigs regts.
1 Special Air Service regt.
3 tpt regts (one air support).
Army Aviation:
1 regt (2 recce, 1 comd spt, 1 utility sqns).
1 avn school + base workshop bn.



Two F-15s from Kadena AB, Japan, join up with two Australian Mirages. The Royal Australian Air Force flies ninety-seven Mirage aircraft.

1 See p. 147 for footnotes.

103 *Leopard* 1A3 MBT; 790 M-113 APC, incl 63 MICV with 76mm gun (48 with *Scorpion*, 15 with *Saladin* turret); some 34 5.5-in. (140mm) guns (to late 1984); 227 105mm, some 6 M-198 155mm how; 51 M-40 106mm RCL; 12 *Milan* ATGW launchers; *Redeye*, 20 *Rapier* SAM launchers; 15 *Turbo-Porter*, 11 *Nomad* ac; 47 Bell 206B-1 *Kiowa* hel; 36 watercraft, 87 LARC-5 amph vehs.
(On order: some 30 M-198 155mm how.)

RESERVES: 30,300 (with trg obligations); 2 inf div HQ, 4 bde HQ, 188 fd, spt, log and trg units; 1 cdo bn, 1 regional surveillance force.

Navy: 16,988 (incl Fleet Air Arm).
6 *Oxley (Oberon)* submarines.
3 *Perth* (US *Adams*) ASW msl destroyers with *Standard* SAM, 2 *Ikara* ASW.
4 *Adelaide* (FFG-7) frigates with 1 *Harpoon* SSM, 1 *Standard* SAM, 2 hel (to get AS-350 hel, early 1985).
6 *River* frigates with 1 × 4 *Seacat* SAM/SSM, 1 *Ikara* ASW.
13 PCF-420 *Freemantle*, 8 *Attack* large patrol craft.
1 mod Br *Ton* coastal minehunter.
6 LCT (1 with Reserve).
1 hy amph tpt ship; 1 destroyer tender with 1 *Wessex* hel; 2 trg ships (1 *Daring* destroyer, 1 ex-ocean ferry); 1 fleet tanker.

FLEET AIR ARM: (1,310); 8 combat hel.
1 ASW hel sqn with 8 *Sea King* Mk 50.
1 utility/SAR hel sqn with 10 *Wessex* 31B, 4 UH-1B, 4 Bell 206B, 6 AS-350B *Squirrel*; 2 HS-748 EW ac (trg).
1 trg sqn with 2 *Wessex* 31B hel.
(On order: 3 FFG-7 frigates, 2 PCF-420 large patrol craft, 2 MCM catamarans; *Harpoon* SSM, 2 *Phalanx* 20mm AA systems.)

Bases: Sydney, Melbourne, Jervis Bay, Brisbane, Cairns, Darwin, Cockburn Sound.

RESERVES: 1,200 (with trg obligations); 5 patrol craft, 1 LCT.

Air Force: 22,677; 133 combat ac.
2 FGA/recce sqns with 16 F-111C, 4 F-111A, 4 RF-111C.
3 interceptor/FGA sqns with 58 *Mirage* IIIO/D.
2 MR sqns: 1 with 6 P-3B *Orion*; 1 with 10 P-3C.
1 OCU with 19 *Mirage* IIIO/D, 10 MB-326H.
1 forward air controller flt: 6 CA-25 *Winjeel*.
6 tpt sqns: 2 with 24 C-130E/H; 1 with 4 Boeing 707-338C (to be tanker ac); 1 with 4 CC-08 (C-7A *Caribou*) ac, 4 UH-1B hel; 1 with 17 CC-08; 1 with 2 BAC-111, 2 HS-748, 3 *Mystère* 20.
1 med tpt hel sqn with 8 CH-47 *Chinook*.
2 utility hel sqns with 31 UH-1B/H *Iroquois*.
Trainers incl 81 MB-326H (72 being uprated), 8 HS-748T2, 48 CT-4/4A *Airtrainer*.
AAM: *Sidewinder*, R-530.
(4 *Chinook* hel in reserve.)
(On order: 75 F/A-18 FGA/interceptor/trg, 10 P-3C MR, 69 A-10 *Wamira* trg ac; 18 AS-350 *Ecureuil* utility hel; R-550 *Magic* AAM; *Harpoon* ASM.)

RESERVES: 1,400 (with trg obligations) in 8 auxiliary sqns.

Forces Abroad: Egypt (Sinai MFO): 110; 8 UH-1H hel. Malaysia/Singapore: 1 sqn with 20 *Mirage* IIIO, 1 flt with CC-08 ac. Papua New Guinea: 135; 2 engr units, 106 advisers. Indian Ocean: 1 destroyer, 2 patrol boats. Trg gps in Indonesia, Malaysia, Philippines, Singapore.

Para-Military Forces: Bureau of Customs: 10 *Searchmaster* MR ac.

BANGLADESH

Population: 96,500,000.
Military service: voluntary.
Total armed forces: 81,300.
GDP 1981/2: Tk 264.990 bn ($13.223 bn). 1982/3: 285.070 bn ($11.999 bn).
Est def exp 1982/3: Tk 4.200 bn ($176.784 m). 1983/4: 4.600 bn ($184.0 m).
GDP growth: 1% (1982/3), 4% (1983/4).
Inflation: 10.0% (1982/3), 9.0% (1983/4).
Debt: 4.0 bn (1983).
$1 = taka 20.040 (1981/2), 23.7578 (1982/3), 25.0 (1983/4).

Army: 73,000.
5 inf div HQ.
12 inf bdes (32 inf bns).
2 armd regts.
9 arty regts.
7 engr bns.
20 Ch Type-59, 30 T-54/-55 MBT; 6 M-24 *Chaffee* lt tks; 30 Model 56 pack, 50 M-101 105mm, 5 25-pdr (88mm), Type-54 122mm guns/how; 81mm, 50 Type-53 120mm mor; 6-pdr (57mm), Ch Type-54 76mm ATK guns; 30 106mm RCL.[2]

Navy: 5,300.[2]
3 Br frigates (1 Type 61, 2 Type 41).
4 Ch *Hoku* FAC(G) with 2 HY-2 SSM.
8 Ch *Shanghai* II FAC.
4 large patrol craft (2 Yug *Kraljevica*, 2 Ind *Akshay*).
1 Ch *Hainan* FAC(P).
4 P-4 FAC(T).
5 *Shamjala* FAC.
5 *Pabna* river patrol boats.
1 trg ship.

Bases: Chittagong (HQ), Dacca, Khulna, Chalna.

Air Force: 3,000: 27 combat ac.[2]
2 FGA sqns with 17 Ch F-6.
1 interceptor sqn with 8 MiG-21MF, 2 -21U.
1 tpt sqn with 1 An-24, 3 An-26.
1 hel sqn with 11 Bell 212, 4 Mi-8, 1 Mi-4.
Trainers incl 8 *Magister*, 16 Ch CJ-6.
AAM: AA-2 *Atoll*.

Para-Military Forces: 80,000: Bangladesh Rifles 30,000, Armed Police Reserve 36,000, Bangladesh *Ansars* (Security guards) 14,000.

BRUNEI

Population: 210,000.
Military service: voluntary.
Total armed forces: 3,950.[3]
Est GDP 1981: $B 9.720 bn ($US 4.629 bn). 1982: 9.100 bn ($US 4.136 bn).
Est def exp 1982: $B 420 m ($US 195 m). 1983: 350 m ($US 162.791 m).
GDP growth: −12% (1982).
Inflation: 6% (1982), 4% (1983).
$US 1 = $B 2.10 (1981), 2.20 (1982), 2.15 (1983).

Army: 3,500.
2 inf bns (3rd forming).
1 armd recce sqn.
1 AD bty with *Rapier*.
1 engr sqn.
1 sigs sqn.
16 *Scorpion* lt tks; 2 *Sultan* armd cars; 24 Sankey AT-104 APC; 16 81mm mor; 12 *Rapier*/*Blindfire* SAM.

Navy: (350).
3 *Waspada* FAC(G) with 2 *Exocet* MM-38 SSM.
3 *Perwira* coastal, 3 Rotork river patrol craft.
2 *Loadmaster* landing craft.
24 assault boats.
1 special boat sqn.

Base: Muara.

Air Force: (100); 6 combat ac.
1 COIN sqn with 6 Saab 105CB.
1 hel sqn with 10 Bell 212.
1 composite sqn with 2 SF-260 ac, 3 Bell 206A/B hel.
VIP flt: 1 BO-105, 1 Bell 212, 1 S-76 hel.
Misc hel: 2 Bell 212, 1 206A.
(On order: 1 AUH-76 (S-76) armed hel.)

Para-Military Forces: Royal Brunei Police elms (1,750); Gurkha Reserve Unit (900).

BURMA

Population: 38,800,000.
Military service: voluntary.
Total armed forces: 180,500.
GDP 1982/3: K 46.945 bn ($5.960 bn). 1983/4: 50.600 bn ($6.30 bn).
Est def exp 1982/3: K 1.650 bn ($209.487 m). 1983/4: 1.770 bn ($220.366 m).
GDP growth: 6.5% (1982), 7.0% (1983).
Inflation: 5.2% (1981), 5.0% (1982).
Debt: $1.6 bn (1981).
$1 = kyat 7.8764 (1982/3), 8.0321 (1983/4).

Army: 163,000.
9 Regional commands, 1 garrison.
3 lt inf divs (under central control, each with 3 Tactical Operational Comds = bdes; 10 bns). (3 more div HQ reported forming.)
16 bdes (Tactical Operational Comds).
2 armd bns.
85 inf bns (incl in divs and bdes).
4 arty bns.
1 AA bty.
24 *Comet* MBT; 40 Humber armd, 45 *Ferret* scout cars; 50 25-pdr (88mm), 5.5-in. (140mm) guns/how; 120 76mm, 80 M-101 105mm how; 80 120mm mor; 50 6-pdr (57mm) and 17-pdr (76.2mm) ATK guns; 84mm *Carl Gustav* RCL; 10 40mm AA guns.[2]

Navy: 10,000.[2]
4 corvettes: 2 US (1 PCE-827, 1 *Admirable*), 2 *Nawarat*.
36 gunboats (15).
46 river patrol craft.
1 US LCU, 8 US LCM, 1 spt vessel.

Bases: Bassein, Mergui, Moulmein, Seikyi, Sinmalaik, Sittwe.

Air Force: 7,500; 38 combat ac.[2]
2 COIN sqns with 16 PC-7 *Turbo-Trainer*, 16 SF-260WB, 6 AT-33A.
3 tpt sqns: 1 F-27F, 5 FH-227, 7 Pilatus PC-6/-6A, 2 DHC-5D.
Liaison flt: 6 Cessna 180, 1 Cessna 550.
4 hel sqns: 10 KB-47G, 2 KV-107/II, 7 HH-43B, 10 *Alouette* III, 14 UH-1.
Trainers incl 10 SF-260MB, 9 T-37C.

Para-Military Forces: 73,000. People's Police Force (38,000); People's Militia (35,000). Fishery Dept: 3 *Osprey*, 12 patrol boats(.

Opposition:
Burmese Communist Party: 12,000 regulars; 8,000 militia.
Kayan New Land Party: perhaps 100.
Karen National Liberation Army: some 7,500; 5 bdes, 3 indep bns.
Shan State Army: some 3,500.
Shan United Revolutionary Army: some 900–1,200.
Shan United Army: 4,000.
Palaung State Liberation Army, Pa-O National Army, Wa National Army: a few hundred each.
Kachin Independence Army: 8,000; 4 bdes.
Karenni Army: perhaps 600; 4 'bdes'.
Mon State Army; two groups: one some 500; other perhaps 200.
Kawthoolei Muslim Liberation Front (Karen linked) absorbed OMMAT Liberation and Rohingya Patriotic Fronts.

FIJI

Population: 680,000.
Military service: voluntary.
Total armed forces: 2,660.
Est GDP 1981: $F 1.088 bn ($US 1.275 bn). 1982: 1.010 bn ($US 1.084 bn).
Est def exp 1982: $F 9.320 m ($US 10.0 m).
Debt: $US 300m (1983).
$US 1 = $F 0.8532 (1981), 0.932 (1982).

Army: 2,500.
3 inf bns.
1 engr coy.
1 arty tp.
Spt units.
4 25-pdr (88mm) guns/how; 12 81mm mor.

Navy: 160.
3 US *Redwing* coastal minesweepers.
3 marine survey vessels.

Base: Suva.

Forces Abroad: 1,095; 2 inf bns. Lebanon (UNIFIL) (626); Egypt (Sinai MFO) (469).

INDIA

Population: 743,300,000.
Military service: voluntary.
Total armed forces: 1,120,000.
Est GDP 1982/3: Rs 1,665.0 bn ($172.924 bn). 1983/4: 1,815.0 bn ($176.0 bn).
Est def exp 1983/4: Rs 58.620 bn ($5.684 bn). Def budget 1984/5: 68.0 bn ($6.326 bn).
GDP growth: 5.0% (1982), 2.0% (1983).
Inflation: 9.0% (1982), 7.0% (1983).
Debt: $23 bn (1982).
$1 = rupees 9.6285 (1982/3), 10.3123 (1983/4), 10.750 (1984).

Army: 960,000.
5 Regional Commands.
8 corps HQ.
2 armd divs.
1 mech div.

18 inf divs.
10 mountain divs.
5 indep armd bdes.
7 indep inf bdes.
1 para bde.
17 indep arty bdes, incl about 20 AD regts.
AFV: 700 T-54/-55, 300 T-72, 1,900 *Vijayanta* MBT, 250 BMP-1 MICV; 500 OT-62/-64, BTR-60 APC.
Arty: Yug M-48 76mm, 25-pdr (88mm) (retiring), 100 100mm, 200 105mm, 550 M-46 130mm (some SP), 5.5-in. (140mm) (retiring), S-23 180mm guns; 75/24 75mm mountain, 105mm (incl M-56 pack, *Abbot* SP), D-20 152mm how; 81mm, 500 120mm, 20 160mm mor.
ATK: M-18 57mm, *Carl Gustav* 84mm, M-40 106mm RCL; 6-pdr (57mm) ATK guns; SS-11-B1, *Milan*, AT-3 *Sagger* ATGW.
AD: 20mm, 40mm, L/60mm, L/70mm, 500 3.7-in. (94mm) towed, ZSU-23-4 SP AA guns; SA-6/-7/-9, 40 *Tigercat* SAM.
(On order: T-72M MBT, BRDM recce, BMP-1/-2/BMD MICV, *Milan* ATGW launchers, 3,700 msls.)

RESERVES: 200,000. Territorial Army 50,000.

Navy: 47,000, incl naval air force.
8 Sov *F*-class submarines.
1 Br *Majestic* aircraft carrier (capacity 18 attack, 4 ASW ac, ASW hel).
1 Br *Fiji* cruiser (trg).
3 Sov *Kashin* II GW destroyers with 4 *Styx* SSM, 2×2 SA-N-1 SAM, 1 Ka-25 hel.
23 frigates: 2 *Godavari* with 2 *Styx* SSM, 1 SA-N-4 SAM, 2 *Sea King* hel; 6 *Leander* with 2 × 4 *Seacat* SAM, 1 hel; 2 Br *Whitby* with 3 *Styx* SSM; 10 Sov *Petya* II; 3 Br *Leopard* (trg).
3 Sov *Nanuchka* corvettes with 4 SS-N-2 SSM, 1 SA-N-4 SAM.
8 Sov *Osa*-I (6 FAC(G), 2 FAC), 8 *Osa*-II with 4 *Styx* SSM.
1 *Abhay*, 6 SDB-2 large patrol craft.
6 Sov *Natya* ocean, 4 Br *Ham* minesweepers; 6 Sov *Yevgenya* inshore minehunters.
6 Sov *Polnocny* LCT, 4 LCU.
(On order: Sov *T*-class, 4 Type 1500 subs, 2 *Kashin* GW destroyers, 4 *Godavari* (mod *Leander*) FFG, 2 *Nanuchka* corvettes, 6 *Polnocny* LCT, *Exocet* SSM.)

Bases: Western Fleet: Bombay, Goa. Southern Fleet: Cochin. Eastern Fleet: Vishakapatnam, Port Blair.

NAVAL AIR FORCE: (2,000); some 37 combat ac, 23 combat hel.
1 attack sqn with 15 *Sea Hawk* FGA-6 (being retired), 8 *Sea Harrier* FRS Mk-51 (2 T-60 trg) (10 ac in carrier).
1 ASW sqn with 5 *Alizé* 1050 (4 in carrier).
2 MR sqns with 4 L-1049 *Super Constellation*, 3 Il-38 *May*.
1 comms sqn with 18 *Defender* (some MR).
4 ASW hel sqns with 10 *Sea King* (carrier, frigates); 5 Ka-25 *Hormone* (in *Kashins*); 8 *Alouette* III (in frigates).
1 SAR/liaison hel sqn with 10 *Alouette* III.
2 trg sqns with 6 HJT-16 *Kiran*, 2 *Sea Hawk* FB-5 ac; 3 *Alouette* III, 4 Hughes 269 hel.
(On order: 10 *Sea Harrier* Mk 51, 1 T-60; 3 Il-38 MR ac; 12 *Sea King* Mk 42B hel; *Sea Eagle* SSM; *Exocet* AM-39 ASM.)

Air Force: 113,000; some 920 combat ac; some 60 armed hel.
4 Air Commands.
3 lt bbr sqns (1 maritime role): 35 *Canberra* B(I)58/B(I)12 (to be replaced); 18 *Jaguar*.
15 FGA sqns: 1 with some 18 *Hunter* F-56A (*Jaguar* to replace); 3 with 50 *Jaguar* GR-1, 6 T-2; 2 with 36 Su-7BM; 1 with 18 HF-24 *Marut* (MiG-23BN to replace); 4 with 72 MiG-23BN *Flogger* H; 4 with 72 *Ajeet*.
21 AD sqns; 19 with 400 MiG-21/FL/PFMA/MF/bis; 2 with 45 MiG-23MF *Flogger* B.
2 recce sqns: 1 with 8 *Canberra* PR-57, 4 HS-748; 1 with 12 MIG-25R, 1 MiG-25U.
9 tpt sqns: 3 with 90 An-32; 2 with 30 An-12B; 2 with 20 DHC-3; 1 with 12 DHC-4; 1 with 9 HS-748M.
1 HQ comms sqn with 7 HS-748M, 2 Boeing 737-248 (leased).
Liaison flts and dets with 15 HS-748, C-47.
6 tpt hel sqns with 72 Mi-8.
8 liaison hel sqns with 100 SA-316B *Chetak* (*Alouette* III), some 60 SA-315B *Cheetah (Lama)*; some with 4 AS-11B ATGW.
Trg Comd: 3 trg and conversion sqns with 12 *Canberra* T-4/-13/-67, 30 *Hunter* F-56/T-66, 40 MiG-21U, 16 Su-7U; MiG-21, Su-7, 13 MiG-23UM *Flogger* CL; 60 HT-2, 83 HJT-16 *Kiran*, 15 *Marut* Mk 1T, some HPT-32 (replacing HT-2), 44 TS-11 *Iskra*, 27 HS-748 ac; *Chetak* hel.
AAM: R-23R/T *Apex*, R-60 *Aphid*, R-550.
ASM: AS-30; AS-11B (ATGW).
30 SAM sqns with 180 *Divina* V 750VK, SA-2, SA-3.
Air Defence Ground Environment System.
(On order: 36 *Mirage* 2000H, 4 TH, 115 *Jaguar* (to be locally assembled), some 100 MiG-27M *Flogger* D/J, MIG-21bis, 20 *Ajeet* ftrs; 6 An-32, Do-228, 20 Il-76, 10 HS-748 tpts; 90 *Kiran* Mk 2, 140 HPT-32, 171 *Hawk* trg ac; Mi-8, Mi-24, 45 *Chetak* hel; R-23R *Apex*, R-60 *Aphid* AAM.)

Para-Military Forces: Border Security Force 85,000; 175,000 in other organizations. Coastguard 2,000: 2 Br Type 14 frigates, 2 FAC(P), 5 *Poluchat* large patrol craft, 2 air sqns with 2 F-27, 5 *Defender* ac, 4 *Chetak* hel. (On order: 3 offshore, 9 inshore patrol vessels, 9 lt tpt ac, 6 hel.)

INDONESIA

Population: 158,300,000.
Military service: selective.
Total armed forces: 281,000.
GDP 1982: Rp 59,633 bn ($88.458 bn). 1983: 72,111 bn ($73.331 bn).
Est def exp 1982/3: Rp 1,935 bn ($2.870 bn). 1983/4: 2,485 bn ($2.527 bn).
GDP growth: 0% (1982), 4.5% (1983).
Inflation: 10% (1982), 12% (1983).
Debt: $23.6 bn (1982).
$1 = rupiahs 674.14 (1982/3), 983.36 (1983/4).

Army: 210,000.
4 Regional, 16 Military Area Commands.
4 inf divs (each 2 bdes).
1 armd cav bde (10 cav bns, spt units).
2 indep inf bdes, 11 indep inf regts (39 inf bns).
2 AB inf bdes (6 bns).
2 fd arty regts (6 bns).
1 AA arty regt (3 bns).
4 special warfare gps.
8 indep fd arty bns.
7 indep AA arty bns; 4 indep btys.
2 construction engr regts (4 bns); 4 indep bns.
1 fd engr regt (2 bns); 6 indep bns; 10 indep dets.
33 indep inf bns.
4 indep AB inf bns.
Marine transport.
Army Aviation:
1 composite sqn; 1 hel sqn.
AFV: 93 AMX-13, 41 PT-76 lt tks; 75 *Saladin* armd, 60 *Ferret* scout cars; 200 AMX-VCI MICV, 60 *Saracen*, 60 V-150 *Commando*, BTR-40/-152 APC.
Arty: some 30 M-1938 76mm pack, 170 105mm guns/how; 480 81/82mm, M-43 120mm mor; 480 M-67 90mm, M-40 106mm RCL.
AA: 20 20mm, 90 M-1 40mm, 200 57mm AA guns.
Avn: 5 NC-212 *Aviocar*, 2 *Aero Commander* 680, 1 Beech 18 ac; 6 Bell 205, 2 *Alouette* III, 16 BO-105 hel.
Amph: 1 LST, 20 LCU, 14 small tpt ships.
(On order: 100 AMX-13 lt tks, 50 AMX L-30 105mm SP how; 2 NC-212-200 *Aviocar* ac; 6 Bell 212, 26 *Super Puma* hel.)

Navy: 42,000 incl naval air and marines.
3 subs: 2 Type 209, 1 Sov *W*-class (trg).
9 frigates: 3 *Fatahillah* with 4 *Exocet* MM-38 SSM (1 with 1 *Wasp* hel); 4 US *Jones*; 2 Sov *Riga*.
14 large patrol craft: 3 Sov *Kronshtadt*, 4 Yug *Kraljevica*, 2 *Kelabang*, 3 *Attack*, 1 US PGM-39, 1 *Komar*.
4 *Dagger* FAC(G) with 4 *Exocet* SSM.
2 Lürssen TNC-45 FAC(T).
6 Aus *Carpentaria* coastal patrol craft(.
2 Sov T-43 ocean minesweepers.
1 comd/spt ship; 1 trg ship with 4 *Exocet*, 1 hel.
12 LST, 4 LCU, 2 control craft.
Spt: 4 cargo ships, 4 tankers, 2 tpts.
(Plus non-operational incl: 1 *Pattimura* frigate; 1 *Kronshtadt*, 2 *Kelabang*, 2 PGM-39, 2 *Attack* patrol craft; 1 *R*-class coastal minesweeper; 1 comd/spt ship.)

Bases: Jakarta (Tanjung Priok), Surabaya.

NAVAL AIR: (1,000); 17 combat ac, 10 combat hel.
10 *Wasp* ASW hel.
11 *Nomad* N-22B, 6 N-22L MR ac.
Other ac incl 6 C-47, 3 *Aero Commander* ac; 1 *Alouette* II, 4 BO-105 hel.

MARINES: (12,000).
2 inf regts (6 bns); 1 combat spt, 1 admin spt, 1 trg regts.
30 PT-76 lt tks; 40 AMX-10 PAC-90 MICV; 57 APC incl 25 AMX-10P; 40 M-38 122mm how; 40mm AA guns.

(On order: 1 T-209 sub, 3 *Tribal* frigates, 2 PB-57 FAC,[4] 2 minehunters, 4 jetfoil patrol boats[4]; 2 *Nomad*, 4 NC-212, 18 NC-235 tpt ac; 26 AS-332F *Super Puma* hel.[4])

Air Force: 29,000; 83 combat aircraft.
6 Air Regions:
2 FGA sqns with 30 A-4E, 4 TA-4H *Skyhawk*.
1 interceptor sqn with 11 F-5E, 4 F-5F.
1 COIN sqn with 15 OV-10F.
1 MR sqn with 1 C-130H-MP, 3 Boeing 737-200, 5 HU-16.
4 tpt sqns: 2 with 21 C-130B/H/HS, 1 L-100-30; 2 with 1 C-140 *Jetstar*, 7 C-47, 1 SC-7 *Skyvan*, 8 F-27, 13 NC-212A4, 1 Boeing 707, 12 Cessna 207/401/402.
3 hel sqns: 1 with 9 Sikorsky UH-34T; 2 with 5 Bell 204B, 12 47G, 9 SA-330L *Puma*, 6 SA-332 *Super Puma*, 1 SA-332L (VIP), 12 Hughes 500; 6 NBO-105 (with forestry).
3 trg sqns: 13 *Hawk* T-53, 15 T-34C1 (OCU), 7 Cessna T-41D, 20 AS-202 *Bravo*.
5 bns Quick Reaction Tps.
(On order: 8 NC-212-200, 32 NC-235 tpt, 9 T-34C1, 3 *Hawk* trg ac; (N)BO-105, SA-332 *Super Puma*, Bell U-412, BK-117 hel.)

Other HQ:
National Strategic Command: HQ only; to command Strategic Reserve forces in strategic operations. Incl army, KOSTRAD, naval forces incl marines, combat and tpt ac.
KOSTRAD = Strategic Reserve Command: army command (16,500–19,000 men) under direct control of the Commander of the Armed Forces: 3 inf, 2 AB bdes, spt arms and services.
KOPKAMTIB = Command for the Restoration of Order and Security; no forces assigned.
KOPPASSANDHA = Special Forces Command: 4,000; 4 special para/cdo gps.

Para-Military Forces: Police mobile bde[5] org in coys: 12,000; 2 BO-105 hel. Militia, about 70,000. Coastguard: many small patrol boats. Customs: 12 28-metre, 8 57-metre Lürssen patrol boats. Civil Defence Force (millions registered).

JAPAN

Population: 120,800,000.
Military service: voluntary.
Total armed forces: 245,000 (ceiling 272,162).
Est GDP 1982: yen 264,707 bn ($1,060.5 bn). 1983: 279,500 bn ($1,178.9 bn).
Def budget: 1983/4: yen 2,754.2 bn ($11.617 bn). 1984/5: 2,934.600 ($12.488 bn).
GDP growth: 3.3% (1982), 3.0% (1983).
Inflation: 3% (1982), 3.5% (1983).
Debt: $114.1 bn (1982).
$1 = yen 249.607 (1982/3), 237.085 (1983/4), 235.000 (mid-1984).

Army: 155,000.
5 Army HQ (Regional Commands).
1 armd div.
12 inf divs (5 at 7,000, 7 at 9,000 men each).
2 composite bdes.
1 AB bde.
1 arty bde, 2 arty gps; 8 SAM gps (each of 4 btys).
1 sigs bde.
5 engr bdes.
Army Aviation:
1 hel bde: 24 sqns.
AFV: some 550 Type 61 (retiring), some 470 Type 74 (increasing) MBT; 430 Type 60, 120 Type 73 APC.
Arty: 354 105mm (incl some 20 Type 74), some 370 155mm SP (incl 166 Type 75), 70 203mm (incl 10 SP) guns/how; 50 Type 30 SSM; 800 81mm, 560 107mm mor (some SP); 50 Type 75 130mm SP MRL.
ATK: 1,600 75mm, *Carl Gustav* 84mm, 106mm (incl Type 60 SP) RCL; 226 Type 64, 25 Type 79 ATGW.
AD: 110 35mm twin, 37mm, 40mm (incl M-42 SP), 75mm AA guns; 10 Type 81 *Tan*, 100 *HAWK*, 100 *Improved HAWK* SAM.
Avn: 33 ac and 354 hel: 21 LR-1, 2 TL-1, 9 L-19 ac; 2 AH-1S, 58 KV-107, 80 UH-1H, 65 UH-1B, 20 TH-55, 147 OH-6J/D hel.
(On order: 72 Type 74 MBT; 9 Type 73 APC; 24 Type 75 155mm, 24 M-110A2 203mm SP how; 8 Type 75 130mm MRL; Type 79 hy ATGW; 224 84mm RCL; 70 *Stinger*, 7 Type 81 *Tan* launchers, 48 *Improved HAWK* SAM; 3 OH-6D, 7 HU-1H hel.)

RESERVES: 43,000.

Navy: 44,000 (including naval air).
14 submarines: 5 *Yushio*, 7 *Uzushio*, 2 *Asashio*.
32 destroyers: 2 *Shirane* with *Sea Sparrow* SAM, 1 × 8 *ASROC* ASW msl launcher, 3 ASW hel; 2 *Haruna* with 1 × 8 *ASROC*, 3 ASW hel; 5 *Hatsuyuki* with 2 × 4 *Harpoon* SSM, 1 *Sea Sparrow*, 1 × 8 *ASROC*, 1 ASW hel; 3 *Tachikaze* with *Tartar/Standard* SAM, 1 × 8 *ASROC*; 1 *Amatsukaze* with 1 *Standard* SAM, 1×8 *ASROC*; 4 *Takatsuki* with 1 × 8 *ASROC*; 6 *Yamagumo* with 1 × 8 *ASROC*; 3 *Minegumo* with 1 × 8 *ASROC*; 2 *Akizuki*; 1 *Murasame*; 3 *Ayanami*.
18 frigates: 3 with 2 × 4 *Harpoon* SSM (2 *Yubari*, 1 *Ishikari*), 11 *Chikugo* with 1 × 8 *ASROC*; 4 *Isuzu*.
4 large patrol craft: 2 *Mizutori*, 2 *Umitaka*.



Japanese F-15 outside maintenance hangar. The Japanese Air Force employs forty F-15s in two interceptor squadrons.

5 FAC(T).
9 coastal patrol craft(.
3 MCM spt ships, 30 coastal minesweepers (11 *Hatsushima*, 19 *Takami*), 6 *Nanago* MCM boats.
1 *Katori*, 2 *Ayanami* trg, 8 trg/spt ships incl 1 *Azuma*, 2 *Harukaze*.
6 LST (3 *Miura*, 3 *Atsumi*); 2 LSU.

Bases: Yokosuka, Kure, Sasebo, Maizuru, Ominato.

NAVAL AIR ARM: (12,000); 81 combat ac, 63 combat hel.
6 Air Wings.
7 MR sqns with 9 P-3C, 58 P-2J, 14 PS-1.
6 ASW hel sqns with 56 HSS-2/2A.
1 MCM hel sqn with 7 KV-107.
1 tpt sqn with 4 YS-11M, 1 B-65.
1 utility sqn with 3 UP-2J.
1 test sqn with 4 P-3C, 2 P-2J ac; 2 HSS-2A hel.
7 SAR flts with 8 US-1 ac, 13 S-61A/2 hel.
5 trg sqns incl OCU with 19 P-2J, 6 YS-11T, 18 TC-90, 7 B-65, 32 KM-2 ac; 11 HSS-2, 3 OH-6J/D, 4 Bell 47G hel.
(On order: 3 *Yushio* subs; 2 Type 171 DDG, 8 *Hatsuyuki* DDG; 4 *Hatsushima* MCM; 1 supply ship; 19 P-3C, 2 TC-90 ac; 13 HSS-2B, 1 SH-60B *Seahawk* ASW, 10 H-6D, 1 US-1A hel.)

RESERVES: 600.

Air Force: 46,000; some 270 combat ac.
6 combat air wings; 1 combat air gp; 1 recce sqn.
3 FGA sqns with 50 F-1.
10 interceptor sqns: 2 with some 40 F-15J/DJ (2 more forming); 6 with 110 F-4EJ; 2 with 50 F-104J.
1 recce sqn with 14 RF-4EJ: early warning gp with 4 E-2C.
1 aggressor trg sqn with 5 T-2, 6 T-33.
1 tactical tpt wing of 3 sqns with 25 C-1, 10 YS-11.
1 SAR wing (10 dets) with MU-2 ac, 29 V-107 hel.
1 air test wing with F-4EJ, F-15J, F-104J/DJ, 2 T-1, 6 T-2, 2 T-3, T-33A, C-1, 4 C-130H.
1 air traffic control and weather wing with YS-11, MU-2J, T-33A.
5 trg wings: 10 sqns with 40 T-1A/B, 59 T-2, 40 T-3, 50 T-33A.
AAM: *Sparrow, Falcon, Sidewinder.*
Air Defence:
3 aircraft control and warning wings and 1 group with 28 radar sites.
6 SAM gps: 19 sqns with 180 *Nike-J.*
(On order: 53 F-15J/DJ, 6 F-1 fighters, 2 C-130H tpt, 8 T-2 trg, 42 E-2C AEW ac; 1 V-107 hel; 4 Type 81 *Tan* SAM launchers.)

Para-Military Forces: Coast Guard: 42 large patrol vessels, 5 with 1 hel; 47 med, 19 small, 220 coastal patrol vessels (204(); 1 C-130HMP, 5 YS-11, 2 *Skyvan*, 2 *King Air* ac, 5 Bell 212 hel.
(On order: 1 large, 2 med, 1 coastal patrol craft.)

KAMPUCHEA/CAMBODIA[6]

Est population: 6–7 million.
Military service: conscription, 18 months minimum.
Total armed forces: some 30,000.

Armed Forces: some 30,000.
4 inf divs.
3 indep inf bdes.
Some 50 indep units incl cav (recce), arty, AD, pioneer.
T-54/-55 MBT PT-76 lt tks; V-100, M-113, BTR-40/-60/-152 APC; M-1942 76mm, M-1938 122mm how; Type-63 107mm, BM-13-16 132mm, BM-14-16 140mm MRL; 82mm, 120mm mor; B-10 82mm, B-11 107mm RCL; M-1938 37mm, M-1950 57mm AA guns.
(On order: tks, arty, ships, ac, Mi-8 hel reported; details unknown.)

Provincial Forces: HQ; bn, coy district and subdistrict units.

Para-Military Forces: Militia; Regional Armed Forces/Self Defence forces (org in coys); People's Police force.

Opposition: Coalition of Democratic Kampuchea: Democratic Kampuchea *(Khmer Rouge)*, some 35,000 org in bdes and bns; Kampuchean People's National Liberation Front (KPNLF), some 13,000 (plus perhaps 7,000 unarmed reserves), small arms, incl mor, RCL; *Armée Nationale Sihanoukienne* (ANS), perhaps 5,000. Though formally merged, the three forces appear to operate independently.

KOREA: DEMOCRATIC PEOPLE'S REPUBLIC (NORTH)

Population: 19,600,000.
Military service: Army, Navy 5 years; Air Force 3–4 years.
Total armed forces: 784,500.
Est GNP 1983: won 36.0 bn ($19.149 bn).
Def budget 1983: won 3.602 bn ($1.916 bn). 1984: 3.831 bn ($2.038 bn).[7]
GNP growth: 9.6% (1982), 7.3% (1983).
Inflation: 5% (1982).
Est debt: $3.0 bn (1982).
$1 = won 0.94 (1983/4 off.), 1.88 (adj.).

Army: 700,000.
9 corps HQ.
2 armd divs.
3 mot inf divs.
34 inf divs.
2 AA divs, 3 indep AA regts.
5 indep tk bdes.
9 indep inf bdes (5–8 bns; up to 8,500 men).
2 indep tk regts.
2 hy arty, 2 mor regts, 120 arty bns, 82 MRL bns } org in divs, bdes and regts.
6 SSM bns with 54 *FROG*.
5 river crossing regts (13 bns).
AFV: 300 T-34, 2,200 T-54/-55/-62, 175 Type-59 MBT; 100 PT-76, 50 Type-62 lt tks; 140 BA-64 armd cars; BMP-1 MICV; 1,000 BTR-40/-50/-60/-152, Type-531 APC.
Arty: 3,300 76mm, 85mm, 100mm, M-30 122mm, M-46 130mm and S-23 180mm towed guns; 800 SU-76 and SU-100 SP guns; 122mm, 152mm how; 11,000 82mm, 120mm, 160mm and 240mm mor; 2,000 107mm, 122mm, 140mm, 200mm and 240mm MRL; 54 *FROG*-5/-7 SSM.
ATK: 1,500 B-10 82mm and B-11 107mm RCL; 45mm, 57mm, Type-52 75mm ATK guns; AT-3 *Sagger* ATGW.
AD: 8,000 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4 and ZSU-57-2 SP AA guns; SA-7 SAM.

RESERVES: 260,000, 23 divs (cadre, no hy eqpt). Up to 3,000,000 have some Reserve commitment.

Navy: 33,500.
21 subs (4 Sov *W*-, 4 Ch *R*-class, 13 local-built).
4 *Najin* frigates (2 may be in reserve).
24 FAC(G): 4 *Soju*, 10 *Osa*-I (4 *Styx* SSM); 10 *Komar* (2 *Styx* SSM)(.
33 large patrol craft: 2 Sov *Tral*, 15 SO-1, 3 *Sariwan*, 6 Ch *Hainan*, 7 *Taechong*.
155 FAC: 20 Sov MO-IV(; 23 Ch (15 Shanghai II, 8 Shantou(), 4 *Chodo*, 4 K-48, 66 *Chaho*(, 38 *Chong-Jin*(.
182 FAC(T): 80 Sov (4 *Shershen*, 64 P-6(, 12 P-4(); 102((9 *Sinpo*, 15 *Iwon*, 6 *An Ju*, 72 *Ku Song/Sin Hung*).
30 coastal patrol craft((10 Sov KM-4, 20 misc gunboats).
3 *Nantze* LSM, 9 LCU, 15 LCM, 80 *Nampo* landing craft(.
2 coast defence msl regts with *Samlet* in 6 sites; M-1931/-37 122mm, SM-4-1 130mm, M-1937 152mm guns.

RESERVES: 40,000.

Bases: East Coast: Wonsan, Cha-ho, Chongjin, Kimchaek, Toejo. West Coast: Nampo, Haeju, Pipaqwan, Sagwan-ri.

Air Force: 51,000; some 740 combat ac.
3 lt bbr sqns with 70 Il-28.
13 FGA sqns: 1 with 20 Su-7; 9 with some 290 MiG-15/-17; 3 with some 100 MiG-19/Q-5.
12 interceptor sqns with 160 MiG-21, some 100 MiG-19.
Tpts incl 250 An-2, 10 An-24, 5 Il-14, 4 Il-18, 2 Tu-154B, 1 Il-62.
Hel incl 40 Mi-4, 20 Mi-8.
Trainers incl 20 Yak-11, 70 Yak-18, 100 MiG-15UTI/-19UTI/-21U, Il-28, 30 CJ-6.
AAM: AA-2 *Atoll*.
4 SAM bdes (12 bns, 40 btys) with 250 SA-2, in 45 sites.

Forces Abroad: Iran 300; Madagascar 100; Uganda 40.

Para-Military Forces: Bureau of Reconnaissance Special forces (100,000): 1 HQ: 22 regts; 4 recce, 3 cdo, 1 river crossing regts; 5 AB, 3 amph bns. Security forces and border guards: 38,000. Workers-Farmers Youth Red Guard (civilian militia) 4,000,000: HQ (corps equivalent) in each of 9 Provinces and 3 towns. Bde HQ in towns; bns, coy/pl at village, farm, factory etc., some with small arms, some AA arty.

KOREA: REPUBLIC OF (SOUTH)

Population: 41,600,000.
Military service: Army and Marines 30 months, Navy and Air Force 3 years.
Total armed forces: 622,000.
GDP 1982: won 52,878 bn ($72.324 bn). 1983: 59,455 bn ($76.642 bn).
Est def exp 1983: won 3,419 bn ($4.407 bn). 1984: 3,452 bn ($4.315 bn).[8]
GDP growth: 7% (1982), 9.3% (1983).
Inflation: 7.2% (1982), 3.4% (1983).
Debt: $37 bn (1982).
$1 = won 731.13 (1982), 775.75 (1983), 800 (mid-1984).

Army: 540,000.
3 Army, 6 Corps HQ.
2 mech inf divs (each 3 bdes: 3 mech inf, 3 mot, 3 tk, 1 recce bns; 1 fd arty bde).
20 inf divs (each 3 inf regts, 1 recce, 1 tk, 1 engr bn, arty gp).
11 indep bdes incl 3 AB (4 AB, 1 recce, 1 hel bns, arty gp), 2 special forces, cdo, inf, 'Capital Command'.
2 AA arty bdes.
2 SSM bns with *Honest John*.
2 SAM bdes: 3 *HAWK*, 2 *Nike Hercules* bns.
1 army aviation bde.
AFV: 1,200 M-47/-48 (incl 600 A5) MBT; 500 M-113/-577, 350 Fiat 6614 APC.
Arty: 2,500 M-53 155mm, M-107 175mm SP guns and M-101 105mm, M-114 towed, 100 M-109A2 SP 155mm, M-115 towed, 20 M-110 SP 203mm how; 130mm MRL; 5,300 81mm and 107mm mor; 12 *Honest John* SSM.
ATK: 8 M-18 76mm, 50 M-36 90mm ATK guns; *LAW* RL; 57mm, 75mm, 106mm RCL; *TOW* ATGW.
AD: 66 *Vulcan* 20mm, 40 40mm AA guns; 110 *HAWK*, 100 *Nike Hercules* SAM.
Avn: 14 O-2A ac; 100 UH-1B, Hughes 500MD *Defender* (50 with *TOW*), 100 OH-6A, 100 *Scout* hel.
(On order: *TOW* ATGW; *Stinger*, 56 OH-6A, 20 Hughes 500MD/*TOW* hel.)
RESERVES: Regular Army Reserves 1,400,000: 23 inf divs (cadre). Homeland Reserve Defence Force 3,300,000.

Navy: 49,000 incl marines.
11 US destroyers: 7 *Gearing* with 8 *Harpoon* SSM (2 with 1 *Alouette* III hel), 2 *Sumner*, 2 *Fletcher*.
8 frigates: 1 *Ulsan* with 8 *Harpoon*; 7 US (1 *Rudderow*, 6 *Lawrence/Crosley*).

11 US large patrol craft with *Standard* SAM (8 PSMM-5 with 4, 1 *Asheville* with 2).
12 other large patrol craft incl 8 US *Cape*.
2 *Kist* FAC(G) with *Exocet*.
6 CPIC FAC(P).
4 coastal patrol craft(incl 2 *Schoolboy* I/II.
8 MSC-268/-294 coastal minesweepers, 1 minesweeping boat(.
33 US landing ships (8 LST, 9 LSM, 6 LCU, 10 LCM).
2 ASW sqns: 1 with 22 S-2A/F ac; 1 with 10 Hughes 500MD hel; 12 *Alouette* III hel flts.

Bases: Chinhae (HQ), Cheju, Inchon, Mokpo, Mukho, Pukpyong, Pohang, Pusan.

RESERVES: 25,000.

Marines: (20,000).
2 dlvs, 1 bde.
M-47 MBT; LVTP-7 APC.

(On order: 1 sub, 7 CKX corvettes, 20 FAC(G) (7 types), 75 *Harpoon* SSM; 40 LVTP-7.)

RESERVES: 60,000.

Air Force: 33,000; some 440 combat ac.
7 combat, 2 tpt wings.
18 FGA sqns: 14 with 260 F-5A/B/E/F; 4 with 70 F-86F.
4 AD sqns with 72 F-4D/E.
1 COIN sqn with 24 OV-10G, some A-37.
1 recce sqn with 10 RF-5A.
1 SAR hel sqn with 6 UH-1H, 20 UH-1B/H.
5 tpt sqns with 10 C-54, 16 C-123J/K, 2 HS-748, 6 C-130H, *Aero Commander*.
Trainers incl: 20 T-28D, 33 T-33A, 39 T-37C, 20 T-41D, 35 F-5B, 63 F-5F.
AAM: *Sidewinder, Sparrow*.
(On order: 30 F-16A, 6 F-16B, 36 F-5E, 30 F-5F ftr; 25 T-27 *Tucano* trg ac; *Maverick* ASM.)

RESERVES: 55,000.

Para-Military Forces: Civilian Defence Corps (to age 50) 4,400,000; Student Homeland Defence Corps (Schools) 1,820,000. Coastguard: 25 small craft, 9 Hughes 500D hel.

LAOS

Est population: 4,000,000.
Military service: conscription, 18 months minimum.
Total armed forces: 53,700.
Est GNP 1980: k 4 bn ($400 m).
Est def exp 1981: k 260 m ($26 m).[9]
Est FMA: $ 100 m (1982).
$1 = kip 10 (1980/81, off.).

Army: 50,000.
4 inf divs.
1 arty div.
7 indep inf regts.
1 engr regt.
2 construction regts, indep construction bns.
5 arty, 9 AA arty bns.
65 indep inf coys.
1 lt ac liaison flt.
30 T-34/-54/-55 MBT; 25 PT-76 lt tks; 8 BTR-40, 40 BTR-152, M-113 APC; 80 M-116 75mm, M-1942 76mm, M-101 105mm, D-30 122mm, M-114 155mm how; 81mm, 82mm, 107mm (4.2-in.) mor; M-18/A1 57mm, 107mm RCL; M-1939 37mm, M-1950 57mm AA guns.

Navy: 1,700.
6 river patrol craft, incl Sov *Shmel*.
(Perhaps 25 more vessels, incl 4 LCM, 7 tpts(in reserve.)

Air Force: 2,000; 20 combat ac.
3 FGA sqns with some 20 MiG-21.
1 tpt sqn with 2 Yak-40, 5 An-24, 2 An-26, 6 An-2.
1 hel sqn with 10 Mi-8, 2 Mi-6, Mi-4.
Trg: MiG-17/-21UTI.
AAM: AA-2 *Atoll*.

Para-Military Forces: Militia, Self-Defence forces.

MALAYSIA

Population: 15,850,000.
Mililtary service: voluntary.
Total armed forces: 124,500.
GDP 1982: $R 61.196 bn ($US 26.204 bn). 1983: 67.480 bn ($US 29.070 bn).
Def exp 1982: $R 4.978 bn ($US 2.144 bn). 1983: 5.480 bn ($US 2.361 bn). Budget 1984: 5.0 bn ($US 2.170 bn).[10]
GDP growth: 4.2% (1982), 5.5% (1983).
Inflation: 5.8% (1982), 3.7% (1983).
Debt: $US 9.5 bn (1982).
$1 = ringgits 2.3354 (1982), 2.3213 (1983), 2.3044 (mid-1984).

Army: 100,500.
1 corps, 4 div HQ.
12 inf bdes, consisting of 36 inf bns (1 APC), 4 cav, 4 fd arty, 1 AA arty, 5 sigs regts; administrative units.
1 Special Service bde gp.
25 *Scorpion* lt tks; some 46 SIBMAS, 140 AML armd, 93 *Ferret* scout cars; AT-105, 200 V-100/-150 *Commando*, some 10 *Stormer*, some 320 *Condor* APC; 12 5.5-in. (140mm) guns, 114 Model 56 105mm pack how; 81mm mor; M-20 89mm RL; 150 106mm, 5 120mm RCL; SS-11 ATGW; 70 12.7mm, 25 40mm AA guns.
(On order: some 25 *Scorpion* lt tks; some 138 SIBMAS AFV, some 10 *Stormer*, some 140 *Condor* APC (being delivered).)

RESERVES: Malaysian Territorial Army 45,000; Local Defence Corps, some 15,000.

Navy: 11,000 (being expanded).
2 frigates: 1 *Yarrow* (1 × 4 *Seacat* SAM); 1 Type 41.
8 FAC(G) with 4 or 2 *Exocet* MM-38 SSM: 4 *Handalan* (*Spica*-M), 4 *Perdana*.
6 *Jerong* FAC.
21 large patrol craft: 3 *Kedah*, 4 *Sabah*, 14 *Kris*.
2 Br *Ton* coastal minesweepers.
2 US 511-1152 LST, 29 small amph vessels.
1 spt, 1 fleet ammunition ship.
(On order: 2 FS-1500 frigates with *Exocet*, 2 1,300-ton patrol vessels, 4 *Spica*-M FAC(G) (*Exocet* MM-40), 4 *Lerici* minehunters, 2 LST.)

Bases: Woodlands (Singapore; trg base), Kuantan, Labuan, Lumut.

RESERVES: about 600.

Air Force: 13,000 (being expanded); 34 combat ac.
2 Air Regions, (5 bns), 1 Spt Command.
1 FGA sqn with 13 F-5E, 4 F-5F, 2 RF-5E.
2 COIN/trg sqns with 12 MB-339.
1 MR sqn with 3 PC-130H.
3 tpt, 1 liaison sqns: 1 with 6 C-130H; 2 with 14 DHC-4A; 1 with 2 HS-125, 2 F-28, 12 Cessna 402B.
2 tpt hel sqns with 36 S-61A-4; 2 liaison sqns with 24 SA-316B *Alouette* III.
3 trg schools: with 11 *Bulldog* 102, 40 PC-7 ac; 7 Bell 47, 2 *Alouette* hel.
AAM: *Sidewinder*.
(On order: 34 A-4S FGA, 6 TA-4 trg (plus 20 more for spares), 4 NC-212 *Aviocar* tpt ac; *Super Sidewinder* AAM.)

RESERVES: 600: 10 CL-41G6 *Tebuan* trg ac.

Para-Military Forces: Police Field Force 12,000; 21 bns (incl 2 Aboriginal), *Shorland* armd cars and SB-301 APC, 210 patrol boats(; 4 Cessna 206. Area Security Units (Home Guard): 3,100 men in 89 units; Border Scouts (in Sabah, Sarawak): 1,200. People's Volunteer Corps (RELA), over 350,000.

MONGOLIA

Population: 1,800,000.
Military service: 3 years.
Total armed forces: 36,500.
Est def exp 1983: tugriks 816.4 m ($247.394 m). Budget 1984: 763.8 m ($231.455 m).
Est FMA: $600 m (1982).
$1 = tugrik 3.30 (1983/4, off.).

Army: 33,000.
2 inf divs.
1 inf bde (may be forming a div).
T-54/-55/-62 MBT; BRDM-2 recce; BMP MICV; 70 BTR-60/-152 APC; ZIS-3 76mm, 100mm incl SU-100 SP, 122mm, 130mm guns; M-1937 152mm gun/how; 152mm how; *Snapper* ATGW; 37mm, 57mm AA guns.

RESERVES: 40,000.

Air Force: 3,500 (100 pilots); Soviet technicians; 12 combat ac. (Operates civil air line.)
1 ftr sqn with 12 MiG-21.
At least 2 tpt sqns with 20 An-2, 19 An-24, 1 An-26.
1 hel sqn with Mi-8, 10 Mi-4.
Trainers: Yak-11/-18, 3 PZL-104 *Wilga* utility.

Para-Military Forces: Ministry of Public Security (15,000): Militia (Police), internal security troops, frontier guards; BTR-40/-152.

NEPAL

Population: 16,100,000.
Military service: voluntary.
Total armed forces: 25,000.
GDP 1981/2: NR 30.539 bn ($2.361 bn). 1982/3: 33.929 bn ($2.459 bn).
Def budget 1983/4: NR 464 m ($30.386 m).
GDP growth: 4% (1982), −1.3% (1983).
Inflation: 13% (1982), 14% (1983).
$1 = rupees 12.936 (1981/2), 13.796 (1982/3), 15.270 (1983/4).

Army: 25,000.
6 inf bdes (1 Palace Guard incl 1 cav sqn, 1 garrison bn).
1 arty bn.
1 engr bn.
1 sigs bn.
1 para bn.
1 tpt bn.
1 air sqn (1 comms flt, 1 Army flt).
6 75mm pack, 4 3.7-in. (94mm) mountain how; 15 4.2-in. (107mm), 18 120mm mor; 2 40mm AA guns; 3 *Skyvan*, 1 HS-748 ac; 4 *Chetak* (*Alouette* III), 2 *Puma* hel.

Para-Military Forces: Police force 15,000.

NEW ZEALAND

Population: 3,300,000.
Military service: voluntary, supplemented by Territorial Army service: 7 weeks basic, 20 days per year.
Total armed forces: 12,692.
GDP 1982/3: $NZ 31.235 bn ($US 22.783 bn). Est 1983/4: 33.0 bn ($US 21.682 bn).
Def exp 1982/3: $NZ 652.10 m ($US 475.638 m). Budget 1983/4: 715.32 m ($US 469.987 m).
GDP growth: 3.2% (1982), 0% (1983).
Inflation: 15.8% (1982), 12.6% (1983).
Debt: $US 10.2 bn (1982).
FMA: $US 0.51 m (1982/3), $US 0.55 m (1983/4).[11]
$US 1 = $NZ 1.3710 (1982/3), 1.5221 (1983/4).

Army: 5,548.
2 inf bns.
1 arty bty.
1 lt armd sqn.
26 *Scorpion* lt tks; 72 M-113 APC; 10 5.5-in. (140mm) guns; 41 105mm (incl pack) how; 71 81mm mor; 22 106mm RCL.

RESERVES: 1,410 Regular, 6,288 Territorial. 6 Territorial inf bns, 4 fd, 1 med arty btys, 1 recce, 1 APC, 1 ATK sqns.

Navy: 2,827.
4 *Leander* frigates: with 1 *Wasp* hel, *Seacat* SAM: 1 with 1 × 4 SAM; 2 with 2 × 4; 1 with 2 × 4, *Ikara* ASW.
4 *Lake* patrol craft.
2 inshore patrol craft.
7 *Wasp* hel.

Base: Auckland.

RESERVES: 708 Regular, 400 Territorial.

Air Force: 4,317; 33 combat ac.
1 FGA sqn with 9 A-4K, 3 TA-4K *Skyhawk*.
1 OCU with 16 BAC-167 *Strikemaster*.
1 MR sqn with 5 P-3B *Orion*.
2 med tpt sqns with 5 C-130H, 6 *Andover* (to retire), 2 Boeing 727-100C.
1 tpt hel sqn with 6 *Sioux*, 11 UH-1D/H.
1 comms sqn with 4 *Andover*, 3 Cessna 421C.
Trainers: 4 *Airtourer*, 15 CT-4 *Airtrainer*, 3 F-27 *Friendship* ac; 3 *Sioux* hel.

RESERVES: 866 Regular, 201 Territorial.

Forces Abroad: Singapore: 1 inf bn with log spt; 1 spt hel unit (3 UH-1). Egypt (Sinai MFO): 35; 2 UH-1 hel.

PAKISTAN

Population: 92,450,000 (excl Afghan refugees).
Military service: voluntary.
Total armed forces: 478,600.
GDP 1982/3: Rs 366.15 bn ($28.831 bn). Est 1983/4: 415.41 bn ($30.859 bn).
Def exp 1982/3: Rs 23.224 bn ($1.829 bn). Est 1983/4: 25.219 bn ($1.873 bn).
GDP growth: 6.6% (1982), 4.5% (1983).
Inflation: 12% (1982), 9.0% (1983).
FMA: $1.6 bn (1983).[12]
Debt: $10.4 bn (1983).
$1 = rupees 12.6998 (1982/3), 13.4616 (1983/4).

Army: 450,000.
7 Corps HQ; 1 Territorial Command.
2 armd divs.
16 inf divs.
4 indep armd bdes.
5 indep inf bdes.
7 arty bdes.
2 AA arty bdes.
6 armd recce regts.
6 SAM btys with 6 *Crotale* (each 4 msls).
1 special services group.
AFV: 370 M-47/-48 (incl A5), 51 T-54/-55, 1,000 Type-59 MBT; 500 M-113, 50 UR-416 APC.
Arty: some 1,000 25-pdr (88mm), Type-59 100mm, 130mm, 5.5-in. (140mm) and 155mm guns and M-116 75mm pack, 105mm incl pack, 12 M-7 SP, 155mm towed, M-109 SP, M-115 203mm how; 122mm MRL; 107mm, 120mm mor.
ATK: 75mm, 3.5-in. (89mm) RL; Type 52 75mm, 106mm RCL; *Cobra*, 200 *TOW* ATGW.
AD: 14.5mm, 37mm, 40mm, 57mm AA guns; 6 *Crotale* SAM.
Aviation:
1 liaison sqn with 20 *Supporter* ac.
4 hel sqns.
Indep army observation flts.
45 O-1E, Cessna 421, 50 *Mashshaq* (Saab *Safari*), *Turbo Commander*, *Queen Air* ac; some 15 Bell AH-1S, 16 Mi-8, 35 *Puma*, 23 *Alouette* III, 13 Bell 47G hel.
(On order: M-113 APC; 75 M-198 towed, 100 M-109A2 SP 155mm, 40 M-110 SP 203mm how; *TOW* ATGW launchers (incl 24 M-901 *Improved TOW* SP, 1,000 msls); some 5 AH-1S hel; 144 RBS-70 SAM launchers, 400 msls.)

RESERVES: 500,000.

Navy: 11,000.
11 subs: 2 *Agosta*, 4 *Daphne*, 5 SX-404 midget.
6 destroyers: 1 Br *County*, 2 ex-4 *Cassat* SAM, 1 *Alouette* hel; 6 US *Gearing* with 1 × 8 *ASROC* ASW; 1 Br *Battle*.
4 Ch *Hainan* FAC(P), 1 *Town* patrol craft.
4 Ch *Hoku* FAC(G) (2 msls).
12 Ch *Shanghai*-II FAC.
4 Ch *Huchwan* hydrofoil FAC(T)(.
19 coastal patrol craft: 1 *Spear*, 18 MC-55 Type.
3 US *Adjutant* and MSC-268 coastal MCM.
1 US *Mission* underway replenishment tanker.
1 Br *Dido* cruiser (cadet trg/AA ship; non-operational).

NAVAL AIR: 3 combat ac, 6 combat hel.
1 ASW/MR sqn with 3 *Atlantic* with *Exocet* ASM.
2 ASW/SAR hel sqns with 6 *Sea King* ASW with *Exocet* AM-39, 4 *Alouette* III.
ASM: AM-39 *Exocet*.

Base: Karachi.

RESERVES: 5,000.

Air Force: 17,600; 314 combat ac.
9 FGA sqns: 1 with 17 *Mirage* IIIEP; 4 with 50 *Mirage* 5PA3; 4 with 52 Ch Q-5.
9 interceptor/FGA sqns with 170 Ch F-6; (1 converting to F-16 (6)).
1 recce sqn with 13 *Mirage* IIIRP.
1 OCU with some 6 F-16.
2 tpt sqns: 1 with 13 C-130B/E, 1 L-100; 1 with 1 *Falcon* 20, 1 F-27-200 (with Navy), 1 *Super King Air*, 1 *Bonanza*.
1 SAR hel sqn with 6 HH-43B, 4 *Alouette* III.
1 utility hel sqn with 4 *Super Frelon*, 12 Bell 47G.
1 trg sqn with 20 T-33A, 4 MiG-15UTI.
Other trainers incl 2 *Mirage* 5DPA2, 3 *Mirage* IIIDP, 25 *Mashshaq* (Saab *Supporter*), 35 T-37C, 45 Ch FT-5 (MiG-17U), 12 CJ-6, 24 Reims FTB-337.
AAM: *Sidewinder*, R-530, R-550 *Magic*.
(On order: 28 F-16, 14 Ch Q-5 FGA.)

RESERVES: 8,000.

Forces Abroad: 30,000 contract personnel: Saudi Arabia (20,000); Jordan, Libya, Oman, UAE.

Para-Military Forces: 109,100: National Guard (22,000); Frontier Corps (65,000); Pakistan Rangers (15,000); Coast Guard (2,000); Frontier Constabulary (5,100).

PAPUA NEW GUINEA

Population: 3,400,000.
Military service: voluntary.
Total armed forces: 3,232 (all part of army).
GDP 1982: K 1.798 bn ($2.438 bn). 1983: 1.940 bn ($2.326 bn).
Est def exp 1983: K 26.9 m ($32.250 m). Budget 1984: 27.4 m ($30.444 m).
GDP growth: −1.5% (1982), 2.0% (1983).
FMA: $15.0 m (1982), 16.0 m (1983).
$1 = kina 0.7375 (1982), 0.8341 (1983), 0.9000 (mid-1984).

Army: 2,846.
2 inf bns.
1 engr bn.
1 sigs sqn.
Log units.

Navy: 300.
5 *Attack* large patrol craft.
2 310-ton landing craft.

Bases: Port Moresby, Lombrum.

Air Force: 86.
1 tpt sqn with 6 C-47, 4 *Nomad* MR ac.

Para-Military Forces: 4,600 Police.

PHILIPPINES

Population: 53,400,000.
Military service: voluntary.
Total armed forces: 104,800.
GDP 1982: P 340.360 bn ($39.855 bn). 1983: 380.820 bn ($34.268 bn).
Est def exp 1983: P 7.404 bn ($666.247 m). Budget 1984: 8.420 bn ($601.343 m).
GDP growth: 2.7% (1982), 1.0% (1983).
Inflation: 12.7% (1982), 10% (1983).
FMA: $1.75 bn (1981).
Debt: $24.5 bn (1982).
$1 = pesos 8.54 (1982), 11.113 (1983), 14.002 (mid-1984).

Army: 60,000.
5 inf divs.
1 special warfare bde.
1 special security bde (1 armd, 2 inf, 2 COIN bns, spt units).
(1 ranger regt (2 ranger, 1 mountain bns, 5 scout coys) being reactivated.)
2 engr bdes.
1 lt armd regt.
4 arty regts.
28 *Scorpion* lt tks; 45 MICV; 80 M-113, 20 *Chaimite* APC; 200 105mm (incl pack), 12 M-114 155mm how; 81mm, 107mm mor; M-20 75mm, M-67 90mm, M-40 106mm RCL.
(On order: 24 M-167A1 towed *Vulcan* AD systems.)

RESERVES: 20,000, 18 bns; some 70,000 more have Reserve commitments.

Navy: 28,000 (9,600 marines, 2,000 Coast Guard).
7 US frigates: 4 *Casco*, 1 *Savage*, 2 *Cannon*.
10 US corvettes: 2 *Auk*, 7 PCE-827, 1 *Admirable*.
3 PSMM-5 FAC(G) with 4 *Exocet*.
16 large patrol craft, incl 1 command ship, 4 *Katapangan*, 5 PGM-39/-71, 2 US PC-461.
62 coastal patrol craft.
31 US landing ships (3 spt, 24 LST, 4 LSM), 61 LCM, 7 LCVP, 3 LCU.
1 SAR sqn with 9 *Islander* ac, 5 BO-105 hel.
3 marine bdes (9 bns) with 30 LVTP-5, 55 LVTP-7 APC; 150 105mm how; 4.2-in. (107mm) mor.
(On order: 2 ex-US destroyers, 3 PSMM-5 FAC(G), 50 patrol boats, 12 LST, 1 trg ship.)

Bases: Sangley Point/Cavite, Zamboanga.

RESERVES: 12,000.

Air Force: 16,800; 82 combat ac.
1 FGA sqn with 24 F-8H.
1 AD sqn with 19 F-5A, 3 F-5B.
3 COIN sqns: 1 with 16 SF-260WP; 2 with 20 T-28D.
1 hel wing with 50 UH-1H, some 7 H(S)-76, 2 S-70AS (tpt).
1 Presidential tpt sqn with 1 Boeing 707, 1 BAC-111, 1 YS-11 ac; 1 S-62A, 2 UH-IN, 1 *Puma* hel.
5 tpt sqns: 1 with 4 C-130H; 1 with 5 C-47, 8 F-27, 3 F-27MR; 1 with 12 *Nomad*; 1 with 12 *Islander* ac; 1 with 12 BO-105 hel.
1 liaison sqn with O-1E, 1 Cessna U-17A/B, 8 *Beaver* (being withdrawn).
4 trg sqns: 1 with 10 T/RT-33A; 1 with 12 T-41D; 1 with 30 SF-260MP; 1 with 10 T-34A.
1 weather sqn with 3 Cessna 210.
AAM: *Sidewinder*.
(On order: 16 Bell 412, 10 S-76, 12 UH-1H hel.)

RESERVES: 16,000.

Para-Military Forces: (Ministry of Defence): Philippine Constabulary 43,500 (1 bde, 13 bns, 180 provincial coys); by law part of armed forces. Civil Home Defence Force 65,000.
Opposition: Moro National Liberation Army: 1,000. New People's Army: 10,000.

SINGAPORE

Population: 2,550,000.
Military service: 24 months; officers/NCOs 30 months.
Total armed forces: 55,500 (34,800 conscripts).
Est GDP 1982/3: $S 32.300 bn ($US 15.125 bn).
Est def exp 1983/4: $S 2.294 bn ($US 1.081 bn). Budget 1984/5: 2.260 bn ($US 1.075 bn).[13]
GDP growth: 6.3% (1982), 7.9% (1983).
Inflation: 4.0% (1982), 1.1% (1983).
Debt: $US 2.0 bn (1982).
$US 1 = $S 2.1355 (1982/3), 2.1226 (1983/4), 2.1015 (mid-1984).

Army: 45,000 (30,000 conscripts).
1 div HQ.
1 armd bde (1 recce, 1 tk, 2 APC bns).
3 inf bdes (each 3 inf bns).
6 arty bns.
1 cdo bn.
6 engr, 3 sigs bns.
350 AMX-13 lt tks; 720 M-113, 280 V-100/-150/-200 *Commando* APC; 60 155mm how; 60mm, 81mm, 50 120mm mor (some SP in M-113); 89mm RL; *Carl Gustav* 84mm, 90 106mm RCL; 20mm, 35mm, L-70 40mm AA guns.

RESERVES: 150,000; 2 armd div, 6 inf bde HQ; 18 inf, 1 cdo, 9 arty, 6 engr, 2 sigs bns. Annual trg to age 40 for men; 50 for officers.

Navy: 4,500 (1,800 conscripts).
6 TNC-45 FAC(G) each with 5 *Gabriel* II SSM.
6 Vosper A/B FAC.
2 large patrol craft (trg ships).
12 Swift coastal patrol craft.
2 US *Redwing* coastal minesweepers.
6 US 511-1152 LST (1 in reserve), 6 landing craft(.
(On order: 3 FPB-57 FAC.)

Base: Paulau Brani (Singapore).

Air Force: 6,000 (3,000 conscripts); 167 combat ac.
2 FGA sqn with 41 A-4S/SI, 6 TA-4S *Skyhawk*.
1 FGA sqn with 21 *Hunter* FGA-74.
1 recce sqn with 7 *Hunter* FR-74S, 4 T-75S.
1 AD sqn with 24 F-5E, 3 F-5F.
3 COIN/trg sqns: 1 with 18 BAC-167; 1 with 11 SF-260W, 12 SF-260MS; 1 with 20 T-33A.
1 tpt/SAR sqn with 8 C-130B/H.
2 hel sqns with 36 UH-1B/H, 3 AB-212, 6 AS-350B *Ecureuil*.
4 SAM sqns: 1 with 28 *Bloodhound* 2; 1 with 10 *Rapier*, 1 with 6 *Improved HAWK*; 1 with Bofors RBS-70.
AAM: *Sidewinder*-9J/P.
(On order: 70 A-4SI (being rebuilt), 30 SIAI S-211 ac; 22 AS-332 *Super Puma* hel; *Rapier*/*Blindfire* SAM; 200 *Maverick* ASM.)

Forces Abroad: Brunei: (500); trg school.

Para-Military Forces: Police/marine police 7,500: 49 patrol craft; Gurkha guard units; People's Defence Force, some 30,000.

SRI LANKA

Population: 15,800,000.
Military service: voluntary.
Total armed forces: 16,560.
GDP 1982: Rs 100.140 bn ($4.812 bn). 1983: 122.322 bn ($5.199 bn).
Est def exp 1982: Rs 1.400 bn ($67.269 m). 1983: 1.80 bn ($76.501 m).
GDP growth: 4.1% (1982).
Inflation: 11% (1982), 14% (1983).
Debt: $2.6 bn (1982).
$1 = rupees 20.812 (1982), 23.529 (1983).

Army: 11,000.
5 inf bdes (each with 1 regular, 2 reserve bns).
1 recce regt (bn), 1 fd arty, 1 AA regts, 1 engr regt (each with one regular and one reserve unit)
1 sigs bn.
Support services.
18 *Saladin* armd, 15 *Ferret* scout cars; 10 BTR-152 APC; 12 76mm, 12 85mm guns; 12 82mm, 12 4.2-in. (107mm) mor; M-60 82mm RCL; 24 40mm, 12 3.7-in. (94mm) AA guns.

RESERVES: 14,000; 10 bns, plus supporting services and a Pioneer Corps.

8 FAC: 7 *Sooraya* (Ch *Shanghai*-II), 1 Sov *Mol*.
26 coastal patrol craft(.
(On order: 2 large patrol craft.)

Bases: Trincomalee, Karainagar, Colombo, Tangalla, Kalpitiya.

RESERVES: Naval Volunteer Force 582.

Air Force: 2,600.
1 tpt sqn with 1 HS-748, 2 DC-3, 3 Riley, 1 *Heron*, 3 Cessna 337, 1 206, 1 421C.
1 hel sqn with 7 Bell 206, 2 SA-365.
Trainers incl 4 Cessna 150/152, 7 *Chipmunk*, 3 *Dove*.
(In storage: 5 MiG-17F, 1 MiG-15UTI, 2 *Jet Provost* Mk 51 ac; 4 Bell 206, 2 Ka-26 hel.)

RESERVES: 1,000; 3 sqns Air Force Regt, 1 sqn Airfield Construction Regt.

Para-Military Forces: Police Force 14,500. Volunteer Force 5,000. Home Guard.

TAIWAN

Population: 19,600,000.
Military service: 2 years.
Total armed forces: 484,000.
GDP 1982/3: $NT 1,829 bn ($US 45.385 bn). Est 1983/4: 1,993 bn ($US 49.825 bn).
Est def exp 1983/4: $NT 135.9 bn ($US 3.398 bn).[14] Budget 1984/5: 141.9 bn ($US 3.574 bn).[14]
GDP growth: 3.8% (1982), 6.0% (1983).
Inflation: 3.0% (1982), 2.0% (1983).
FMA: $US 830 m (1982–3).
Debt: $US 9.2 bn (1982).
$US 1 = $NT 40.3 (1982/3), 40.0 (1983/4), 39.7 (mid-1984).

Army: 330,000.
3 Army, 6 Corps HQ.
12 hy inf divs.
6 lt inf divs.
6 armd/inf bdes.
3 AB bdes.
4 tk gps.
20 fd arty bns.
5 SAM bns: 2 with *Nike Hercules*, 3 with *HAWK*.
6 army aviation sqns.
309 M-48 MBT; 325 M-24 (90mm gun), 795 M-41 lt tks; M-8 armd cars; M-3 half-track, 1,100 M-113, 150 V-150 *Commando* APC; 390 M-59 155mm guns/how; 350 M-116 75mm pack, 550 M-101 (T-64) 105mm, 90 M-114 (T-65) 155mm, 10 M-115 203mm towed, 225 M-108 105mm, 125 M-109 A-1 155mm, 75 M-110 203mm SP how; 81mm mor; *Kung Feng (Worker Bee)* towed and SP 127mm MRL; *Hsiung Feng* (*Drone Bee* = *Gabriel*-type) coastal defence SSM, *Ching Feng* (*Green Bee* = *Nike Hercules*-type) SSM/SAM; 150 M-18 76mm SP ATK guns; 500 106mm RCL; *Kun Wu* (*Fire God* = *TOW*-type), *TOW* (some SP) ATGW; 300 40mm AA guns (some M-42 SP); 400 *Nike Hercules*, 800 *HAWK*, 20 *Chaparral* SAM; 118 UH-1H, 2 KH-4, 7 CH-34 hel.
(On order: 164 M-113 APC (incl variants), 125 M-109 155mm, 75 M-110A 203mm SP how; 1,000 *TOW*, *Kun Wu* ATGW; 504 MIM-72F *Chaparral* msls; 370 *Improved HAWK* SAM.)

DEPLOYMENT: Quemoy: 60,000; Matsu: 20,000.

RESERVES: 1,500,000: 9 divs; an additional 1.3 million have some Reserve obligation.

Navy: 38,000.
2 US *Guppy*-II submarines.
23 US destroyers: 10 *Gearing* with 1 hel (4 with 3 *Hsiung Feng (HF)* SSM, 7 with 1 × 8 *ASROC*); 1 *Gearing* radar picket with 3 *HF*; 8 *Sumner* (1 with 1 × 3, 2 with 2 × 3 *HF*); 4 *Fletcher* with 1 × 2 *Sea Chaparral* SAM.
9 US frigates: 8 *Lawrence*, 1 *Crosley*.
3 US *Auk* corvettes.
28 FAC(G) with *HF* SSM: 2 *Lung Chiang* with 4 × 1, 26 *Tzu Chiang (Dvora)* with 2 × 1.
30 coastal patrol craft.
14 US *Adjutant* and MSC-268 coastal MCM.
2 LSD, 23 LST, 4 LSM, 22 LCU, some 400 small landing craft.
1 repair ship; 2 tpts; 7 tankers.
(On order: 2 *Lung Chiang*, 4 *Tzu Chiang* FAC(G); 10 ASW hel; *ASROC* ASW; 170 *Standard* SM-1, 284 *Improved Sea Chaparral* SAM.)

Bases: Tsoying, Makung (Pescadores), Keelung.

RESERVES: 45,000.

Marines: 39,000.
3 divs.
LVT-4/-5 APC; 105mm, 155mm how; 106mm RCL.



The Royal Thai Navy has taken delivery of the Fokker F-27 Maritime (see p. 173 for details) for coastal surveillance, search and rescue, and environmental control.

RESERVES: 35,000.

Air Force: 77,000; 547 combat ac, 12 armed hel.
5 combat wings.
13 ftr sqns with 226 F-5E, 30 F-5F, 42 F-100A/D, 60 F-104G.
1 interceptor sqn with 19 F-104A.
1 recce sqn with 8 RF-104G.
1 MR sqn with 9 S-2A, 20 S-2E.
1 ASW hel sqn with 12 Hughes *Defender* 500MD.
1 SAR sqn with 8 UH-16B ac, 10 UH-1H hel.
6 tpt sqns with 20 C-47, 5 C-54, 1 C-118B, 40 C-119, 10 C-123, 1 Boeing 720B, 4 727-100.
OCU: 82 F-5A/B, 30 F/TF-104G, 6 F-104D, 15 F-100F.
Trainers incl 55 PL-1B *Chien Shou*, 50 T-CH-1, 32 T-33/-38, 10 T-28, AT-3.
2 hel sqns with 7 UH-19, 10 Bell 47G.
AAM: *Sidewinder*, *Shafrir*.
ASM: *Bullpup*, AGM-65A *Maverick*.
(On order: 39 F-104G, 27 TF-104G, 60 F-5E/F ftr, 12 C-130 tpt, 50 XAT-3 trg ac; *Sparrow* AAM.)

RESERVES: 90,000.

Para-Military Forces: Taiwan Garrison Command, 25,000.

THAILAND

Population: 50,700,000.
Military service: 2 years.
Total armed forces: 235,300.
GDP 1982: baht 846.14 bn ($36.789 bn). 1983: 928.55 bn ($40.372 bn).
Def exp 1982/3: baht 35.500 bn ($1.543 bn).[15] Budget 1983/4: 37.989 bn ($1.652 bn).[15]
GDP growth: 5.2% (1982), 3.8% (1983).
Inflation: 5.3% (1982), 4.0% (1983).
FMA: $142 m (1982), $70 m (1983).
Debt: $11.7 bn (1982).
$1 = baht 23.0 (1982/4).

Army: 160,000.
4 Regions; 4 Army HQ.
1 cav div (2 cav, 1 arty regts).
1 armd div (1 tk, 1 cav, 1 mech regts).
7 inf divs (5 with 1 tk bn).
2 special forces divs.
1 arty div, 1 AA div (2 AA arty regts).
11 engr bns.
8 indep inf bns.
4 recce coys.
AFV: 150 M-48A5 MBT; 200 M-41 (most in reserve), 144 *Scorpion*, M-24 lt tks; 32 *Shorland* Mk 3 recce; 340 M-113, M-3A1 half-track, 120 V-150 *Commando*, 20 *Saracen* APC.
Arty: 300 M-116 75mm pack, M-101/-101 mod 105mm, 80 M-114, some 24 M-198 155mm how; 81mm, 120mm mor.
ATK: M-72 *LAW* RL; 57mm, M-20 75mm, 215 106mm RCL; *TOW*, *Dragon* ATGW.
AA: 24 20mm M-163 *Vulcan*, 80 M-1/L-70/M-42 SP 40mm AA guns, *Redeye* SAM.
Army Aviation:
3 airmobile coys, some hel flts.
4 C-47, 1 *King Air* tpt, 80 O-1, 13 U-17A, 1 Beech 99 lt, 23 T-41A trg ac; 76 UH-1B/H, 4 CH-47A, 15 OH-13H, 3 OH-58A, 11 TH-55A hel.
(On order: 40 M-48A5, 16 M-60A3 MBT; 56 *Cascavel* armd cars; 148 M-113 (incl variants), 164 V-150 APC; 34 M-114, 38 M-198 155mm how; 105mm MRL; *Blowpipe* SAM; 2 Bell 214ST, 4 UH-60A hel.)

RESERVES: 500,000. 4 div HQ.

Navy: 32,200, incl naval air and marines.
6 frigates: 1 *Yarrow*-type with 1 × 4 *Seacat* SAM; 2 PF-103; 2 US *Tacoma*; 1 *Cannon*.
6 FAC(G): 3 Breda BMB-230 with 4 *Exocet* SSM; 3 TNC-45 with 5 *Gabriel* SSM.
3 MV-400 FAC.
19 US large patrol craft: 6 PC-461, 10 PGM-71, 3 *Cape*.
31 coastal, 40 river patrol craft(.
4 US *Bluebird* coastal minesweepers, 5 minesweeping boats(.
5 LST, 3 LSM, 2 LSIL-351, 1 LCG, 10 LCU, 26 LCM (all US), 4 LCA, 12 LCVP.
3 trg ships: 2 Br (1 *Algerine*, 1 *Flower*), 1 *Maeklong*.

NAVAL AIR: some 15 combat ac.
1 MR/ASW sqn with 10 S-2F.
1 MR/SAR sqn with 4 F-27MPA, 4 *Searchmaster*, 2 HU-16B, 2 CL-215, 5 C-47.
1 trg/SAR hel sqn with 11 UH-1H/N.
1 observation sqn with 13 U-17, 10 O-1A, 7 O-2, 2 LA-4 ac.

MARINES: (13,000).
1 bde: 2 inf, 1 arty regts; 1 amph assault bn; 40 LVTP-7 amph APC, 24 GC-45 155mm guns/how, support weapons.

(On order: 1 *Descubierta* frigate, 4 PSMM-5 FAC(G), 2 corvettes, 4 large, 3 coastal patrol craft; *Harpoon* SSM; 10 *Exocet* MM-39 coast defence msls; 2 F-27MPA MR ac.)

Bases: Bangkok, Sattahip, Songkla, Phangnga.

Air Force: 43,100; 188 combat ac.
1 FGA sqn with 13 F-5A/B.
2 AD sqns with 34 F-5E, 5 F-5F.
7 COIN sqns: 1 with 22 T-28D; 2 with 25 OV-10C; 1 with 15 A-37B; 1 with 25 AU-23A; 1 with 14 AC-47; 1 with 14 T-33A, 3 RT-33.
1 recce sqn with 4 RF-5A, 6 RC-47D, 3 *Arava* 201, 1 *Queen Air* 65, 1 Cessna 340.
3 tpt sqns, incl Royal flt: 1 with 10 C-47, 2 *Merlin* IVA; 2 with 16 C-123B, 3 C-130H; 8 HS-748; 1 737-200, some 15 N-22B *Nomad*, 5 NC-212 *Aviocar*.
3 liaison sqns with 4 U-10, 23 O-1.
2 hel sqns: 18 CH-34C, 27 UH-1H, 2 Bell 412.
Trainers incl 10 T-37B, 6 O-1A, 9 T-41A, 16 SF-260MT, 23 CT-4, some 7 *Fantrainer*.
AAM: AIM-9 *Sidewinder*.
Airfield defence troops: 4 bns; *Blowpipe* SAM.
(On order: 8 F-5E, 2 RF-2E, 6 RC-47; 2 *Merlin* IVA, some 5 *Nomad*, 6 HS-748, 1 C-130H-30 tpt; 47 *Fantrainer* trg ac; 4 UH-60 hel; AIM-9P AAM; *Blowpipe* SAM.)

Para-Military Forces: Volunteer Defence Corps 33,000. Marine Police 1,700. Police Aviation 500; 3 *Skyvan*, 8 PC-6, 2 DHC-4, 1 Do-28, 2 Cessna 310, 1 *Airtourer*, 1 CT-4 ac; 27 Bell 205, 13 206, 1 S-62, 6 HH-12, 1 KH-4 hel. Border Patrol Police 20,000. Special Action Force 3,800. Rangers 13,000. Village Scouts. National Defence Volunteers. 20 V-150 *Commando* APC, 1 Coastguard cutter.
(On order: 7 *Nomad*.)

VIETNAM

Population: 58,840,000.
Military service: 3 years; specialists 4 years; some ethnic minorities 2 years.
Total armed forces: 1,227,000 (excl para-military).
GNP 1982/3: estimates range from $6.0 bn to $16.0 bn.
Est FMA: $1 bn (1982).
Debt: $5.3 bn (1982).

Army: 1,000,000.
16 Corps HQ.
1 armd div.
56 inf divs.[16]
10 marine bdes.
7 engr, 15 economic construction divs.[17]
5 fd arty divs (some 10 regts).
4 indep engr bdes.
10 indep armd regts.
AFV: 1,500 T-34/-54/-55/-62, Type-59, 400 M-48 MBT; 450 PT-76 and Type-60/63, 150 M-41 lt tks; M-8, M-20 armd cars; BRDM-2 recce; 1,500 BTR-50/-60, Ch Type-55/-56, Type-531, 1,200 M-113, V-100 *Commando* APC.
Arty: 300 76mm, 85mm, 100mm, 122mm, 200 130mm, M-107 175mm guns; 75mm pack, M-101/-102 105mm, 122mm, 100 152mm, M-114 155mm how; 90 SU-76, SU-100, ISU-122, 200 M-109 155mm and M-110 203mm SP how; Type-63 107mm, BM-21 122mm, BM-14-16 140mm MRL; 60mm, 81mm, 82mm, 107mm, 120mm, 160mm mor.
ATK: Type-36 57mm, 75mm, 82mm, Type-51 88mm, 107mm RCL.
AD: 3,000 23mm, 30mm, 37mm, 40mm, 57mm, Type-63 37mm, M-42 40mm, ZSU-23-4, ZSU-57-2 SP AA guns; SA-6/-7/-9 SAM.[18]

Navy: 12,000.[18]
6 frigates: 4 Sov *Petya*, 2 US (1 *Barnegat*, 1 *Savage*).
10 FAC(G) with *Styx* SSM: 8 Sov *Osa*-II, 2 *Komar*.
17 Sov FAC(T): 8 *Shershen*, 3 P-4(, 6 P-6(.
22 Ch FAC: 8 *Shanghai*, 14 *Swatow*.
6 Sov SO-1, 19 US PGM-59/-71 large patrol craft.
9 Sov coastal patrol craft(: 6 Zhuk, 3 PO-2.
3 US 510-1152, 3 Sov *Polnocny* LST.
1 SAR hel sqn with 10 Mi-4.
Perhaps some 1,300 ex-US, South Vietnamese naval vessels, naval and civilian junks and coasters could augment this force.

Bases: Cam Ranh Bay, Da Nang, Haiphong, Hanoi, Ha Tou, Ho Chi Minh City. Kampuchea: Kompong Som.

Air Force: 15,000; 290 combat ac, 40 armed hel (plus many in store).
4 Air Divs.
3 FGA regts with 70 MiG-17, 40 Su-7/-20 (Su-22 reported).
4 interceptor regts with 180 MiG-21bis/F/PF, MiG-15.
3 tpt regts (350 ac) incl 20 An-2 and 20 Li-2, 9 An-24, 50 An-26, 2 An-30, 6 Tu-34, 11 Yak-40, 7 Il-14, 2 Il-18; 2 C-130, 1 DC-3, 4 DC-4, 2 DC-6, 2 Boeing 707, 7 U-17.
1 hel div (3 hel regts; 150 ac) 25 Mi-6, 40 Mi-8, 25 Mi-24, 15 Ka-25, 45 UH-1.
4 trg regts (60 ac) incl L-29, L-39, MiG-17, MiG-21.
AAM: AA-2 *Atoll*.
Air Defence Force: 60,000: 4 AA divs (30,000): 1,000 85mm, 100mm and 130mm towed; 20 SAM regts (20,000): some 60 sites with SA-2/3, 6 radar bdes (10,000): 100 sites.

RESERVES (all services):
'Tactical Rear Force': 500,000 semi-mobilized first-line quick reinforcement org.
'Strategic Rear Force': 2,500,000.

Forces Abroad (numbers fluctuate): Laos: 40,000 (3 inf divs and spt tps). Kampuchea/Cambodia: 160,000 (2 Front HQ, 12 army divs plus spt tps, naval base, fighter ac incl MiG-21).

Para-Military Forces:
Border Defence Forces 60,000.
Peoples Regional Force (militia; 500,000): 1 regt HQ at each provincial capital; local inf coys, small arms. Some Northern regts org in divs. Some AA eqpt.
People's Self Defence Force: (1,000,000): Two components: Urban; Rural (People's militia): local coy-sized units in towns, some mobile police function and support. Small arms.
Armed Youth Assault Force (South Vietnam) (1,500,000): Young People only. Training incl use of inf weapons, some field service.

1 Actual strength suspect. Divs reported to average 2,500 (*i.e.*, about quarter strength). Desertion is common. The Soviet High Command in Afghanistan (see p. 93 for Soviet forces deployed) effectively controls the Afghan forces; it is not possible to differentiate between Soviet and Afghan holdings of identical equipment.

2 Spares are short; some eqpt unserviceable.

3 All services form part of the Army.

4 May be for Coastguard.

5 Part of Department of Defence and Security.

6 No reliable data since April 1975 available.

7 South Korean sources estimate that North Korea spent $3.250 bn on defence in 1982.

8 Excl 1982–6 plans to purchase some $3.5 bn worth of new equipment from the US.

9 Data unreliable.

10 All figures include internal security budget.

11 Defence Mutual Assistance Programme.

12 FMA commitment 1983/7.

13 Incl defence development budget.

14 Estimates for each year run up to $NT 165.0 bn.

15 Excl Internal Security Budget.

16 Incl Forces Abroad. Inf div strengths vary by geographic location, composition and role between 5,000 and 15,000, but 10,500 is 'average.'

17 [illegible] fully armed, with military and economic role; most in northern Vietnam.

18 Much US eqpt is inoperable.

Latin America

Continental Treaties and Agreements

The Act of Chapultepec. Signed by Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, the US, Uruguay, and Venezuela in March and April 1945, this Act declared that if any aggression across boundaries established by treaty occurs, or threatens, the signatories will consult to agree upon measures up to and including the use of armed force to prevent or repel it.

The Inter-American Treaty of Reciprocal Assistance (Treaty of Rio). Signed in September 1947 by all parties to the Act of Chapultepec plus El Salvador and Trinidad and Tobago but except Ecuador and Nicaragua, this Treaty expands the Act, constrains signatories to settle disputes among themselves peacefully and provides for collective self-defence should any member be subjected to external attack. It came into force on 3 December 1948 and has been invoked some twelve times since. Cuba withdrew in March 1960.

The Charter of the Organization of American States (OAS). Dated April 1948, the Charter embraces declarations based upon the Treaty of Rio. The members of the OAS—the signatories to the Act of Chapultepec plus Antigua and Barbuda, Barbados, Dominica, El Salvador, Grenada, Jamaica, St Kitts-Nevis (1984), St Lucia, St Vincent, Suriname, and Trinidad and Tobago—are bound to settle internal disputes peacefully and take collective action in the event of external attack upon any signatory. Amendments (Rio, 1965; Bogotá, 1966) reiterated the goal of peaceful settlement of disputes. In 1965/6 an Inter-American Peace Force was formed for service in the Dominican Republic. Subsequent attempts to create a permanent force failed, but an Inter-American Defence Board has been formed to co-ordinate planning. Declarations condemning Communism in the Western Hemisphere, signed in Bogotá in 1948 by 17 nations (Brazil, Chile, the Dominican Republic, and the US abstaining), were reiterated at Caracas (1954, 1973), San José (1960), Punta del Este (1962), and Washington (1972).

The Treaty for the Prohibition of Nuclear Weapons in Latin America (Tlatelolco Treaty). This was signed in February 1967 by 25 Latin American countries, 24 of which have ratified it (Argentina has not). Brazil and

Chile will not implement it until all other Latin American states have done so. Cuba and Guyana have not signed it. The Treaty therefore is not in force for those five countries. Britain and the Netherlands have ratified it for the territories within the Treaty area for which they are internationally responsible and, with France and the US, 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); Britain, China, France, the USSR and the US have signed Protocol II (an undertaking not to use or threaten to use nuclear weapons against the parties to the Treaty). An Agency was set up to monitor compliance.

Regional Agreements

The 1903 treaty with the Republic of Panama, granting the United States virtual sovereign rights over the Canal Zone in perpetuity, was renegotiated, and the resulting 1977 Treaties came into force in October 1979. About 40% of the former Canal Zone will remain under US control until 31 December 1999. Panama received 11 of 14 US bases. Defence of the Canal will be the joint responsibility of both nations, with Panama assuming an increasing role until the total accession of the Canal to her sovereignty. The US has guaranteed the area's neutrality after 2000.

Belize (British Honduras) became independent on 21 September 1981. Britain agreed to leave troops as protection and to train the Belizean defence forces 'for an appropriate time'. The US is also providing aid and training. Under the 'Commonwealth Pact', if a threat to Belize's independence occurs, Britain, Barbados, Bahamas, Canada, Guyana, Jamaica, and Trinidad and Tobago will meet and consult.

The Central American Defence Council (CONDECA; El Salvador, Honduras and Panama), formed in 1965 to contain Nicaraguan influence, is reported to have been revived and to be creating a common military training centre. In November 1981 El Salvador, Guatemala, and Honduras agreed on an informal alliance against Cuba, Nicaragua, and domestic guerrilla movements in each member country. The US provides assistance to Honduran-based rebels against Nicaragua and to the Government against rebels in El Salvador. A similar regional grouping, the *Communidad Democrática Centroamericana* (Costa Rica, Honduras and El Salvador; observers, Colombia, the US and Venezuela) agreed in January 1982 to provide mutual aid in case of external aggression. Argentina and Peru reportedly entered into a Military Pact in late 1982. A Caribbean Defence Pact, signed in October 1982 between Antigua, Barbados, Dominica, St Lucia and St Vincent, was joined by St Kitts-Nevis on 8 February, 1984. Grenada reportedly will join after November 1984.

The US has had a bilateral agreement with Cuba for jurisdiction and control over Guantánamo Bay since 1934. In 1960 she stated that it could be modified or abrogated only by mutual agreement and that she had no intention of giving such an agreement. She has also leased 2.3 square miles from Bermuda for a naval and air base since 1941.

The US, which has bilateral military sales arrangements at varying levels with most countries of the region, concluded a status of forces agreement with Antigua in 1977/8. The USSR has no known formal defence agreements with any of the states in the area.



Cuba and Vietnam signed a 25-year Treaty of Friendship and Co-operation in October 1982. Cuba and the USSR supplied arms to Grenada before October 1983 and to Nicaragua. Most countries in the region, however, obtain their major equipments from Western, rather than Communist, countries.

Argentina and Brazil are designing and manufacturing for export their own military equipment. Brazil has sold hers to the Middle East (Algeria, Iraq, Libya, Tunisia), Africa (Zambia), and Belgium and Canada, as well as Latin America, and has a training agreement with Suriname. Chile is assembling *Mirage* 50 aircraft and light AFV under licence and reportedly has made some transfers to Paraguay.

Economic Factors

For the past three years Latin American countries generally have experienced a continuous decline in GDP. The Inter-American Development Bank (IDB) reports an overall drop of 3%, and a 6% decline in real per-capita income. Massive international debts have caused many countries (especially Mexico, Brazil, Venezuela and Argentina) serious problems in meeting demands for repayment of their international borrowings. (Brazil and Mexico alone account for 25% of the world debt total.) These factors, coupled with hyper-inflation (in some countries over 400%) and an over-valued dollar, have distorted the economic profile of most Latin American countries. The economic data in this section must therefore be viewed with great caution, since in most cases international comparison in dollar terms is not possible at present.

ARGENTINA

Population: 29,500,000.
Military service: Army and Air Force 1 year, Navy 14 months.
Total armed forces: 153,000 (108,000 conscripts).
GDP 1981: $123.0 bn.
Est def exp 1983: $2.80 bn. Budget 1984: $1.90 bn.[1]
GDP growth: −5.4% (1982), 2% (1983).
Inflation: 210% (1982), 435% (1983).
Debt: $44.0 bn (1983).

Army: 100,000 (80,000 conscripts).
5 army corps; 5 Military Regions; 1 Garrison HQ.
2 armd cav bdes (each 2 armd cav, 1 tk regts; 1 arty bn).
1 mech, 4 mot inf bdes (each 3 regts, plus armd cav sqn, engr, arty bns).
3 mountain inf bdes (each 3 regts; arty, engr bn; recce det).
1 jungle bde.
1 AB bde (3 AB regts, 1 arty gp).
(1 air cav bde to form 1984/5.)
16 arty bns (2 SP; 12 with brigades).
1 Presidential Guard tk regt.
4 indep cav regts (3 horsed).
1 indep mech inf regt.
1 AB trg regt.
5 AD bns.
1 indep engr gp (regt), 5 indep engr bns.
5 log bns.
1 aviation bn (5 dets); 1 spt coy.
AFV: 125 M-4 *Sherman*, 130 *TAM* MBT; 50 M-41, 60 AMX-13 lt tks; VBC-90 armd cars; 300 AMX-VTP, some 150 *TAM* VCPT MICV; 85 M-3, 125 M-113, 80 MOWAG *Roland*, 5 BDX APC.
Arty: 18 M-59 155mm towed guns; 180 105mm incl M-56 pack, 70 M-114 155mm towed, 20 M-2A1/M-101 105mm, 24 Mk F3, 6 M-109 155mm SP how; SALM-Pampera 105mm; SAPBA-1 127mm MRL; 81mm, 200 120mm (some SP in VCTM MICV) mor; 227 *Kuerassier* 105mm SP ATK guns; 75mm, 90mm, 105mm RCL; Rh 202 twin HSS-669 20mm, HS-83/4 30mm, K-63 35mm, 40mm, 88mm, 50 M-1A1 90mm (trg) AA guns.
Msls: SS-11/-12, *Bantam*, *Cobra*, *Mathogo*, *Mamba* ATGW; *Tigercat*, *Blowpipe*, *Roland*, SAM-7 SAM.
Air: 3 G-222, 3 DHC-6, 5 *Turbo-Commander* 690A, 2 *Turbo-Porter*, 5 *Merlin* IIIA, 2 *Queen Air;* 1 *Sabreliner;* 49 Cessna (15 182, 20 U-17A/B, 7 207, 2 *Citation*, 5 T-4D) ac; 9 A-109, 31 Bell (7 206, 18 UH-1H, 2 47G, 4 212), 6 FH-1100, 1 CH-47C, 6 SA-315B *Lama*, 12 SA-330 *Puma*, some 6 AS-332B *Super Puma* hel.
(On order: 85 *TAM* MBT; 25 155mm SP how conversion kits; 198 *Kuerassier* SP ATK; some 18 AS-332B (being delivered), 9 A-109 hel.)

RESERVES: 250,000: National Guard, 200,000; Territorial Guard 50,000.

Navy: 36,000 (18,000 conscripts), incl naval air force and marines.
3 subs: 2 Type 209, 1 TR-1700.
1 Br *Colossus* aircraft carrier (up to 12 *Super Etendard*/A-4, 6 S-2 ac; 4 S-61 hel).
10 destroyers: 4 *Meko* 360H-2 with 2 × 4 *Exocet* MM-40 SSM, 1 × 8 *Aspide* multi-role msls, 2 *Lynx* hel; 2 Type 42 with 4 *Exocet* MM-38, 1 × 2 *Sea Dart* SAM, 1 *Lynx* hel; 4 US (3 *Sumner*, 1 *Gearing* with 4 *Exocet*).
6 corvettes with *Exocet* SSM: 3 *Espora* (*Meko* 140) with 4 MM-40, 1 hel; 3 Fr A-69 with 4 MM-38.
5 patrol ships: 2 US *Cherokee*, 2 *King* (1 trg), 1 US *Sotoyomo*.
1 large patrol vessel.
2 TNC-45 FAC(G).
4 *Dabur* FAC(P).
2 US *Higgins* FAC(T).
6 Br *Ton* coastal minesweepers/hunters.
1 LST, some LCVP, 4 LCM.
3 tankers: 1 14,000-, 1 6,000-, 1 1,600-ton.
Some 10 coast defence batteries: 12 M-1898 87mm, 16 M-3 155mm, 12 280mm guns.
(On order: 2 TR-1400, 3 TR-1700 subs, 6 *Espora* corvettes.)

Bases: Buenos Aires, Rio Santiago, Puerto Belgrano, Mar del Plata, Ushuaia.

NAVAL AIR FORCE: (3,000); 54 combat ac, 8 combat hel.
3 attack sqns with 24 A-4Q, 14 *Super Etendard*.
2 MR sqns: 1 with 3 S-2A, 6 S-2E; 1 with 7 L-188E *Electra*.
2 tpt sqns with 8 *Super King Air*, 1 HS-125, 3 F-28.
1 liaison sqn with 5 *Queen Air*, 3 *Turbo-Porter*.
1 Antarctic flt with 3 PC-6, 1 C-45.
Hel incl 6 SH-3D/NR ASW, 8 *Alouette* A-103 (III), 2 WG-13 *(Sea Lynx)*.
3 trg sqns with 4 EMB-326GB *Xavante*, 11 T-34C, 12 T-28, 10 MB-339A.

ASM: 20 *Exocet* AM-39.
(On order: 6 EMB-326 trg ac; 6 WG-13 hel.)

MARINES: (10,000).
2 Fleet Forces:
1 marine inf bde (2 bns, 1 amph recce gp, 1 fd arty bn, 1 hy mor, 1 ATK, 1 engr coys).
1 marine inf bde (2 bns).
1 amph spt force:
2 special forces gps.
1 amph veh bn.
1 AA regt.
1 sigs bn.
1 service/log bn.
6 indep inf (security) coys.
12 Panhard ERC-90 *Lynx* recce; 15 LVT-3/-4, 19 LVTP-7, 15 LARC-5, 6 MOWAG *Roland* APC; 40 105mm how; 81mm, 106mm mor; 75mm, 90mm, 105mm RCL; 20 *Bantam* ATGW; 20mm, 35mm AA guns; 7 *Tigercat* SAM.

Air Force: 17,000 (10,000 conscripts); 170 combat ac, 18 armed hel; 6 more may be armed.
9 air bdes (1 more forming).
AD Command (4 bdes):
4 FGA/interceptor sqns: 2 (1 OCU) with 15 *Mirage* IIIEA, 22 IIICJ; 2 with 9 5P; 32 *Dagger (Nesher)*.
Air Operations Command:
1 bbr sqn with 6 *Canberra* B-62, 2 T-64.
3 FGA sqns with 54 A-4P *Skyhawk*.
2 COIN sqns with 30 IA-58A *Pucará*.
1 COIN hel sqn with 12 Hughes 500M (369HM), 6 UH-1H.
1 SAR hel sqn with 5 *Lama*.
5 tpt sqns with 4 Boeing 707, 8 C-130E/H, 1 KC-130H, 3 *Learjet* 35A, 4 C-47, 13 F-27, 5 F-28, 5 DHC-6, 14 IA-50 *Guarani* II, 2 *Merlin* IVA ac; 2 S-58T (VIP) hel.
1 Antarctic sqn with 1 DHC-6, 1 LC-47 ac; 2 S-61R/NR, 4 UH-19, 2 CH-47C (SAR); 15 Bell (3 UH-1D, 4 47G, 8 212) hel.
1 comms sqn with 13 *Shrike Commander*.
Air Training Command:
24 *Paris*, 12 EMB-326GB *Xavante*, 48 T-34C, 35 Cessna 182.
AAM: R-530.
ASM: AS-11/-12; *Pescador ('Kingfisher')*.
(On order: 100 IA-58 *Pucará* COIN; 2 C-130, 16 *Turbo-Commander* tpt; 100 IA-63, 10 MB-339 trg ac, 3 AS-332B *Super Puma* hel.)

Para-Military Forces. (Ministry of Defence): 21,000. Gendarmerie 12,000: *Shorland* armd cars, 40 M-113 APC, 22 lt ac, 3 hel, mainly for frontier duties. Argentine Naval Prefecture (coastguard) 9,000: 20 large (9 *Halcón* with 1 hel; 1 more on order), 19 coastal patrol craft; 5 SC-7 *Skyvan* ac; 6 Hughes 500M *Defender;* 3 *Puma* hel.

BOLIVIA

Population: 6,250,000.
Military service: 12 months, selective.
Total armed forces: 27,600.
Est GDP 1981: pB 162.81 bn ($6.643 bn). 1982: 398.458 bn ($6.214 bn).
Def budget 1981: pB 4.441 bn ($181.191 m). 1982: 6.006 bn ($93.668 m).
GDP growth: −9.2% (1982).
Inflation: 300% (1982), 330% (1983).
Debt: $3.6 bn (1983).
$1 = pesos 24.510 (1981), 64.12 (1982).

Army: 20,000.
6 Military Regions: 4 corps (1 forming 1984), 10 div HQ.
6 cav regts (horsed).
2 mech inf regts (each 2 bns).
13 inf regts (incl 1 Presidential Guard, 2 mountain), each with 2 bns.
3 arty regts.
2 ranger regts.
1 para regt.
2 armd bns.
6 engr bns.
24 EE-9 *Cascavel* armd cars; 18 M-113, 15 V-100 *Commando*, 22 MOWAG *Roland*, 24 EE-11 *Urutu* APC; 26 75mm guns; 6 M-116 75mm pack, 6 M-101 105mm how; 60mm, 45 81mm mor; 36 JPz-SK *Kuerassier* 105mm SP ATK guns; 37mm AA guns.

Navy: 3,600 (incl 550 marines).
1 lt cargo ship.
40 lake and river patrol craft (35).
1 Cessna U-206G, 2 AT-6G ac.
1 marine bn.

Bases: Tiquina, Puerto Busch, Riberalta, Trinidad, Guayaramerin.

Air Force: 4,000; 22 combat ac; 9 armed hel.
1 fighter/trg sqn with 12 T-33A/N, 5 F-86F.
2 COIN sqns with 5 AT-6G.
1 Special Operations Group with 9 Hughes 500 armed hel.
1 SAR hel sqn with 5 SA-315B *Gavião (Lama)*.
1 tpt sqn: 1 *Electra*, 1 L-100-30, 1 C-130H, 1 *Sabreliner*, 2 *Learjet*, 2 *Arava*, 2 CV-440, 3 CV-580, 8 C-47, 3 *King Air*, 6 F-27, 2 U-3A.
Utility ac incl 1 *Turbo-Porter;* 27 Cessna (3 172K, 3 *Turbo-Centurion*, 8 185/U-17A, 9 U-206C/G, 2 414, 2 421); 5 UH-1H, 2 Bell 212 hel.
Trg ac incl: 4 T-6G, 3 T-41D, 18 T-23 *Uirapuru*, 4 SF-260M, 25 PC-7 *Turbo-Trainer*.
1 para bn.
1 airbase defence regt (Bofors L/40mm AA guns).

BRAZIL

Population: 131,000,000.
Military service: 12 months.
Total armed forces: 274,000 (134,200 conscripts).
Est GDP 1982: Cr$ 45,000 bn ($250.682 bn). 1983: 131,000 bn ($227.021 bn).
Est def exp 1981: Cr$ 145.0 bn ($1.557 bn). 1982: 330.0 bn ($1.838 bn).
GDP growth: 1.4% (1982), −3.3% (1983).
Inflation: 100% (1982), 211% (1983).
Debt: $94 bn (1983).
$1 = cruzeiros 93.12 (1981), 179.51 (1982), 577.04 (1983).

Army: 183,000 (132,000 conscripts) (to be 282,000).
4 army, 2 regional comd, 12 military region, 8 div HQ.
1 armd cav bde.
3 armd inf bdes.
4 mech cav bdes.
12 motor inf bdes.
1 AB bde.
1 AA arty bde.
10 fd arty regts (2 hy, 1 AB).
8 coast arty gps.
10 AA arty gps (5 hy).
2 special forces bdes (6 'jungle' inf bns).
2 engr gps.
AFV: 75 M-4 MBT; some 250 M-3A1, 24 X-1A2, 315 M-41B lt tks; 196 EE-9 *Cascavel*, 29 M-8 armd cars; 170 EE-11 *Urutu*, 22 M-59, some 600 M-113 APC.
Arty: 500 M-116 75mm pack, 413 105mm, 150 M-114 155mm towed, some 60 M-7/-108 105mm SP how; some 240 57mm to 12-in. (304.8mm) coast arty guns incl some 100 Mk 5 6-in. (152mm); 81mm, 4.2-in. (107mm), 120mm mor; SS-06 108mm, SS-40 180mm, SS-60 300mm incl SP MRL.
ATK: 240 M-18A1 57mm, M-20 75mm, 106mm RCL; 3.5-in. (89mm) RL; 300 *Cobra* ATGW.
AD: 30 35mm, 30 40mm, some 180 57mm, M-2A1 90mm AA guns; 4 *Roland* II SAM.
(On order: 50 X-1A2 lt tks; SS-60 (FGT-X40) 300mm MRL, *TOW* ATGW.)

RESERVES: Trained first-line 1,115,000: 400,000 subject to immediate recall. Second-line (limited trg) 225,000; state military police schools, centres.

Navy: 46,000 incl naval air force, marines (2,200 conscripts).
7 subs: 3 *Oberon*, 4 US *Guppy* II/III.
1 Br *Colossus* ASW carrier (converting to attack) (capacity 7–8 S-2E ASW ac; 12–13 SH-3D *Sea King* hel).
10 US destroyers: 5 *Sumner* (1 with 1 × 4 *Seacat* SAM, 4 with 1 *Wasp* hel); 2 *Gearing* with *ASROC* ASW, 1 *Wasp* hel; 3 *Fletcher*.
6 *Niteroi* frigates with 2 × 3 *Seacat* SAM, 1 *Lynx* hel: 2 GP with 2 × 2 *Exocet* SSM, 4 ASW with *Ikara*.
9 *Imperial Marinheiro* patrol vessels.
5 river patrol ships: 2 *Pedro Teixeira*, 3 *Roraima*.
1 river monitor with 1 × 3-in. (76mm), 2 × 40mm, 2 × 47mm, 6 × 20mm guns.
6 *Piratini* large patrol craft.
6 *Aratu* (*Schütze*-type) coastal minesweepers.
2 US LST, 3 LCM, 4 US 1610 LCU.
28 river tpts.
1 fleet spt tanker; 1 repair, 1 spt ships; 5 ocean, 18 harbour tugs; 1 riverine oiler, 18 tpts.

Bases: Rio de Janeiro, Aratu (Salvador, Bahía), Val-de-Caes (Belem), Natal, Ladario (Mato Grosso province), Rio Negro (Amazonas province).

NAVAL AIR FORCE: (700); 17 combat hel.
2 ASW hel sqns with 4 SH-3D, 4 ASH-3H *Sea King*, 9 WG-13 *Sea Lynx*.
1 utility hel sqn with 8 *Wasp* HAS-1, 9 AS-350B *Esquilo (Ecureuil)*.
1 hel trg sqn with 13 Bell *Jetranger* II.

MARINES: (13,500).
Fleet Force: 1 amph div (1 comd, 3 inf, 1 service bns, 1 arty gp).

[1] See p. 154 for footnotes.

1 Reinforcement Comd: 5 bns incl 1 engr, 1 special operations, supply.
Internal Security Force: 6 Regional, 1 Special Operations Gps.
5 EE-9 *Cascavel* armd cars; 30 M-113, 5 EE-11 *Urutu* APC; 8 M-102 105mm how; SS-06 108mm MRL.
(On order: 2 Type 209 subs, 4 corvettes, 1 trg ship; 12 *Exocet* SSM; 60 *Tigerfish* torpedoes; 12 LVTP-7A1 APC.)

Air Force: 45,000; 215 combat ac.
Air Defence Command: (14 combat ac).
1 interceptor gp (2 sqns) with 13 F-103E (*Mirage* IIIEBR), 1 F-103D (DBR).
Tactical Command: 8 gps (155 combat ac).
2 FGA sqns with 32 F-5E, 4 F-5B.
5 COIN sqns with 100 AT-26 *Xavante*.
2 recce sqns with 8 RC-95, 11 RT-26 *Xavante*.
4 liaison sqns: 27 Neiva C/U/L-42, 2 EMB-810C (U-7A) *Seneca* ac, 23 UH-1H hel.
1 hel sqn with 2 UH-1H, 6 SA-330 *Puma*.
Maritime Command: 4 gps (46 combat ac).
1 ASW sqn with 8 S-2E; 7 S-2A (trg).
3 MR/SAR sqns with 5 RC-130E, 14 EMB-110, 12 P-95 (EMB-111).
Transport Comd: 6 gps (12 sqns), 6 indep sqns:
2 sqns with 9 C-130E/H, 1 with 2 KC-130H, 4 with 19 C-115 (DHC-5); 2 Boeing 737, 23 EMB-810C, 9 HS-125, 12 C-91 (HS-748), 90 EMB-110 *Bandeirante* (50 C-95, 20 C-95A, 20 -B), 6 EMB-121 (VU-9) *Xingu*, 6 *Seneca* ac.
Training Command:
50 T-23 *Uirapuru* (being replaced by 100 YT-17), 80 T-25 *Universal* (being replaced), some 38 T-27, 90 AT-26, some EMB-110, 5 Neiva U-42 ac; 16 Bell 47 (H-13J), 8 UH-1D hel.
1 calibration unit: 2 HS-125 (EC-93, U-93), 2 C-95A, 4 EC-95.
AAM: R-530, *Piranha* (MAA-1).
(On order: 88 AM-X, 12 EMB-120 *Brasilia* tpt, 100 YT-17 (A-123) *Tangará*, some 80 T-27 *Tucano* (EMB-312) trg ac; *Piranha* AAM.)

Para-Military Forces: Some 185,000 Public Security Forces in state, military police orgs (State Militias) under Army control and considered an Army Reserve.

CHILE

Population: 12,000,000.
Military service: 2 years (Army and Navy only).
Total armed forces: 96,000 (33,000 conscripts).
GDP 1981: pC 1,288.9 bn ($33.049 bn). 1982: 1,228.7 bn ($24.135 bn).
Est def exp 1980: pC 80.0 bn ($2.051 bn). 1981: 82.0 bn ($2.103 bn).
GDP growth: −14% (1982), −1% (1983).
Inflation: 10% (1982), 27.0% (1983).
Debt: $11 bn (1982).
$1 = pesos 39.00 (1980/1), 50.909 (1982).

Army: 53,000 (30,000 conscripts).
6 div HQ.
2 armd regts.
8 cav regts (3 mech, 5 horsed).
24 inf regts (14 with 2 bns, 10 mountain with 1 to 4 bns each).
10 arty bns (6 fd, 3 mountain, 1 AA).
7 engr bns.
1 hel-borne ranger unit.
Army Aviation:
1 composite gp with 1 tac bn and spt unit.
150 M-4A3, 21 AMX-30 MBT; 15 M-3, 50 M-41 lt tks; 200 EE-9 *Cascavel* armd cars; 60 M-113, 150 Cardoen/MOWAG *Piranha*, 250 EE-11 *Urutu*, APC; 124 105mm how; 12 Mk F3 155mm SP how; M-1 81mm, 120mm mor; M-18 57mm, 106mm RCL; *Milan*/*Mamba* ATGW; HS-639/665 20mm, 35mm AA guns.
Avn: 6 C-212A10 tpts, 1 *Citation*, 8 *Dakota* 236, 4 *Navajo*, 18 R-172 *Hawk* XP trg ac; 12 SA-330FL *Puma*, 1 AS-332 *Super Puma*, 10 SA-315B *Lama*, 2 AB-206B hel.
(On order: 50 *Piranha*, *Orca*, *Alacrán*, APC.)

RESERVES: 240,000.

Navy: 28,000 (3,000 conscripts), incl naval air and marines.
1 Type 209, 2 *Oberon* subs.
2 cruisers: 1 Br *County* with 4 *Exocet* MM-38 SSM, 1 × 2 *Seaslug*, 2 × 2 *Seacat* SAM, 1 hel; 1 Swed *Gota Lejon*.
4 destroyers: 2 *Almirante* with 4 *Exocet* MM-38, 2 × 4 *Seacat*, 2 US *Sumner* with 1 hel.
2 *Leander* frigates with 4 *Exocet* MM-38 SSM, 1 × 4 *Seacat* SAM, 1 hel.
2 *Saar*-IV FAC(G) with 6 *Gabriel* SSM.
4 Lürssen-type FAC(T).
4 US large patrol craft: 2 *Sotoyomo*, 1 *Cherokee*, 1 PC-1638.
22 coastal patrol craft, 20(.
1 511-1152 LST, 2 *Batral* lt, 2 amph tpts, 3 LSM, 1 LCU.
3 tankers, 66 spt ships/tpts.
(On order: 1 Type 209 sub, 1 GW destroyer (1984), 1 *Reshef* FAC.)

Bases: Talcahuano, Valparaiso, Puerto Montt, Punta Arenas, Puerto Williams, Iquique, Arica.

NAVAL AIR FORCE: (500); 5 combat ac.
1 MR sqn with 5 EMB-111N.
1 utility sqn with 3 EMB-110N *Bandeirante*, 3 C-212A.
1 hel sqn with 9 *Alouette* III, 4 SH-57 (Bell 206A).
1 trg sqn with 10 Pilatus PC-7.

MARINES: (5,000).
4 bn gps, each with 1 inf bn+, 1 coast, 1 AA arty btys.
MOWAG *Roland*, LVTP-5 APC; 16 105mm, 35 155mm how; 16 GPFM-3 155mm coast guns; 50 60mm, 50 81mm mor; 20 37mm AA guns; *Crotale* SAM.

Air Force: 15,000; 102 combat ac.
4 Air Bdes.
4 combat wings and 2 gps; each wing also has a comms flt with ac/hel.
2 FGA sqns with 31 *Hunter* F-71, 15 F-5E, 3 F-5F.
2 COIN sqns with 29 A-37B.
1 ftr/recce sqn with 11 *Mirage* 50FC, 9 C-101 *Aviojet*.
2 photo recce sqns with 2 *Canberra* PR-9, 2 *Learjet* 35-A.
1 tpt sqn with 1 Boeing 727-22C, 1 707-351C, 2 C-130H, 5 DC-6B, 9 Beech 99A, 1 *King Air* 90 ac; 2 SA-315B *Lama*, 1 Bell 47 hel.
Utility/liaison flts incl 17 DHC-6, 3 *Twin Bonanza* ac, 3 S-55T, 4 *Lama* hel.
1 trg wing, 3 flying schools: 4 *Hunter* T-72, 30 T-34A, 25 T-37B/C, 8 T-41A, 4 Piper T-35 *Pillan*, 10 Cessna 180, 10 Piper *Dakota* 236 ac; 6 UH-1H, 3 Bell 212 hel.
AAM: AIM-9L *Sidewinder*, *Shafrir*.
ASM: AGM-65B *Maverick*, AS-11/-12.
1 AA arty regt of 5 gps with GAI-CO1 twin 20mm, K-63 twin 35mm, 24 M-1A1 37mm AA guns; *Blowpipe*, 12 *Cactus (Crotale)* SAM, 4 radar sqns.
(On order: 3 *Mirage* 50 ftr, 13 C-101BB, 2 EMB-120 tpt, *Dakota*, *Pillan* ac; 3 *Super Puma* hel.)

Para-Military Forces: 27,000 *Carabineros*.

COLOMBIA

Population: 28,200,000.
Military service: 2 years.
Total armed forces: 69,700 (28,500 conscripts).
GDP 1981: pC 2,005 bn ($36.795 bn), 1982: 2,458.8 bn ($38.358 bn).
Def exp 1983: pC 35.940 bn ($455.762 m). Est budget 1984: pC 31.240 bn ($320.568 m).
GDP growth: −0.5% (1981), 1.3% (1982).
Inflation: 25% (1982), 17% (1983).
Debt: $10.6 bn (1982).
$1 = pesos 54.491 (1981), 64.102 (1982), 78.857 (1983), 97.452 (mid-1984).

Army: 57,000 (28,500 conscripts).
10 inf bdes ('Regional Bdes'): 6 with 3 inf, 1 arty, 1 engr gp, 1 mech or horsed cav gp; 4 with 2 inf bns only.
1 trg bde, incl Presidential Guard (mech bn).
1 indep mech gp.
1 Ranger, 1 para, 1 AA bns.
12 M-3A1 lt tks; 41 M-8, 200 EE-9 *Cascavel* armd cars; 15 EE-11 *Urutu*, 45 M-3A2 half-track, M-113A1 APC; 48 M-101 105mm how; 125 81mm, 148 107mm mor; 30 M-1A1 40mm AA guns.

RESERVES: 70,000.

Navy: 8,500 (incl 2,500 marines).
2 Type 209 subs.
2 SX-506 midget subs (in reserve).
2 destroyers: 1 *Halland*, 1 US *Sumner*.
4 frigates: 3 FS-1500 with 8 *Exocet* MM-40 SSM, 1 US *Courtney*.
3 US *Cherokee* large patrol craft.
6 gunboats: 2 *Asheville*, 3 *Arauca*, 1 *Barranquilla*.
2 coastal, 8 river patrol craft.
2 marine bns; 3 indep coys, cdo units.
(On order: 1 FV-1500 corvette.)

NAVAL AIR: forming late 1984 with 1 ac sqn, 4 hel flts.

Bases: Cartagena, Buenaventura (2 more are planned).

Air Force: 4,200; 46 combat ac, 17 armed hel.
Combat Command:
2 FGA sqns: 9 *Mirage* 5COA, 2 5COR, 2 5COD; 12 *Kfir* C-2.
1 COIN sqn with 12 AT-33A and 9 A-37D.
1 recce hel sqn: 10 Hughes 500C (OH-6A), 7 Hughes 300C.
Military Air Transport Command:
Tpt sqn: 1 C-130E, 4 C-54, 20 C-47, 3 HS-748, 3 *Arava*, 2 F-28, 10 DHC-2, 1 *Aero Commander* 560A, 12 PC-6 *Turbo-Porter*.
Hel sqn: 19 UH-1B/H, 13 Bell 205A1, 20 SA-315B *Lama*.
Training and Support Command:
11 T-37C, 27 T-41D, 3 RT-33, 12 T-33A, 25 T-34A/B, 10 A-37B ac; 8 Bell 47 (OH-13), 2 Hughes 300C hel.
Skyguard/*Sparrow* AD system.
AAM: R-530.
(On order: 2 F-27 tpt, 14 EMB-326 *Xavante* trg ac; 12 UH-1H, 9 Hughes 300C hel; AIM/RIM-7F *Sparrow* AAM; ASM.)

Forces Abroad: Egypt (Sinai MFO) 500.

Para-Military Forces: National Police 50,000; 1 HS-748 ac, 30 hel; Coastguard: 9 craft(.

CUBA

Population: 10,000,000.
Military service: 3 years.
Total armed forces: 153,000 (some 94,500 conscripts).
Est GNP 1981: pC 12.085 bn ($16.525 bn).[2] 1982: 12.251 bn ($15.488 bn).[2]
Est def exp 1982: pC 990 m ($1.252 bn).[3]
GNP growth: 2.5% (1982), 5% (1983).
Est FMA: $300 m (1981), 300 m (1982).
Debt: $3.5 bn (1983).
$1 = pesos 0.7313 (1981), 0.7910 (1982).

Army: 125,000 (incl proportion of Ready Reserve) (some 75,000 conscripts).
3 Regional Commands, 2 Army, 4 Corps HQ.
3 armd divs (2 cadre).
3 mech divs.
13 inf divs (8 cadre, others at about 60%).
1 AB assault bde; Special Force (1,000) 2 bns.
8 indep inf regts.
1 arty div (3 fd arty bdes).
AFV: 350 T-34, 350 T-54/-55, some 150 T-62 MBT; 40 PT-76 lt tks; some 150 BRDM-1/-2 armd cars; some 100 BMP MICV; 400 BTR-40/-60/-152 APC.
Arty: 1,200 guns/how incl: M-1942 76mm, 85mm, 100 SU-100 SP, 122mm, M-46 130mm, D-1, D-2, ML-20 152mm; BM-21 122mm, BM-14 140mm, BM-24 240mm MRL; 65 *FROG*-4/-7 SSM; M-43 120mm mor; additionally, some 60 JS-2 hy, T-34/85 tks, SU-100 SP guns may be static defence arty.
ATK: M-1943 57mm guns; 57mm RCL; *Sagger*, *Snapper* ATGW.
AD: At least 26 regts: 1,500 AA guns incl: ZU-23, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4 23mm, 30mm M-53 (twin)/BTR-60P, ZSU-57 57mm SP; SA-7/-9 SAM.

RESERVES: Ready Reserves 190,000 (serve 45 days per year); to fill out Regular and 18 Reserve inf divs.

Navy: 12,000 (8,500 conscripts).
4 Sov subs: 3 *F*-class; 1 *W*-class (non-operational; trg).
2 Sov *Koni* frigates.
11 Sov large patrol craft: 9 SO-1, 2 *Kronshtadt*.
26 Sov FAC(G) with *Styx* SSM: 5 *Osa*-I, 13 *Osa*-II, 8 *Komar*(.
26 Sov FAC(T): 8 *Turya*, 6 P-6(, 12 P-4(.
22 Sov *Zhuk* FAC(P)(; 12 coastal patrol craft(.
12 Sov minesweepers: 2 *Sonya*, 10 *Yevgenya*(.
2 *Polnocny* LSM, 7 T-4 LCM.

NAVAL INFANTRY: (some 350); 1 amph assault bn.

COASTAL DEFENCE:
M-1931/37 122mm, M-1937 152mm, SM-4-1 130mm guns; 50 *Samlet* SSM.

Bases: Cienfuegos, Cabañas, Havana, Mariel, Punta Ballenatos, Banes.

Air Force: 16,000, incl air defence forces (11,000 conscripts); 250 combat ac, some 38 armed hel.
4 FGA sqns: 1 with 15 MiG-17; 3 with 36 MiG-23BN *Flogger* F.
16 interceptor sqns: 2 with 30 MiG-21F; 3 with 34 -21PFM; 2 with 20 -21PFMA; 8 with 100 -21bis; 1 with 15 MiG-23 *Flogger* E.
4 tpt sqns: 16 Il-14, 35 An-2, 3 An-24, 22 An-26, 4 Yak-40.
8 hel sqns: 60 Mi-4, 40 Mi-8 (perhaps 20 armd), 18 Mi-24 *Hind* D.
Trainers incl 2 MiG-23U, 10 MiG-21U, some An-2, 30 Zlin 326, some L-39.
AAM: AA-1 *Alkali*, AA-2 *Atoll*, AA-8 *Aphid*.
30 SAM bns: 28 with 60 SA-2, 140 SA-3; 2 with 12 SA-6.
The Civil Airline has 9 Il-62, some 4 Tu-154, which are used as tp tpts.

Forces Abroad: Angola 19,000; Congo 750; Ethiopia 3,000; Mozambique 750; Other Africa 500; Iraq 2,000; Libya 3,000; S. Yemen 300; Nicaragua 3,000; Afghanistan ?500.

Para-Military Forces: Ministry of Interior: State Security 15,000; Frontier Guards 3,500; some 22 craft. Ministry of Defence: Youth Labour Army 100,000; Civil Defence Force: 100,000; Territorial Militia 530,000.

DOMINICAN REPUBLIC

Population: 6,000,000.
Military service: voluntary.
Total armed forces: 23,000.
GDP 1982: $RD 7.877 bn ($US 7.877 bn). Est 1983: 8.735 bn ($US 8.735 bn).
Def exp 1982: $RD 127.9 m ($US 127.9 m). 1983: 129.3 m ($US 129.3 m).
GDP growth: 1.6% (1982).
Inflation: 7.6% (1982), 8% (1983).
Debt: $2.1 bn (1982).
$1 = peso 1.00 (1982/3).

Army: 14,000.
3 Defence Zones.
3 inf bdes (10 bns).
1 fd arty regt (2 bns).
1 mixed armd bn.
1 Presidential Guard (mounted rifle) bn.
1 engr bn.
13 AMX lt tks; 20 AML armd cars; 8 V-150 *Commando*, 25 M-3A1 half-track APC; 20 M-101 105mm how; 24 120mm mor.

Navy: 4,500, incl naval inf.
1 Cdn *River* frigate (trg).
5 US corvettes: 2 *Admirable* (ex-minesweepers), 3 *Cohoes*.
3 large patrol craft (2 US *Argo*, 1 reserve).
11 coastal patrol craft (8().
1 LSM, 2 LCU.
1 naval inf bn; 1 cdo unit.

Bases: Santo Domingo, Bani, Haina.

Air Force: 4,500; 19 combat ac.
1 ftr sqn with 8 F-51D *Mustang* (to retire), 11 T-34B *Mentor*.
1 tpt sqn with 5 C-47, 1 DHC-2, 1 *Aero Commander*.
1 hel sqn with 2 Bell 205A-1, 2 UH-12E, 6 OH-6A, 3 *Alouette* II/III, 2 H-19, 2 UH-1.
1 Presidential tpt flt with 1 SA-365 *Dauphin* 2.
Trg: 12 T-6G, 2 AT-11, 2 T-33A, 3 Cessna 170, 4 T-41D, T-34.
1 para gp.
1 AA arty bn: 20 40mm AA guns.

Para-Military Forces: Gendarmerie 10,000.

ECUADOR

Population: 9,700,000.
Military service: 2 years, selective.
Total armed forces: 39,300.
GDP 1982: ES 408.9 bn ($13.618 bn). Est 1983: 573.5 bn ($13.0 bn).
Est def exp 1982: ES 6.898 bn ($229.734 m). 1983: 7.898 bn ($179.032 m).
GNP growth: 1.4% (1982).
Inflation: 25% (1982), 50% (1983).
Debt: $8.0 bn (1983).
$1 = sucres 30.026 (1982), 44.115 (1983).

Army: 20,000.
4 Military zones.
6 div HQ.
2 armd bdes
9 inf bdes (3 'jungle') } 23 bns.
1 Presidential Guard regt.
1 special forces (AB) bde of 4 units.
3 arty gps.
3 AA bns (12 btys).
2 engr bns.
45 M-3, 150 AMX-13 lt tks; 27 AML-60, 18 AML-90 armd cars; 20 M-113, 55 AMX-VCI APC; M-56 pack, 18 M-101 105mm towed, 10 Mk F3 155mm SP how; 12 160mm mor; 28 M-167 20mm, 30 40mm AA guns; 240 *Blowpipe* SAM.
Avn: 3 DHC-5D, 3 *Turbo-Porter*, 1 *Learjet*, 2 *King Air*, 3 *Arava*, 6 Cessna (2 T-41D, 3 172G, 1 185D) tpt ac; 5 *Puma*, 3 *Super Puma*, 12 *Gazelle*, 1 *Lama*, 1 *Alouette* III hel.

Navy: 4,500 incl some 1,000 marines.
2 Type 209 submarines.
2 US destroyers: 1 *Gearing*, 1 *Lawrence*.
6 Esmeraldas corvettes with 4 *Exocet* MM-40 SSM, 1 × 4 *Albatros/Aspide* SAM, 1 AB-212 hel.
6 FAC(G): 3 *Quito* (Lürssen) with 4 *Otomat* SSM, 3 *Manta* with 4 *Gabriel* 2.
7 coastal patrol craft(.
4 US LSM.
1 *Super King Air*, 3 T-34C, 1 *Arava*, 1 Cessna 320E ac; 2 *Alouette* III hel.
3 marine bns, 2 on garrison duties; 1 cdo.

Bases: Guayaquil, San Lorenzo, Galápagos Islands.

Air Force: 4,800; 65 combat ac.
4 Wings.
1 lt bbr sqn with 3 *Canberra* B-6.
2 interceptor sqns: 1 with 15 *Mirage* F-1JE, 2 F-1JB; 1 with 10 F-5E, 2 -5F.
2 FGA sqns: 9 *Jaguar* (7 S, 2 B), 12 *Kfir* C-2.
1 COIN sqn with 6 A-37B.
1 COIN/trg sqn: 6 BAC-167 *Strikemaster* Mk 89.
Military Air Transport Gp (incl civil/military airline): 1 Boeing 727-2T3, 4 707, 3 720, 4 *Electra*, 1 C-130H, 1 L-100-30, 2 DC-6B, 2 HS-748, 5 *Arava*.
Liaison/SAR flts: 1 *Navajo* ac; 2 SA-330C *Puma*, 6 SA-316 *Alouette* III, 2 Bell UH-1D hel.
Training ac incl 20 T-34C, 10 T-41, Cessna A-150, T-33A.
AAM: R-550 *Magic*.
1 para sqn.

Para-Military Forces: coastguard (500): 2 PGM-71, 14 small patrol craft.

EL SALVADOR

Population: 5,300,000.
Military service: conscription, selective, 2 years.
Total armed forces: 41,650 (being increased).
GDP 1981: C 8.647 bn ($3.459 bn). 1982: 8.915 bn ($3.566 bn).
Est def exp[4] 1982: C 347.5 m ($139.0 m). 1983: 393.75 m ($157.50 m).
GDP growth: −9.5% (1981), −6.0% (1982).
Inflation: 12% (1981), 14% (1982).
Est FMA: $82 m (1982), $126 m (1983), $200 m (1984).
$1 = colones 2.50 (1981/3).

Army: 39,000.
3 Military zones.
4 inf bdes (9 bns).
1 mech cav regt.
1 arty bde (2 bns).
14 indep inf bns.
1 engr bn.
1 AA arty bn } under Air Force control.
1 para bn }
3 special forces bns.
12 AMX-13 lt tks; 18 AML-90 armd cars; 10 M-113, 20 UR-416 APC; 30 M-101, 6 Yug M-56 105mm, 6 M-114 155mm how; 81mm, 8 UB-M52 120mm mor; M-18 57mm, M-20 75mm RCL; *LAW* RL; 20mm, L/70 40mm AA guns.

RESERVES: 12 inf regts (48 bns).

Navy: 300.
6 patrol boats: 3 31-metre Camcraft, 1 20-metre Sewart, 2 US river(.

Air Force: 2,350 (incl AD and security gp); 59 combat ac, 9 armed hel.
2 FGA sqns with 11 *Ouragan*, 18 *Super Mystère* B-2.
1 lt COIN sqn with 7 *Magister*, 17 A-37.
1 recce unit with 6 O-2.
1 tpt sqn with 5 C-47, 2 DC-6B, 5 *Arava*, 2 C-123K.
2 hel sqns: 1 COIN with 9 UH-1H; 1 SAR/liaison with 3 SA-315B *Lama*, 2 *Alouette* III, 1 FH-1100.
Trg: 3 T-34, 8 T-6, 6 T-41, 9 Cessna (7 180, 1 182, 1 185), 3 CM-170 *Magister*.
1 para bn.
1 AA arty bn with Yug M-55 20mm (some SP) guns.
(On order: 9 UH-1H hel.)

Para-Military Forces: National Guard 2,500; National Police 4,500; Treasury Police 2,500; *Orden* (territorial civil defence force) perhaps 70,000 (2,000 effective).

Opposition: perhaps 10,000. *Dirección Revolucionaria Unificada* (DRU)—political wing *Frente Democrático Revolucionaria* (FDR), military wing *Frente Farabundo Martí para la Liberación Nacional* (FMLN): 8,000 plus 6,000 'reserves' claimed—plus 4 smaller gps.

GUATEMALA

Population: 8,200,000.
Military service: conscription; 24–30 months.
Total armed forces: 40,000 (being increased).
GDP 1982: q 8.607 bn ($8.607 bn). 1983: 8.724 bn ($8.724 bn).
Est def exp 1982: q 92.0 m ($92.0 m).[5]
GDP growth: −0.5% (1982), −3.5% (1983).
Debt: $1.6 bn (1982).
$1 = quetzal 1.00 (1982/3).

Army: 38,000.
4 Regional bde HQ:
1 armd bn.
17 inf bns.
4 fd arty gps (12 btys).
1 AA arty gp (2 btys).
1 engr bn.
4 recce sqns.
1 Presidential Guard bde.
1 Special Forces bde (2 bns).
8 AMX-13, 10 M-41A3, 7 M-3A1 lt tks; 8 M-8, 10 RBY-1, 6 M-3A1 armd cars; 15 M-113, 7 V-150 *Commando* APC; 12 M-116 75mm pack, 36 M-101 105mm how; M-1 81mm, 12 M-30 4.2-in. (107mm), 12 EC1A 120mm mor; 12 M-1A1 40mm AA guns.

Navy: 1,000 incl 650 marines (4 coys).[6]
15 coastal patrol craft.
1 LCM; 2 small tp carriers.
8 small craft; some armed.
12 *Zodiac*-type assault boats (marines).

Bases: Santo Tomás de Castillas, Sipacate.

Air Force: 1,000; 16 combat ac, 4 armed hel.[6]
1 COIN sqn with 10 A-37B, 6 PC-7 *Turbo-Trainer*.
1 tpt sqn with 1 DC-6B, 10 C-47, 8 *Arava*.
1 comms sqn with 17 Cessna: 4 170A/B, 8 172K, 2 180, 2 U-206C, 1 310.
1 hel sqn with 25 Bell (perhaps 6 operational): 9 UH-1D (4 armed), 1 212, 6 412, 5 206B, 4 206L-1.
1 Presidential flt with 1 *Super King Air* 200.
Trg: 5 PC-7 *Turbo-Trainer*, 5 T-33A, 3 T-37C, 12 T-41.

Para-Military Forces: National Police 9,500; Treasury Police 2,100; Territorial Militia (500,000) formed; 70,000 may be armed. 10 armed lt ac.

HONDURAS

Population: 4,250,000.
Military service: conscription; 18–24 months.
Total armed forces: 17,200 (12,250 conscripts).
GDP 1982: L 5.626 bn ($2.813 bn). 1983: 5.889 bn ($2.944 bn).
Est def exp 1981: L 90.3 m ($45.15 m). 1982: 120.0 m ($60.0 m).
Est FMA: $32.0 m (1982), $50.0 m (1983).
Debt: $1.9 bn (1982).
$1 = lempiras 2.00 (1981/2).

Army: 15,500 (12,000 conscripts).
1 inf bde (1 tk, 3 inf bns).
1 Presidential Guard (2 inf bns).
3 inf bns (one mech).
3 arty bns.
1 engr bn.
1 special forces bn.
16 *Scorpion* lt tks; 12 RBY Mk 1 recce; M-116 75mm pack, 24 M-102 105mm how; M-1 81mm, 30 120mm mor; 106mm RCL.

Navy: 500 (50 conscripts).
9 Swiftships patrol craft: 1 106-ft, 3 105-ft fast, 5 65-ft coastal(.

Bases: Puerto Cortés, Amapala.

Air Force: 1,200 (200 conscripts); 30 combat aircraft.
1 FGA sqn with 12 *Super Mystère* B2.
1 COIN sqn with 4 F-86E *Sabre*, 10 A-37B, 4 *Tucano* (8 F-8E in reserve).
1 tpt sqn with 10 C-47, 2 *Arava*, 1 *Electra*, 1 *Westwind*.
1 spt sqn with 1 Beech *Baron*, 4 Cessna (2 180, 2 185), 1 PA-31 *Cheyenne* ac; 2 S-76 hel.
1 hel sqn with 10 UH-1H (on loan), 5 UH-1B.
Trg: 12 T-28A, 7 T-41A.
(On order: 4 *Tucano* COIN, 4 C-101BB *Aviojet* trg.)

Para-Military Forces: Public Security Forces (FUSEP) (national police) 4,500.

MEXICO

Population: 78,000,000.
Military service: voluntary, with part-time conscript militia.
Total armed forces: 120,000 regular, 250,000 part-time conscripts.
GDP 1981: pM 5,875 bn ($239.649 bn). 1982: 9,256 bn ($164.108 bn).
Est def exp 1983: pM 72.0 bn ($599.530 m). Budget 1984: 94.243 bn ($581.747 m).

GDP growth: −0.2% (1982).
Inflation: 100% (1982), 104% (1983).
Debt: $90 bn (1983).
$1 = pesos 24.515 (1981), 56.402 (1982), 120.094 (1983), 162.0 (mid-1984).

Army: 94,500 regular, 250,000 conscripts.
1 inf div HQ.
1 mech bde gp (Presidential Guard) (3 bns).
2 inf bde gps (each of 2 inf, 1 armd recce, 1 arty bns).
1 AB bde (2 bns).
1 armd regt.
1 recce regt.
35 Zonal Garrisons incl: 28 indep cav (being mot), 3 arty regts, 64 indep inf bns.
AA, engr and support units.
40 M-3A1, 20 M-5A1 lt tks; 70 M-3A1, 15 M-8, 40 Panhard ERC-90, 15 MAC-1 armd cars; 50 HWK-11, 3 M-3 APC; 18 M-116 75mm pack, 50 M-101 105mm towed, some 40 M-8 75mm and M-7 105mm SP how; 1,600 60mm, 81mm, 4.2-in (107mm) and 60 120mm mor; 35 M-3 37mm ATK guns; 40 12.7mm AA guns.
(On order: 27 Panhard recce veh.)

Navy: 20,000, incl naval air force and marines.
3 US destroyers: 2 *Gearing*, 1 *Fletcher*.
6 frigates: 4 US *Lawrence/Crosley*, 1 *Durango*, 1 US *Edsall* (trg ship).
6 *Halcón* (B-119) corvettes with 1 BO-105 hel.
34 US patrol ships: 18 *Auk*, 16 *Admirable* ex-minesweepers.
32 *Azteca* large patrol craft.
14 patrol craft(: 5 *Polimar*, 2 *Azueta*, 1 *Guanajuato* coastal, 6 river.
2 US 511-1152, 1 *De Soto* LST; 1 repair ship.
Coastal defence: M-1902/1906 75mm, L/27 120mm guns.

Bases: Gulf: Vera Cruz, Tampico, Chetumal, Ciudad del Carmen, Yukalpetén. Pacific: Acapulco, Ensenada, La Paz, Puerto Cortés, Guaymas, Mazatián, Manzanillo, Salina Cruz, Puerto Madero, Lázaro Cárdenas.

NAVAL AIR FORCE: (300); 8 combat ac.
1 MR sqn with 8 HU-16 *Albatross*.
1 liaison sqn with 1 *Learjet* 24D, 3 F-27, 6 *Bonanza*; 11 Cessna (3 150J, 3 180, 3 310, 2 337).
1 hel sqn with 4 *Alouette* II, 5 Bell 47G, 5 MBB BO-105.
Trg: 4 T-34B *Mentor*.

MARINES: (4,500).
3 bn HQ.
19 security coys.

(On order: 6 *Azteca* and *Olmeca*, 4 *Aguila* patrol boats.)

Air Force: 5,500 (2,000 para bde); 85 combat ac.
1 interceptor sqn with 10 F-5E, 2 F-5F.
6 COIN sqns with 55 PC-7, 10 T-33.
1 photo/recce sqn with 8 *Aero Commander* 500S.
2 SAR sqns: 1 with 8 *Arava* ac; 1 with 2 *Alouette* II/III, 1 Hiller 12E, 3 *Puma*, 17 Bell (1 47G, 5 206B, 1 212, 10 205A) hel.
1 Presidential (tpt) sqn with 9 Boeing 727, 2 737, 1 F-27, 1 *Jetstar*, 1 *Electra*, 1 HS-125-400, 5 *Sabreliner*, 1 Cessna 310R ac; 1 Bell 212, 2 *Puma* hel.
4 tpt sqns with 3 DC-6/-7, 2 C-118, 5 C-54, 12 C-47, 3 *Skyvan*, 1 *Islander*, 6 CF-27, 2 DHC-5D, 1 Cessna 182, 2 U-206E.
Trg: some 12 T-28D, 1 *Baron*, 20 Beech F-33-9, 2 *King Air*, 34 *Musketeer*, 5 PC-7 *Turbo-Trainer*, 20 CAP-10B ac.
1 para bn.

Para-Military Forces: Coastguard; 6 patrol craft. 17 ac and hel incl: 1 C-47, 2 *Baron*, 6 C-45, 2 Cessna 402, 4 *Alouette III*, 2 Bell UH-1H.

NICARAGUA

Population: 3,200,000.
Military service: conscription, 2 years.
Total armed forces: 61,800.
Est GDP 1981: $C 26.250 bn ($US 2.612 bn).
Est def exp range 1981: $C 0.945–1.7 bn ($US 94.03–169.154 m). 1982: 2.1–2.3 bn ($US 208.955–228.856 m).
GDP growth: −3% (1982), 3% (1983).
Inflation: 22% (1982).
Debt: $2.4 bn (1982).
$1 = córdobas 10.050 (1981/2).

Army: 60,000 (incl 12,000 Reserves).
7 Military Regions.
1 mot inf bde.
3 armd bns.
12 inf bns (being reorganized).
3 COIN (lt inf) bns.
1 fd arty gp (3 bns).
1 engr bn.
1 AA arty gp (9 btys; with Air Force).
3 M-4A3, 60 T-54/-55 MBT; 10 PT-76 lt tks; 20 BRDM-2, 20 *Staghound* armd cars; 80 BTR-40/-60/-152 APC; 30 M-1942 76mm guns; 12 105mm, 24 M-1938 122mm how; 12 D-30, some 12 D-20 152mm gun/how; perhaps 12 BM-21 122mm MRL; 24 120mm mor; SPG-9 73mm RCL; 48 ZIS-2 57mm AA.

Navy: 300.
1 Fr, 4 *Dabur*, 1 Sewart, 8 other coastal patrol craft; 1 LCM.

Air Force: 1,500, incl AD; 12 combat ac.
1 COIN sqn: 3 T-33A, 3 T-28D, 6 SF-260 *Warrior*.
1 tpt sqn: 1 C-212A, 1 *Arava*, 4 C-47, An-2, 1 *Falcon* 20.
1 hel sqn: 2 OH-6A, 2 *Alouette* III.
Trg: 6 L-39.
AD (Army/Air Force): 138 ZPU-4 14.5mm, ZU-23 23mm, 6 M-1939 37mm, some M-1950 57mm guns, SA-7 SAM.
(On order: MiG-21 ftrs; 100 Matra LRF-2 68mm ASM pods.)

RESERVES: (all services): 60,000, 12,000 on duty in army.

Para-Military Forces: Border Guard, some 4,000 (under Army); 6 bns, Civilian Militia, perhaps 40,000. Ministry of Interior Troops.

Opposition: some 15,000; perhaps 5,000 combat elms. Democratic Revolutionary Alliance, Nicaraguan Democratic Force.

PARAGUAY

Population: 3,600,000.
Military service: 18 months; Navy 2 years.
Total armed forces: 16,900 (10,900 conscripts).
GDP 1981: Pg 708.69 bn ($5.625 bn). 1982: 737.04 bn ($5.850 bn).
Est def exp 1981: Pg 11.04 bn ($87.619 m). 1982: 14 bn ($111.111 m).
GDP growth: −2.5% (1982).
Inflation: 7.7% (1982), 18% (1983).
$1 = guaraníes 126.00 (1981/2).

Army: 12,500 (9,000 conscripts).
3 corps HQ.
1 cav div (bde) (2 mech cav regts, 1 mot inf bn, 1 arty bty).
6 inf divs (cadre; bn gps).
2 indep cav regts.
1 indep inf bn.
1 Presidential Escort regt.
1 spt comd with 1 arty regt, 5 engr bns, sigs; 1 log comd.
16 M-4A3 MBT; 15 M-3A1 lt tks; 12 M-8 recce, 12 M-3 APC; 25 Model 1935 75mm, 10 M-101 105mm how; 24 20mm, 12 M-1A1 40mm AA guns.

RESERVES: some 25,000; 12 inf regts on mobilization.

Navy: 2,500 (1,200 conscripts).
2 *Humaita* river defence vessels.
3 corvettes (Arg *Bouchard* minesweepers).
13 patrol craft: 1 large, 12 coastal(.
1 US LSM (with hel deck: UH-12); 2 LCU.
6 spt/cargo ships.
1 marine 'regt' (bn) (400).

Coastal Defence: 8 M-1911 3-in. (76.2mm), 6 mobile 152mm guns.

NAVAL AIR FORCE (55):
Utility ac: 1 C-47, 9 Cessna (4 U-206, 4 150M, 1 210).
Trg ac: 2 T-6G.
Hel: 2 OH-13, 2 UH-12E.
(On order: 1 45-metre river patrol vessel.)

Bases: Asunción/Puerto Sajonia, Bahía Negra, Puerto Presidente Stroessner.

Air Force: 1,900 (700 conscripts); 15 combat ac.
1 composite sqn:
COIN flt: 8 EMB-326 *Xavante*, 7 AT-6G.
Liaison flt: 7 Cessna (5 185, 1 337, 1 402) ac.
Hel flt: 14 Bell 47G/OH-13A, 2 UH-12/SL-4.
1 tpt sqn with 2 C-54, 3 DC-6B, 1 C-131D, 23 C-47, 1 DHC-6 (VIP), 1 DHC-3, PBY-5A.
Trg: 10 Neiva T-25, 12 T-37C, 8 T-23 *Uirapuru*, 10 T-6, 5 T-41, 8 Fokker S-11, 1 MS-760A.
1 para regt (bn).
(On order: *Xavante* COIN, 4 C-212 *Aviocar*, 10 *Bandeirante* tpt, *Uirapuru* trg ac.)

Para-Military Forces: internal security forces (1,500).

PERU

Population: 19,800,000.
Military service: 2 years, selective.
Total armed forces: 135,500 (some 71,000 conscripts).
GDP 1981: S 8,416.0 bn ($19.903 bn). 1982: 13,813 bn ($19.802 bn).
Def exp 1982: S 1,134 bn ($1.626 bn).[7] Budget 1983: 1,345 bn ($828 m).
GDP growth: 0.7% (1982), −12% (1983).
Inflation: 80% (1982), 125% (1983).
FMA 1982: $700 m.
Debt: $11.6 bn (1982).
$1 = soles 422.85 (1981), 697.57 (1982), 1,625 (1983).

Army: 75,000 (51,000 conscripts).
5 Military Regions.
2 armd divs (bdes).
1 cav div; 3 horsed regts.
7 inf divs (bdes, each of 4 bns, 1 arty gp).
1 para-cdo div (bde; 1 para, 2 cdo bns).
1 jungle div (bde).
2 indep fd arty gps.
1 AA gp, 1 SAM gp.
2 indep inf gps.
4 engr bns.
3 armd recce regts.
2 air sqns: 1 liaison, 1 hel.
270 T-54/-55, 25 M-4A3 MBT; 110 AMX-13 lt tks; 60 M-8/-20, 35 M-3A1, 20 Fiat 6616 scout cars; 150 M-113, 120 UR-416 APC; 10 M-56 pack, 170 M-101 105mm, 30 122mm incl SP, 30 M-1954 130mm, 36 M-114 155mm guns/how; 300 M-1951 120mm mor; 40 40mm, M-3 76mm towed, ZSU-23-4 SP AA guns; SA-3/-7 SAM.

Avn: 3 Helio H-391 ac; 29 Mi-8, 6 *Alouette* II hel.
(On order: 80 *TAM*, 100 SPz-12-3 MICV; 150 M-113 APC; 2 *Nomad* lt tpt ac.)

Navy: 20,500 (perhaps 7,000 conscripts) incl naval air, marines.
12 subs: 6 Type 209, 6 US (2 *Guppy* I, 4 *Abtao*).
2 Neth *De Ruyter* cruisers (1 with 3 SH-3D hel).
10 destroyers: 2 Br *Daring* with 8 *Exocet* MM-38 SSM; 8 Neth (1 *Holland*, 7 *Friesland*).
2 *Carvajal* frigates with 8 *Otomat* SSM, 1 × 8 *Albatros*/*Aspide* SAM, 1 AB-212 hel.
6 PR-72P FAC(G) with 4 *Exocet* MM-38 SSM.
5 river gunboats.
4 lake patrol craft(.
2 US LST, 2 US LSM.
2 tpts; 3 replenishment, 2 spt tankers.

NAVAL AIR FORCE: 9 combat ac; 10 combat hel.
1 ASW sqn with 7 S-2E *Tracker*.
1 ASW hel sqn with 4 SH-3D, 6 AB-212.
1 MR sqn with 2 F-27MPA.
1 utility hel sqn with 5 Bell 206B.
Tpts: 2 C-47, 1 *Aztec*.
Trg: 6 T-34A/C, 3 Beech B-200 ac; 4 Bell 47G hel.

MARINES: (2,200).
1 Marine bde (3 bns): amph veh, V-100 armd cars, 40 V-200 *Chaimite* APC, twin 20mm AA guns, 84mm RL.
3 coast defence btys: 18 155mm how.
(On order: 2 *Lupo* frigates, 2 *van Straelen* MCM, 3 EMB-111 MR ac.)

Bases: Callao, San Lorenzo Island, Talara, Iquitos (river), Puno (lake), Madre de Dios (river).

Air Force: 40,000 (some 13,000 conscripts); 91 combat ac, some 16 armed hel.
2 lt bbr sqns with 15 *Canberra* B-2/B(I)-8.
6 FGA sqns: 2 with 15 *Mirage* 5P; 4 with 31 Su-22.
2 COIN sqns with 25 A-37B (MB-339 replacing).
1 COIN hel sqn with some 16 Mi-24.
1 photo recce sqn with 2 *Queen Air* A-80, 2 *Learjet* 25B.
4 tpt sqns: 7 L-100-20, 2 DC-8-62CF, 16 An-26, 8 DHC-6, 14 DHC-5, 6 *Turbo-Porter*, 5 C-47, 1 *Mystère* 20F.
2 hel sqns: 6 *Alouette* III, 6 Mi-6, 5 Mi-8, 3 BO-105, 37 Bell (9 206B, 16 212, 12 214ST).
Presidential Flt: 1 F-28 ac.
4 trg sqns: 19 T-41D, 23 T-37B/C, 10 *Queen Air* A-80, some 16 MB-339A.
ASM: AS-30, 30 *Exocet* AM-39.
(On order: 26 *Mirage* 2000P/DP (status uncertain), some 50 MB-339 COIN/trg ac; 8 UH-60A hel.)

Para-Military Forces: Guardia Civil, 26,500, with MOWAG *Roland* APC. Coastguard (700) with 23 patrol craft. Republican Guard 5,000.

URUGUAY

Population: 3,000,000.
Military service: voluntary.
Total armed forces: 29,800.
GDP 1981: $UR 120.704 bn ($US 11.155 bn). 1982: 128.403 bn ($US 9.232 bn).
Est def exp 1981: $UR 4.221 bn ($US 390.111 m). 1982:

5,445 bn ($US 391.473 m).
GDP growth: −1.3% (1981), −8.7% (1982).
Inflation: 20% (1982), 50% (1983).
Debt: $4.3 bn 1982).
$1 = new pesos 10.820 (1981), 13.909 (1982).

Army: 22,300.
1 div HQ (regional).
3 cav bdes (6 armd/mot, 5 horsed regts).
5 inf bdes, each with 3 bns (incl 1 armd inf, 1 AB, 1 tpt bns).
1 arty div: 5 fd, 1 AA gps.
1 horsed cav bde (2 regts + Presidential Guard).
1 engr bde: 4 combat engr, 1 road, 1 construction, 1 spt bns.
1 comms bde: 1 comms, 1 spt bns.
17 M-24, 29 M-3A1, 22 M-41A1 lt tks; 12 FN-4-RM-62, 16 EE-3 *Jararaca*, 15 EE-9 *Cascavel* scout cars; 15 M-113, 55 *Condor* APC; 12 Bofors M-1902 75mm, 40 M-101A1, 8 M-102 105mm, 8 M-114A2 155mm how; 6 M-167 *Vulcan* 20mm AA guns.
(On order: 15 *Scorpion* lt tks.)

Navy: 4,500 incl naval air, naval infantry.
3 US frigates: 1 *Dealey*, 2 *Cannon*.
1 US *Auk* corvette.
4 large (1 US *Adjutant*, 3 *Vigilante*), 4 coastal patrol craft(.
4 LCM.

NAVAL AIR FORCE (459): 7 combat ac.
1 ASW flt with 6 S-2A/G.
1 MR flt with 1 *Super King Air* 200T.
Tpts: 5 *Expeditor* (C-45J); 1 *Super Cub* utility.
Trg: 2 T-6G, 9 T-28, 1 T-34B, 2 T-34C ac.
Hel flt: 2 Bell 47G, 2 OH-13, 2 SH-34J, 1 Bell 222 SAR.

NAVAL INFANTRY: 1 bn (450).

Base: Montevideo.

Air Force: 3,000; some 24 combat ac.
2 COIN sqns: 1 with 5 AT-33A, 7 A-37B; 1 with 6 IA-58B *Pucará*.
1 recce/trg sqn with 6 T-6G.
1 SAR sqn: 8 U-17A ac; 2 Bell 212, 10 UH-1B/H hel.
3 tpt sqns with 5 C-212, 5 C-47, 6 *Queen Air* 80, 1 *Learjet* (VIP), 6 EMB-110B/C; 2 F-27, 2 FH-227.



This is one of the first F-16 aircraft produced by General Dynamics for Venezuela.

Trg: 6 T-41D, 34 T-34B.
(On order: 6 *Pucará* COIN ac.)

Forces Abroad: Egypt (Sinai MFO), 70.

Para-Military Forces: Metropolitan Guard: 650. Republican Guard: 520. Coastguard: 1,500; 6 coastal patrol craft(.

VENEZUELA

Population: 15,600,000.
Military service: 18 months, selective.
Total armed forces: 44,250 (some 10,000 conscripts).
GDP 1981: Bs 285.21 bn ($66.444 bn). 1982: 291.27 bn ($67.856 bn).
Def exp 1982: Bs 4.944 bn ($1.152 bn). Est 1983: 5.100 bn ($1.188 bn).
GNP growth: 0.6% (1982).
Inflation: 8.3% (1982), 6.0% (1983).
Debt: $32.6 bn (1982).
$1 = bolívares 4.2925 (1981/3).

Army: 27,500.
5 div HQ (regional).
1 armd bde (3 med, 1 lt tk bns).
6 inf bdes (11 hy, 13 lt inf bns).
1 ranger bde (6 bns).
1 cav regt (horsed).
1 AB regt (2 bns).
2 indep mech bns.
6 arty gps, 1 AA arty gp.
5 engr bns.
75 AMX-30 MBT; 40 AMX-13 lt tks; 10 AML-245, 12 M-8, 60

Armed Forces of Other Latin American States

Country	Est population (000)	Est GDP 1982 ($m)	Est def exp 1983 ($m)	Total armed forces	Army: Manpower and formations	Army: Equipment	Navy: Manpower and equipment	Air Force: Manpower and equipment	Para-military forces
Costa Rica*	**2,450**	**1,661†**	**28.0**	**9,800§**		1 V-100 armd car; M-113 APC	9 patrol craft, 1 armed tug	8 lt ac, 6 hel	**(2,800)§**
Grenada	**113**	**108**	**2.3**	Forces disbanded 1983. Eqpt incl 6 BTR-60P APC; 6 85mm guns; 24 81mm mor; 12 12.7mm, 6 ZU-23-2 AA guns.					
Guyana	**955**	**485**	**60.0**	**6,500§**	**6,000§** 3 inf bns 1 arty bty	EE-11 *Urutu*, 4 *Shorland* armd cars, 6 130mm guns; 12 81mm, 18 82mm, 20 Ch T-53 120mm mor; SA-7 SAM	**300§** 1 large, 7 coastal patrol craft(	**200§** 6 BN-2A, 2 DHC-6, 1 *Super King Air* 200, 1 Cessna U-206F tpts; 3 Bell 206B, 3 212 hel	**5,000**
Haiti	**5,400**	**1,662**	**20.0**	**6,800**	**6,300** Pres Guard (1 inf bn, 1 arty bty) 1 inf bn 1 Special Forces bn Garrison det	5 M-5A1 lt tks; 6 M-113, 6 V-150 *Commando* APC; 4 M-1A1 75mm pack, 6 M-101 105mm how; 81 mm mor; M-18 57mm RCL; M-3 37mm, M-157mm ATK guns	**300** (coastguard) 15 coastal patrol craft(	**200** 8 Cessna 337 COIN; 4 C-47, 2 DHC-2, 3 DHC-3, 1 *Baron*, 1 Cessna 310, 1 402 tpts; 6 SF-260TP, 3 Cessna 150, 1 172, 1 *Bonanza* trg ac; 6 S-58/CH-34C, 4 Hughes 269/369C hel	**14,900** (Police)
Jamaica	**2,310**	**3,184**	**n.a.**	**9,720§**	**3,500§** 2 inf bns 1 Reserve bn 1 spt bn	10 V-150 *Commando* APC; 12 81mm mor	**140§** 1 115-ft, 3 85-ft coastal patrol boats(	**80§** 2 *Islander*, 1 *King Air*, 1 Cessna 337, 1 210 ac; 3 Bell 206, 3 212 hel	**6,000§** (Police)
Panama*	**2,160**	**4,287**	**n.a.**	**9,500§**	**1,500§** 7 lt inf coys	16 V-150 armd cars/APC	**300** (coastguard)§ 6 patrol craft, 2 LSM, 3 LCM, 3 spt vessels	**200§** **15 tpt, 12 lt ac, 20 hel**	**7,500§**
Suriname	**370**	**1,050** (1980)	**n.a.**	**2,020§**	**1,800§** 1 inf bn	5 YP-408 APC, 81 mm mor	**160§** 3 large, 4 coastal, 3 river patrol craft	**60§** 4 *Defender* ac	**1,000**
Trinidad and Tobago	**1,200**	**6,900** (1981)	**n.a.**	**1,500§**	**(1,200)§** 1 inf bn 1 reserve bn 1 spt bn	6 81mm mor	**(250)** (coastguard)§ 6 large, 7 coastal patrol craft (4 armed)	**(50)§** 1 Cessna 402 ac; 2 *Gazelle*, 2 S-76 (SAR) hel	**n.a.§**

Smaller states in the area: Bahamas, Barbados, St Vincent have small para-military marine components. Belize and Bermuda have small infantry forces.

* Costa Rica and Panama maintain para-military forces. † Incl Internal Security Forces and Police budget. § All services form part of the Army.

M-706E1 armd cars; *Fuchs/Transportpanzer* 1, 25 AMX-VCI, 100 V-100 APC; 40 75mm pack, 50 M-56 105mm pack, 35 M-101 105mm towed, 20 Mk F3 155mm SP how; 25 160mm SP MRL; 81mm, 120mm mor; 35 M-18 76mm SP ATK guns; 106mm RCL; SS-11, AS-11 ATGW; 50 40mm towed; AML S530 twin 20mm SP AA guns.

Army Aviation:
1 tpt sqn with 1 *Islander*, 4 IAI-202 *Arava*, 2 G-222, 1 *Queen Air*, 1 *Super King Air*; 9 Cessna (3 182, 6 206).
1 hel sqn with 2 Bell 206, 4 UH-1H, 4 205A1.

Navy: 12,000 incl naval air and marines.
3 subs: 2 Type 209, 1 US *Guppy* II.
8 frigates: 6 *Sucre (Lupo)* with 8 *Otomat* SSM, 1 ×8 *Albatros/Aspide* SAM, 1 AB-212 hel (2 on refit); 2 *Almirante Clemente*.
6 Vosper Thornycroft FAC(G) with 2 *Otomat* SSM, 3 '121-ft'.
1 LST, 1 LSM, 12 LCVP (all US).
3 transports (one on refit).

NAVAL AIR FORCE: (3,500). 6 combat ac; 6 combat hel.
1 sqn with 6 S-E *Tracker* ac.
1 ASW hel sqn (afloat) with 6 AB-212AS.
1 SAR sqn with 3 C-212/200 MR.
1 tpt sqn: 1 DHC-7, 1 HS-748, 1 *King Air*, 2 Cessna 310/310R, 2 402 ac, 6 Bell 47J hel.

MARINES: (4,250).
3 bns.
1 arty bn.
1 AA coy.
1 amph coy.
11 LVTP-7 APC, 18 105mm how, 6 M-42 40mm twin SP AA guns.

(On order: 4 LST; 2 C-212 *Aviocar* tpts; 6 AB-212 ASW hel; 30 EE-11 *Urutu* APC.)

Bases: Caracas, Puerto Cabello, La Guaira, Puerto de Hierro, Falcón.

Air Force: 4,750; 85 combat ac.
2 lt bbr/recce sqns: 20 *Canberra* (12 B-82, 5 B(I)-82, 1 PR-83, 2 T-84).
1 FGA sqn: 12 *Mirage* (5 IIIEV, 5 5V, 2 5DV).
3 interceptor/FGA sqns (1 forming): 2 with 14 (C)F-5A, 2 (C)F-5D; 1 with 16 *Mirage* (10 IIIEV, 4 5V, 2 5DV); 6 F-16 (3 -A, 3 -B).
1 COIN sqn with 15 OV-10E *Bronco*.
1 Presidential (tpt) sqn with 1 Boeing 737, 1 DC-9, 1 *Gulfstream* 2, 1 Cessna 500 ac; 2 Bell UH-1H hel.
2 tpt sqns with 5 C-130H, 5 C-47, 7 C-123A, 2 G-222.
2 utility/liaison/recce sqns with 3 *King Air*, 9 *Queen Air*, 8 Cessna 182N ac; 4 Bell 47G, 13 *Alouette* III hel.
1 hel sqn with 14 Bell (10 UH-1D/H; 2 214ST, 2 412).

Trg: 12 *Jet Provost*, 20 T-2D *Buckeye* (12 armed), 23 T-34 *Mentor*.
AAM: R-530 *Magic*.
1 para bn.
(On order: 15 F-16A, 15 (C)F-5A ftrs, 24 *Pucará* (6 trg), 6 G-222 tpt, 4 (C)F-5B, 3 F-16B/D trg.)

Para-Military Forces: Fuerzas Armadas de Cooperación: 20,000: 25 UR-416 MICV; 15 *Shorland* APC; 120 60mm mor; 3 *Arava*, 1 *Islander*, 1 *King Air* ac; 3 Agusta 109A, 3 Bell (2 206B, 1 214ST) hel; (Coastguard) 40 coastal patrol craft.

1 High inflation and fluctuating exchange rates make these figures unreliable. The figures also apparently exclude foreign arms purchases (est $10 bn 1978–82). Excl 1984 security budget ($652 m).

2 The Cuban economy is heavily subsidized through Soviet aid (est $3.0–4.5 bn p.a.). GNP in 1974 pesos.

3 Official budget pC 228.40 m ($312.320 m)

4 Including 'public security sector' budget.

5 Excl 'private-sector contributions' (some $60 m).

6 National Armed Forces are combined; the Army provides logistic support to the Navy and Air Force.

7 Original budget reportedly reduced by 50%. New aircraft purchase (some $700 m) financed by long-term credit. Arms purchase debt to USSR some $750 m.

Economic Trends and Defence Expenditure

Compared to 1982, when the world's real GNP/GDP achieved virtually a zero growth rate, 1983 showed signs of quite strong recovery with the achievement of worldwide net growth of over 2.1%.[1] Even the non-oil-producing developing countries realized an overall 1.6% growth (0.1% in 1982). Nevertheless, many individual countries in Africa and Latin America continued to suffer and their economies to decline. The Arab oil-exporting countries, on the other hand, while still showing negative growth of 1.1% (led by Qatar with −16%) did considerably better than in 1982, when output fell by an average of 4.3%.

Despite these encouraging signs, and perhaps even better prospects for 1984, other and longer-term problems are present: high unemployment rates, fiscal deficits, high interest rates and high inflation rates—in some cases amounting to hyper-inflation. For many developing countries, debt servicing has become a financial nightmare, and between 1977 and 1983 (according to the OECD) developing country debt increased by 147% from $329 bn to $812 bn.[2] Latin American countries' debt increased by 184% (from $109 bn to $310 bn), that of African countries by 133% (from $30 bn to $70 bn), and Middle Eastern indebtedness by 154% (from $22 bn to $56 bn).[2] Debt as percentage of exports and services constituted 44% for Latin America in 1983, 25% for Africa (excluding South Africa), 21% for the Middle East, and 11% for Asia.

Eastern Europe, especially Poland and Hungary, also had serious debt problems; together they owed about $85.0 bn, equivalent to about 15% of their combined 1983 GDP. Poland's external debt/service ratio is the highest in Europe at 177% (followed by Portugal at 130%). Eastern Europe's NMP growth rates also did not meet the planned figures but, like those of Western Europe and the US, showed signs of recovery.

Despite the huge debt problems and budget deficits, military spending in real terms has not decreased significantly. Indeed, in many cases expenditure has gone up as a result of either regional security problems—*e.g.*, in the cases of Central America and Iran-Iraq (and thus also of the adjacent Gulf states)—or the increase in tension in East-West relations. Another, and potentially significant factor is the high cost of new technology. This applies especially to sharply rising research and development costs, which must be met either by government or industry in the producing countries or by the export buyers.

After a decline in real defence spending in the post-Vietnam period, both the Carter Administration and subsequently (and especially) the Reagan Administration embarked on defence spending increases amounting to an average of about 9% per annum since 1980 (for FY 1985 an increase of 13% in real terms is planned). Whether the US Congress will continue to support the Administration in this may be doubted, and a levelling off of the rate of increase can be anticipated. However, the money committed forward (Total Obligational Authority, or TOA) for long-lead items is considerable, and it seems fairly certain that US budget will not decline in real terms.

European economic and social problems and rising public resistance to defence expenditure increases—in view of cutbacks in other sectors—will make it difficult for governments, whatever their political complexion, to persuade their legislatures to vote more funds.

(Belgium, the Netherlands, Denmark and Portugal have particular problems here.) Even West Germany will not be able to meet the 3% annual increase in real terms which was agreed by NATO Ministers in 1978. She has committed herself only to a nominal 3.8% per annum increase over the next few years, and if inflation approaches that figure real growth will be close to zero. The British government, too, is committed to a 3% annual real increase 'in addition to the Falkland costs' on average until 1986, but thereafter little or no real growth is foreseen.[3] France has launched a five-year defence plan which totals fr 830,000m, but this will represent less than 2.1% real annual growth, and in any case almost a third of the funding is allocated to the nuclear programme. The rest of NATO Europe has fallen short of the 3% increase agreed in 1978, and will certainly fall short of the 1983–8 NATO force goals agreed in 1982.

While it is difficult to calculate the real cost of non-Soviet Warsaw Pact defence expenditure, the availability of Romanian, Hungarian and Polish consumer price indices makes it possible broadly to estimate real defence expenditure trends. On the basis of this data it appears that between 1975 and 1982 Warsaw Pact defence expenditure increased by an average of 3.6% per annum in 1975 prices. Poland appears to have undertaken a major increase in military outlays over the two years from 1982 to 1984 (some 36%, based on 1979 prices), while East Germany has sustained an average increase of 6% per annum (1975 prices). Romania, who has frozen her defence budget at the 1982 level, showed a decrease of about 1.1%.

Middle Eastern countries spent about $72 bn on the military sector in 1983, of which 39% was spent by the states comprising the Gulf Co-operation Council (GCC), 18% by Egypt, Israel, Lebanon and Syria, and 38% by Iran and Iraq. There is no indication that defence expenditures have decreased in 1984. The continuing Gulf War (the costs of which can only be estimated) and fear of its escalation have forced surrounding states to continue to buy arms in substantial quantities, despite reduced revenues and large current account deficits. The construction of a sophisticated air defence system by Saudi Arabia, at an estimated cost of $16 bn, and the development of similar systems in other Gulf states have forced these governments to maintain high defence outlays. Also, the GCC countries continue to provide financial support to Iraq, hitherto estimated at some $40 bn since 1980. It is only this aid, plus large credits from France (estimated at $5 bn) and the USSR (no estimate possible), that enables Iraq to continue the war.

The Palestinian conflict consumed at least $13 bn in 1983. Israel's hyper-inflation (400%+ in mid-1984) makes it impossible to calculate real defence costs, nor is it possible to estimate the real value of Soviet military aid to Syria. US military assistance to Egypt, Israel, Jordan and Lebanon in 1983 totalled over $3.2 bn.

There appears to have been no real increase in defence outlays in the continent since 1981, although reliable information is difficult to obtain for most countries. From the information available, however, it appears that in most smaller countries the largest amounts (possibly as high as 40%) are allocated to internal and border security forces. The greatest expenditures are those of South Africa and Nigeria—although in the latter case the most reliable statistics are available only up to 1980. South Africa increased her defence budget by almost 7% for 1984, but (as in many other countries) much of the cost is hidden in other departmental budgets (this applies especially to research and development). Nigeria's defence budget increased considerably in 1982, mostly due to the purchase of 18 *Jaguar* aircraft for the Air Force and to the provision of capital for infrastructure expansion. For Mozambique and Angola no reliable statistics are available.

Asia's GDP growth rate was better than that of any other area in the world, reaching about 3% in 1982 and 4.3% in 1983. Even two of the less wealthy countries, India and Pakistan, were able to attain growth rates of 4.5% and 6.5% respectively. Australia, Indonesia, New Zealand, and the Philippines had the lowest growth rates, and they also had very high debt/service ratios (as did Thailand and South Korea). Nevertheless, Asian countries had significant increases in defence expenditure (above the GDP growth rate) reaching an average of about 7.1% in 1983. Regional security problems in the Indian subcontinent, in Thailand and on the Chinese-Vietnamese border continue unabated. Pakistan is to receive $1.6 bn in military aid from the US over the next few years; India has placed large aircraft orders with the USSR; and Indonesia, Malaysia and Singapore are modernizing their naval and air forces. For the region as a whole, however, defence expenditure growth has slowed during the past five years, from about 10% in the mid-1970s to some 5.6% in the early 1980s.

Japan (with a GDP growth rate of 3.0% in 1983) is under American pressure to raise her defence outlay above 1% of GNP (it is presently 0.99%). The opposition to the ruling Liberal Democratic Party will fight this strongly; a compromise may be reached by allocating additional funding to other ministries. In mid-1984, the Ministry of Defence was negotiating for a 7% increase in expenditure.

Calculating military expenditures for many Latin American countries is again particularly difficult. Not only does hyper-inflation in some cases make it virtually impossible to determine the figures in local currency, but frequent devaluations also make dollar comparisons almost meaningless. Despite a very low regional GDP growth rate (0.5% from 1981 to 1982, and −1.6% in 1983) and some of the highest debts in the world relative to GNP/GDP, military spending in the region appears to have increased by over 10% since 1980. Argentina, whose losses during the Falklands war are estimated at over $2 bn, continues to perceive Britain as a threat in the South Atlantic and consequently has restored her losses and maintains a large military establishment. Brazil, with the highest debt in the world (over $90 bn and a debt/service ratio of 155% in 1982), is expanding her military manpower by almost 10%. Peru, with a debt/service ratio of 110% and a GDP reduction of 12% in 1983, continues to import weapons (including 26 *Mirage* 2000 aircraft) at an estimated cost of some $5 bn. The Central Bank of Colombia has also reported defence expenditure increases of 11% per annum since 1980.

---

1 All information based on OECD, IMF and central bank reports.

2 Excluding Iran, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia and the U.A.E.

3 *Statement on Defence Estimates 1984(1)* (London: HMSO, Cmd 9227-I).

The East–West Conventional Balance in Europe

Assessing the conventional balance between NATO and the Warsaw Pact using comparisons of manpower, combat units or equipment contains quite a large margin of uncertainty. There are a number of characteristics which it is almost impossible to evaluate: the quality of units or equipment, geographical advantages, doctrine, military technology, deployment, training, logistic support, morale, leadership, tactical initiative, terrain, weather, political will and alliance cohesion. Such comparisons must in any case be set within the wider political and strategic contexts, including the nuclear balance, world-wide force deployments, the reinforcement potential of both sides and, most important, the relative strengths of the respective navies and long-range tactical and support air forces.

One cannot foretell the form and scope of any hostilities, their duration, their management or their results. Recent local conflicts have shown that the expenditure of materiel tends to run well above even the highest previous estimates. The impact of this factor on the ability to sustain combat, on the theatre logistics arrangements, or on the national infrastructures cannot be estimated. Yet all these factors have a bearing on the employment of the forces in Europe, on their reinforcement and on the resources needed to supply them.

Direct comparisons between items of military equipment are also difficult. It is possible to compare, for example, the numbers of tanks of each side, but the tanks in the respective Alliances are obviously not equivalent in terms of battle-worthiness. Some are old and unmodernized: others are modern and sophisticated. The former may not move as fast, take such advantage of the terrain, fire with the same chance of a first-round hit, resist fire so well or communicate with each other so well. Moreover, although the tank is still highly regarded as perhaps one of the best anti-tank weapons, other and very efficient tank-killers exist—such as armed helicopters, modern ground-attack aircraft, vehicle-mounted guided anti-tank weapons and mines. In short, many static and dynamic factors must be considered in comparing forces.

Bearing those considerations in mind, therefore, the question of numerical balance is reviewed in the table accompanying this essay using a number of different static indicators under the headings of Manpower, Divisions (including divisional equivalents), Ground Force Equipment, Naval Units, Naval and Maritime Aircraft, and Land Attack Aircraft and Fighters. Totals are given for NATO in Central and Northern Europe (taken together) and Southern Europe, for US Forces in Europe or in sea areas adjacent to Europe and, by category, for NATO as a whole. Compared with these totals will be the equivalents for the Non-Soviet Warsaw Pact, for the Soviet Union's forces opposed to NATO and the totals for each category.

Defining the Combat Zone

One of the central problems for analysis is whether to compare forces at a very high level of aggregation (*i.e.*, Alliance totals) or to attempt to define more realistic interactions (*i.e.*, by fronts). It has to be acknowledged that quite large elements of the forces of both sides are not necessarily committed at the outset to specific combat zones. A substantial degree of flexibility exists, especially with Soviet reserve forces, to switch these at will. The Northern and Central European sectors are shown here as one entity, yet this is inevitably an incomplete notion. The Norwegian land forces, for example, have deployed a major element of their active field forces to protect the northern approaches to the country, against which the Soviet forces in the northern Leningrad Military District pose a substantial potential threat (and have plans to reinforce the far north in war). The Norwegian Navy must assign its larger vessels to support the Atlantic coastal flank of the forces in northern Norway, but the Soviet Baltic Fleet poses a threat to southern Norway, forcing the Navy to attend also to that area. The Norwegian Air Force has to be prepared to support both sectors. The West German province of Schleswig-Holstein, although also part of NATO's Northern Command, must anticipate attack both from the direction of East Germany and from the sea.

NATO's Southern Flank Commander has to be prepared to defend three widely separated fronts, each with its own peculiar tactical and supply requirements. Italy must contest any Pact threat from Central Europe.

Greece and Turkey must between them defend Thrace and the Aegean Sea and its air space, while Turkey must also defend her eastern border in the Caucasus.

Manpower

The total number of men in uniform for all countries is given. Yet many of those in the armed forces of the super-powers may well be committed outside the NATO area. The totals for those forces available for combat and actually located in Europe include, for NATO, French and Canadian forces in Germany, but not Spanish forces. For the USSR, those in the Kola Peninsula opposite Norway are included, as are those in the Trans-Caucasus MD facing Turkey.

In the event of hostilities erupting, or threatening to erupt, the combat zones could be augmented. This could be done either by moving standing forces to Europe or by mobilizing the reserves, either for combat in place or to be moved to Europe by those outside powers. Again, not all of the total reserves in these states would be available for deployment in the European theatre or could necessarily be mobilized and moved in time to affect the outcome of hostilities.

Mobilization

The rate at which nations *can* mobilize will depend upon the system adopted, staff procedures and competence, distances and the transport facilities available. The rate at which nations *will* mobilize will depend on the warning received, on political will, on the ability to make decisions and put them into effect, and on how far enemy action obstructs mobilization. The Warsaw Pact countries have maintained reserves based upon conscripts who have completed their period of obligatory service. Those released less than five years previously would probably be available for immediate service; after more than five years the men would need refresher training. The Soviet Union, in particular, uses the Military District organization for recalling and placing reservists into skeleton formations ('Category 2' and 'Category 3' divisions) for war. The links between the central USSR and the borders are more than adequate for rapid movement towards potential battlefronts, so long as they stay free from attack. The limitations of Soviet internal communications might make it difficult to switch divisions from one part of the USSR to another.

Within Europe many countries can mobilize in place. In the case of Britain, movement to the mainland of Europe is less easy and is liable to interdiction. Those countries which must move reinforcements across the Atlantic clearly face the possibility of serious interruption. Finally, the United States, Britain and Canada do not have a pool of trained reserve manpower comparable to that available to other nations which have universal conscription.

Formations

The normal measure of force comparison is the division, defined as the smallest force capable of independent combat action—generally an all-arms force with its own logistics support. In all cases the term 'Tank' includes tank and armoured divisions; 'Mech' includes mechanized, motorized and motor rifle divisions; 'Other' includes airborne, air portable, air assault, mountain, amphibious and light infantry divisions. Not all national armies field divisional organizations in peacetime. To simplify the presentation, three brigades (nine battalions of armour, infantry or a mix) are considered to be a divisional equivalent—setting aside provision of support elements, including artillery, field engineers and logistics support units, etc. The first category in the Table shows divisions actually in place in Europe and manned in peacetime. For NATO they include, besides forces of the Continental states adjacent to the NATO fronts, Britain's BAOR, Canadian forces, France's Third Corps and the US Army in Europe. For the Soviet Union, this includes the formations in the Kola Peninsula and about half those in the Trans-Caucasus, in addition to those already in Eastern Europe.

The divisions earmarked for reinforcement prior to mobilization are listed separately. So also are those potential reinforcing divisions which would have to be mobilized from the reserves and earmarked for Europe as follow-on forces. In the case of the Soviet Union, formations for primary reinforcement include those divisions in the Western and Southern Theatres of the Soviet Union, two Category 1 divisions in Byelorussia and the Category 2 divisions in the Leningrad, Baltic, Byelorussian, Carpathian, and North Caucasus MD. Secondary reinforcement would include the Category 3 divisions and those cadre or 'shadow' formations in the above MD—equivalent to the existing organization plus the formations in the 'in depth' Military Districts, Kiev and Odessa, and, most probably, the cadre 'shadow' formations. Not included in these figures are territorial defence/Home Guard units, and no attempt has been made to calculate the force augmentation provided by support arms units under Corps/Army, Army or Army Group/Front control. There have been some significant changes in divisional readiness and deployment categories over earlier years, due partly to reorganization and partly to different assumptions about states of readiness. These assumptions, of necessity, have had to be arbitrary.

Equipment

Equipment holdings can be broken down into categories. The complicating factors are that total holdings of equipment do not necessarily match the sum of what appears to be held on divisional establishments (there are equipment reserves, the holdings of non-divisional units and stockpiles to add), and not all equipment will be in theatre at the outbreak of hostilities. Soviet formations moving from the western USSR will be expected to take their full unit inventories. Some American reinforcing formations, on the other hand, plan to equip themselves from stockpiles in Europe. For these reasons, the Table includes for each side only the total holdings of equipment known or estimated to be in Europe and in the inventories of the reinforcing formations in the Warsaw Pact.

Naval Forces

In the case of NATO, we show the numbers of vessels presumed to be in the Eastern Atlantic, Channel, North Sea and Mediterranean. For the Warsaw Pact, we include the Soviet Northern, Baltic and Black Sea Fleets, together with non-Soviet Pact vessels in the Baltic and

Black Seas. Soviet naval forces in the Mediterranean are drawn from the Black Sea Fleet or, in the case of submarines, from the Northern Fleet. As with ground force equipment, there are great disparities within categories, both with respect to capability and age. Classification by type of naval or maritime aircraft conforms to the nomenclature used in the country entries. The figures include both land- and sea-based aircraft with a clear maritime role in the above sea areas.

Air Forces

Assessment of land attack aircraft, fighters and armed helicopters requires assumptions similar to those made for ground forces. The figures for US aircraft represent those based in Europe and do not take account of possible reinforcements from the continental US; the Soviet estimates show aircraft deployed in the territories of the Pact allies, together with a possible reinforcement of air units from the Western MD. The bomber figures given here are for all medium-range bombers, regardless of whether or not they might be reserved for nuclear delivery. The number of multi-role aircraft on both sides obviously complicates any listing by mission categories. Ground attack aircraft (FGA) often have at least a limited self-defence capability but function primarily in the former role. National terminologies generally separate the standard air-superiority fighter and the interceptor, usually making the distinction organizationally as well.

Commonality and Technology

The accompanying table shows that the Warsaw Pact enjoys numerical advantage in virtually all categories of weapons shown, the notable exceptions being most naval vessel types and naval aircraft. What these figures do not show, however, is a primary advantage enjoyed by the Warsaw Pact—namely that the weapons in service, and the tactical doctrines for their use, are common throughout the Pact. NATO suffers from doctrines by no means identical from country to country and from a wide variety of everything from weapon systems to support vehicles, with consequent duplication of supply systems and some considerable difficulties of interoperability.

The question of technological superiority is impossible to answer without the test of combat. In general, however, Soviet equipment is thought to be rugged, relatively immune to mishandling and fairly reliable. Crew comfort and safety standards are significantly lower than those demanded in the West. While these factors may not be detrimental to efficiency in the short term, under the stress of combat the accident rate could rise and efficiency decline rather severely.

Logistics

NATO's logistic system is based almost entirely on national supply lines, and the difficulties are compounded by lack of standardization between nations and by lack of central co-ordination. In these respects it is markedly inferior to that of the Warsaw Pact. Certain NATO countries, too, still lack sufficient spares and ammunition, although there has recently been some attempt to remedy this situation. Some Pact nations may also suffer from shortages, but the fact that their equipment is standardized will enable them to restock more quickly. The Soviet logistic system, which uses a mix of rail, road and pipeline, has been greatly improved in recent years.

Air Power

Warsaw Pact doctrine has long envisaged the use of surface-to-surface missiles to deliver high-explosive, nuclear and chemical warheads against targets deep in enemy rear areas. In addition, the rising Soviet inventory of modern fighter-bombers poses an increasingly significant long-range threat. The Pact's defence against air attack combines a large number of interceptors with an impressive array of surface-to-air missiles and artillery. While advanced electronic counter-measures could probably go some way to nullify these defences, NATO air forces nevertheless face an increasingly formidable task in maintaining close air support for NATO ground forces on the European battlefield. Since NATO depends on its air forces to counter the apparent numerical superiority in Pact ground force numbers, their ability to penetrate Pact air defences could be a critical factor. Of particular concern is that NATO has yet to adopt a common IFF (Identification Friend or Foe) system and could lose aircraft to friendly air defence fire. However, it probably still enjoys a narrowing margin of overall electronic superiority, and may enjoy somewhat greater flexibility in command and control in combat conditions.

The Warsaw Pact continues to enjoy the benefits of standardized aircraft servicing and handling facilities. Although its aircraft generally cannot operate from unimproved runways, there are a very large number of modern airfields available to the Pact with hardened aircraft shelters. NATO, on the other hand, still suffers from too few airfields and too many types of aircraft, although considerable improvements have been made in interoperability, in preparing airfields to receive aircraft from outside the theatre (the co-located operating base (COB) concept) and in hardening its airfields.

Summary

The numerical balance—particularly in equipment—continues to move gradually in favour of the East. At the same time, the West has largely lost the technological edge in conventional equipment which allowed NATO to believe that quality could substitute for numbers. Because of the presence in the equation of so many unknown and unknowable factors, one cannot necessarily conclude that NATO would suffer defeat in war, nor that the Warsaw Pact would see its advantage as being sufficient to risk an attack, but one can conclude that there is still sufficient danger in the trend to require remedies in the Western Alliance, particularly as manpower shortage becomes a problem by the end of the 1980s.

Our conclusion remains that the conventional overall balance is still such as to make general military aggression a highly risky undertaking. Though tactical redeployments could certainly provide a local advantage in numbers sufficient to allow an attacker to believe that he might achieve limited tactical successes in some exposed areas, there would still appear to be insufficient overall strength on either side to guarantee victory. The consequences for an attacker would still be somewhat unpredictable, and the risks—particularly of nuclear escalation—incalculable.

Conventional Force Comparisons: NATO and Warsaw Pact

		NATO				*Ratios of*		Warsaw Pact			
		Europe						Soviet		Non-Soviet	
		North[a]	South[b]	US	Total	*NATO:Pact Totals*	Total	North[c]	South[d]	North[c]	South[d]
Manpower (000)											
Total uniformed manpower[e]		1,671	1,217	2,136	5,024	*1:1.23*	6,169	5,115		612	442
Reserves (all services)		2,076	1,908	1,440	5,424	*1:1.31*	7,119	5,300		1,115	704
Total ground forces		982	934	977	2,893	*1.09:1*	2,657	1,840		478	339
Total ground force reserves[f]		989	1,350	974	3,313	*1:1.50*	4,963	3,500		913	550
Total ground forces deployed in Europe		616	934	217	1,767	*1:1.11*	1,960	825	318	478	339
Divisions[g]											
Divs deployed in Europe, manned in peacetime	Tk[h]	12⅓	2	2⅓	16⅔	*1:1.66*	27⅔	15	2	8	2⅔
	Mech	7⅓	13	2⅓	22⅔	*1:1.51*	34	18	3	12	1
	Other	2⅓	1	1⅓	4⅔	*1:3.14*	11⅓	5⅓	1⅓	2⅔	2⅔
Divs manned and available for immediate frontal reinforcement[i]	Tk	5	1	2	8	*1:1.25*	10	4	2	2	2
	Mech	16⅓	11	5⅓	32⅔	*1.56:1*	21	6	4	4	7
	Other	3⅔	2⅓	3	9⅔	–	–	–	–	–	–
Extra divs available on mobilizing first-line reserves[j]	Tk	1⅓	3	3	7⅓	*1:2.33*	17	14	3	–	–
	Mech	15	18⅓	14	47⅓	*1:1.25*	59	10	32	7	10
	Other	1	–	3	4	*3.60:1*	⅓	–	–	⅓	–
Total divs, war mobilized[k]	Tk	18⅓	6	7⅓	32	*1:1.71*	54⅓	33	7	10	4⅓
	Mech	38⅔	42⅓	21⅓	102⅔	*1:1.11*	114	34	39	23	18
	Other	7⅔	3⅓	7⅓	18⅔	*1.60:1*	11⅔	5⅓	1⅓	2⅔	2⅔
Ground Force Equipment											
Main battle tanks		8,716	7,026	5,000	20,742	*1:2.43*	50,500	22,000	14,000	10,100	4,400
Arty, MRL		4,855	4,940	670	10,465	*1:1.89*	19,800	7,000	6,500	3,500	2,800
SSM launchers		165	60	168	393	*1:5.25*	2,065	994	734	196	141
ATK guns		600	–	–	600	*1:7.80*	4,681	1,868	1,738	770	305
ATGW launchers (crew-served, see also armed hel.)		1,200*	148*	800*	2,148*	*1:2.01*	4,316	1,747	1,647	688	234
AA guns		3,630	1,680	100	5,410	*1:1.38*	7,487[l]	2,954	2,032	1,576	925
SAM launchers (crew-served, ground forces only)[k]		464	82	180	726	*1:4.76*	3,457[l]	1,138	874	720*	725
Naval Units											
Submarines: cruise missile		–	–	–	–	–	42	41	1	–	–
attack		89	46	53	188	*1.25:1*	151	113	33	3	2
Carriers		4	3	7	14	*4.67:1*	3	1	2	–	–
Cruisers		–	3	11	14	*1:1.79*	25	14	11	–	–
Destroyers		44	39	38	121	*2.37:1*	51	27	23	1	–
Frigates		89	49	43	181	*1.36:1*	133	75	53	2	3
Corvettes/large patrol craft		78	43	–	121	*3.67:1*	33	10*	10*	10	3
FAC (G/T/P)		91	61	6	158	*1:2.11*	334	85	30	109	110
MCM[l]		179	82	3	264	*1:1.55*	408	190	95	77	46
Amphibious[m]		16	196	25	237	*1.63:1*	145	39	25	54	27
Naval and Maritime Aircraft											
Bombers		–	–	–	–	–	254	174	80	–	–
Attack		77	20	336	433	*4.16:1*	104	40*	30*	34	–
Fighters		27	8	168	203	–	–	–	–	–	–
ASW		40	42	70	152	*1.17:1*	130*	80	50*	–	–
MR/ECM		60	37	77	174	*1.39:1*	125*	75*	40*	10	–
ASW hel		227	133	136	496	*2.87:1*	173*	110*	60*	–	3
Land Attack Aircraft and Fighters[n]											
Bombers		28	–	–	28	*1:16.8*	470		470	–	–
FGA		1,142	626	522	2,290	*1:1.05*	2,430*	1,200*	670*	417	146
Fighters		42	–	–	42	*1:2.98*	125*	–	–	125	–
Interceptors		426	189	96	711	*1:6.33*	4,500*	1,800	1,400*	855	455
Reconnaissance[o]		247	91	38	376	*1:1.73*	650*	300*	190	104	54
Armed hel		605	–	330*	935	*1:3.37*	3,150*	1,300*	1,750*	66	36

* Estimated figures.

[a] Comprises Norway, Denmark, W. Germany, Luxembourg, Netherlands and Belgium, and includes forces actually deployed from Britain, Canada, US (Second Fleet), France (Army; Navy: Atlantic-deployed elms incl Naval air).

[b] Comprises Turkey, Greece, Italy, Portugal, France (Navy), US Sixth Fleet and forces deployed in Southern Europe.

[c] Comprises Poland, E. Germany and Czechoslovakia, and includes Soviet forces in those countries and in the Leningrad, Baltic, Byelorussian and Kiev MD.

[d] Comprises Hungary, Romania and Bulgaria, and includes Soviet forces in Hungary and in the Carpathian, Odessa, Volga, North Caucasus and Trans-Caucasus MD.

[e] 'Uniformed manpower' refers to main forces only and does not include para-military forces.

[f] 'Reserves': Many countries have Reserve obligations into middle age; where not otherwise stated a five-year post conscript period has arbitrarily been selected in calculating the numbers. After five years, health and training standards begin to decline. In Pact countries a large proportion of these older reservists are probably assigned to 'shadow' formations and units with stored obsolete equipment, potentially doubling the mobilizable forces from those shown but necessarily at very low standards of efficiency. This table, however, shows equipment totals for listed Category 1, 2 and 3 divisions only.

[g] Divisions are not a standard formation between Armies; 3 brigades or regiments are considered to be a divisional equivalent.

[h] 'Tk' includes tank and armoured divs; 'Mech' includes mechanized, motorized and motor rifle; 'Other' includes airborne, air portable, mountain, amphibious, light infantry and naval infantry.

[i] Mobilization and reserve reinforcement systems vary considerably. A distinction between these two categories must of necessity be judgmental, especially for NATO. Readers may indeed wish to consider them as one.

[j] Figures in part on unit organization. Ratio between guns and SAM may vary.

[k] Field forces only; Soviet Air Force and *Voyska-PVO* equipment is considered primarily to be for airfield defence and not for use by field formations.

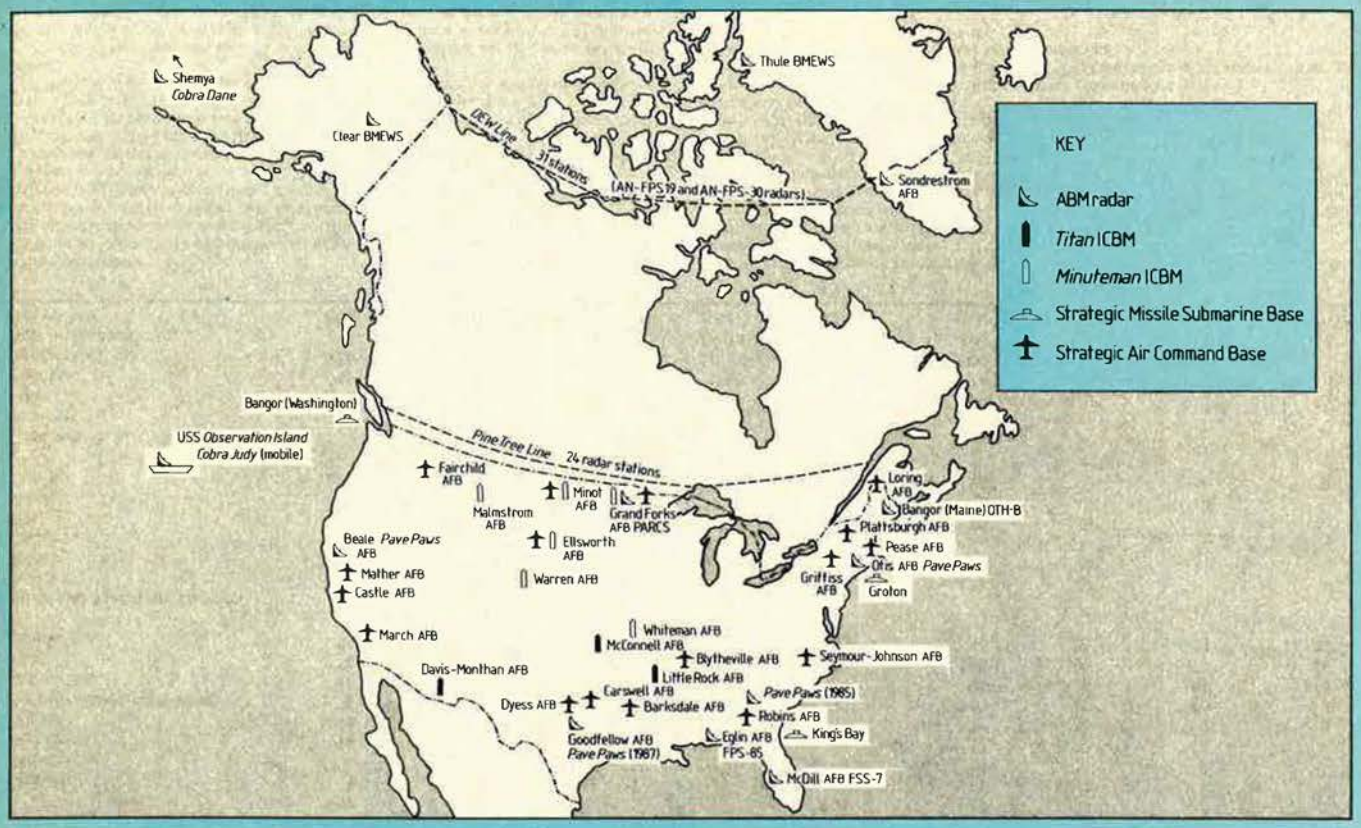
[l] Includes support craft and inshore boats.

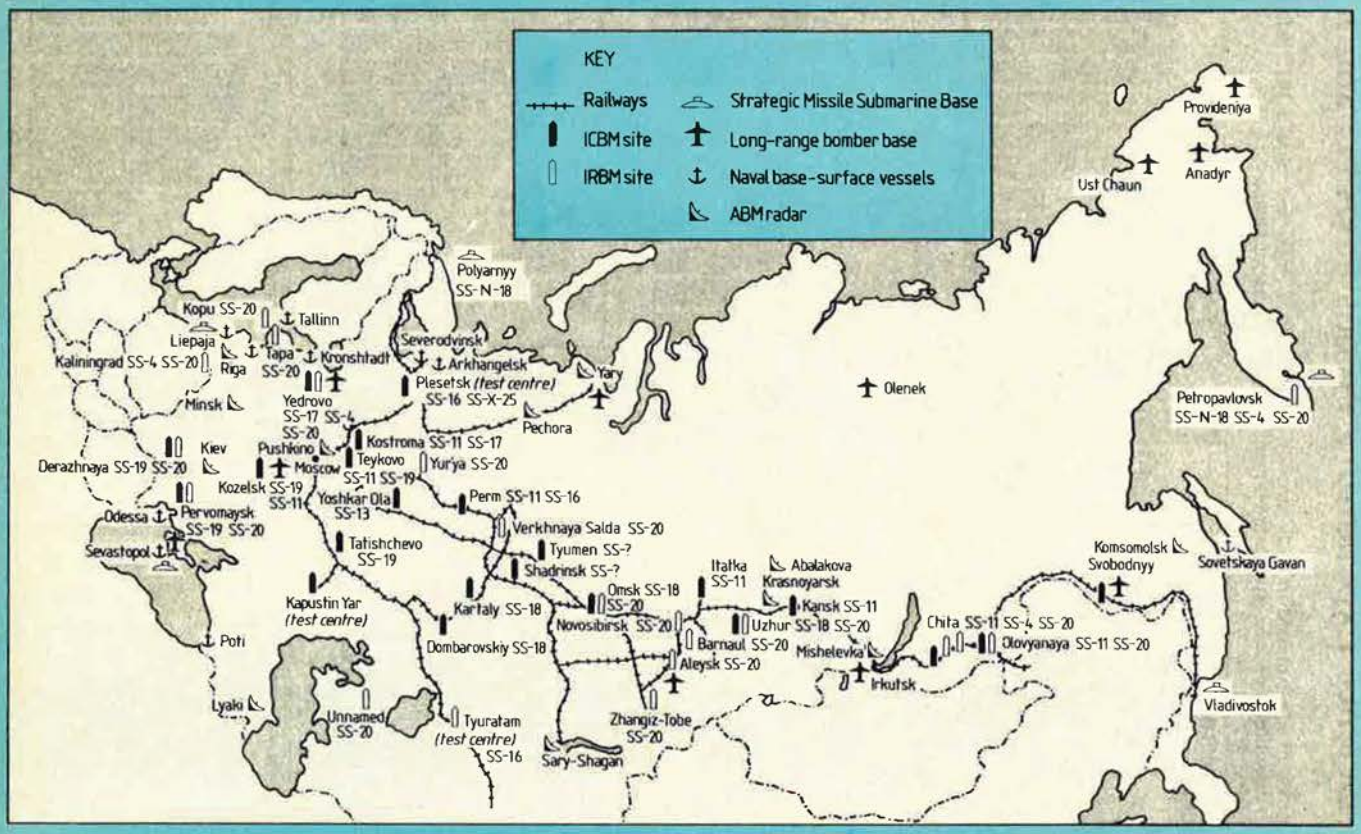
[m] All types.

[n] OCU aircraft are included in these totals.

[o] Includes EW/ECM aircraft.

2. Deployment of Strategic Systems in the US and USSR





THINK OF IT AS 75,000 PARTS



FLYING IN VERY CLOSE FORMATION

Imagine the logistics problems faced by the U.S. Air Force, with spares and parts requirements approaching one million items and annual needs ranging from $15 to $18 billion. Imagine a "pipeline" involving 150,000 repairable parts where more than 90% of demands are satisfied by repair.

Now imagine a company able to design and implement an automated system to manage all this.

The right answer, and the right company, is BDM. BDM is leading a team developing a prototype Requirements Data Bank for the USAF Logistics Command. The operational RDB —complete with all the software, procedures, and interfaces to make it work — will update the current logistics process. Including everything from the forecast of requirements, up to 7 years ahead . . . through the entire maintenance, repair, and distribution cycle . . . to contracting and purchasing. So the Air Force can do its job, not wait for parts and spares.

BDM is analyzing, designing, and implementing systems in defense, communications, energy, space, and other critical areas. Areas where tomorrow's world belongs to those who can make it work best. How is your world working? Call on us. BDM International, Inc., 7915 Jones Branch Drive, McLean, Virginia 22102. Phone (703) 821-5000. Telex 901103.

MANAGING THE COURSE OF CHANGE

BDM

CHANGING THE COURSE OF MANAGEMENT

NOTE

The tabular presentation of data on nuclear-capable weapon systems has been changed in this edition. Table 1, which includes systems in Chinese and South Korean hands, now gives world-wide coverage of nuclear-capable systems reported as deployed, with inventories and weapon and warhead characteristics, where known. Table 2 amplifies this by listing deployed launcher totals for categories of system (except some maritime systems) which directly affect the European Theatre.

No attempt has been made to compare totals directly, chiefly because weapon loading and the use to which dual-capable systems are put are so uncertain. Not every example of a nuclear-capable system necessarily has a nuclear role—indeed there may be no nuclear warheads available for it—nor are crews invariably trained in nuclear delivery.

Tables of Comparative Strengths

1. Nuclear-Capable Delivery Vehicles: World-Wide

Category[a] and type	First year deployed	Range (km)[b]	Throw-weight (000 lb)[c]	CEP (m)[d]	Launcher total 7/84	Warhead details[e] and comments
UNITED STATES						
LAND-BASED						
Strategic						
ICBM						
LGM-25C *Titan* II	1962	15,000	8.3	1,300	37	1 × 9MT W-53/Mk 6. Being phased out
LGM-30F *Minuteman* II	1966	11,300	1.6	370	450	1 × 1.2MT W-56/Mk 11C. (442 launchers if 8 are comms vehs.)
LGM-30G *Minuteman* III	1970	14,800	1.5	280	250	3 × 170KT W-62/Mk 12 MIRV.
	1980	12,900	2.4	220	300	3 × 335KT W-78/Mk 12A MIRV.
Intermediate-/medium-range						
GLCM						
BGM-109A *Tomahawk*	1983	2,500	n.a.	n.a.	64	1 × 10–50KT W-84.
MRBM						
Pershing II	1983	1,800	n.a.	45	48	1 × 5–50KT W-85 (yield selectable).
Tactical						
SRBM						
MGM-31A/B *Pershing* IA	1967	160–720	(0.7)	400	90	1 × 60/400KT W-50.
MGM-52C *Lance*	1972	110	0.5	150–400	90	1 × 1/10/50KT W-70. Dual-capable
Artillery (dual-capable)						
M-110A1/A2 203mm SP how	1977/9	20	0.3	170	1,046	5–10KT W-33 (M-422) or 0.5–2KT W-79 (M-753).
M-109 155mm SP how	1963	18/24/30	0.128	n.a.	2,200	1 × 0.1KT W-48 (M-454).
M-198 155mm towed how	1979	1.6–14	0.128	n.a.	907	1 × 0.1KT W-48 (M-454).
Atomic Demolition Munitions (ADM = mines)						
Special ADM	1964	–	0.15	–	n.a.	Sub-KT.
Medium ADM	1965	–	0.4	–	n.a.	W-45. ?3 yields, 1–15KT.

Category[a] and type	First year deployed	Range (km)[b]	Throw-weight (000 lb)[c]	CEP (m)[d]	Launcher total 7/84	Warhead details[e] and comments
NATO (excluding US)[f]						
LAND-BASED[h]						
Intermediate-range						
IRBM						
SSBS S-3	1980	3,500	n.a.	n.a.	18	1 × 1MT. France.
Tactical						
SRBM						
MGR-1B *Honest John*	1953	40	n.a.	n.a.	54	1 × KT range. Greece, Turkey.
MGM-31A/B *Pershing* 1A	1962	160–720	(0.7)	400	72	1 × KT range. FRG (Air Force).
Pluton	1974	120	n.a.	n.a.	44	1 × 15KT or AN-51 25KT. France.
MGM-52C *Lance*	1976	110	0.5	150–400	56	1 × 50KT range. Belgium, Britain, FRG, Italy, Netherlands.
Artillery (dual-capable)						
M-110 203mm SP how	1962	16.8	0.25	170	436	5–10KT W-33. Belgium, Britain, FRG, Greece, Italy, Netherlands, Turkey.
M-109 155mm SP how	1964	18	n.a.	n.a.	1,186	1 × 0.1KT W-48. Belgium, Britain, Canada, Denmark, FRG Greece, Italy, Netherlands, Norway, Portugal, Turkey.
SAM (dual-capable)						
MIM-14B *Nike Hercules*	1962	140	1.12	–	644	2/20/40KT W-31. Belgium, FRG, Italy, Netherlands.
SEA-BASED[h]						
Strategic						
SLBM						
Polaris A-3	1967	4,600	n.a.	900	64	3 × 200KT MRV. Britain.
MSBS M-20	1977	3,000	n.a.	n.a.	80	1 × 1MT. M-4 (6 MIRV) to replace from 1985. France.

SEA-BASED						
Strategic						
SLBM						
UGM-73A *Poseidon* C-3	1971	4,600	3.3	450	304	10 × 40–50KT W-68. Max 14 MIRV.
Trident C-4	1980	7,400	3.0+	450	288	8 × 100KT W-76 MIRV.
Tactical						
SLCM						
BGM-109A *Tomahawk*	1983	2,500	0.27	–	48	1 × 200–250KT (selectable) W-80. Dual-capable.
ASW						
UUM-44A *SUBROC*	1965	50	0.6	–	324	1 × 1–5KT W-55.
RUR-5A *ASROC*	1961	11	0.25	–	±800	1 × 1KT W-44. Dual-capable.
SAM (dual-capable)						
RIM-2D *Terrier* (BT-3A(N))	1956	37	0.35	–	±300	1 × 1KT W-45. (*Standard*-2 with W-81 to replace.)
MIM-14B *Nike Hercules*	1958	140	1.12	–		2/20/40KT W-31 mod 2. (Msl not in first-line service.)

AIR			Max speed (Mach)	Weapon load (000 lb)		
Strategic						
Long-range bombers						
B-52G	1959	12,000	0.95	45	151	12 ALCM, 4 SRAM, 4 × B-28/-43/-57/-61 bombs.
B-52H	1962	16,000	0.95	45	90	4 SRAM, 4 × B-28/-43/-57/-61 bombs.
Medium-range bombers						
FB-111A	1969	4,700	2.5	37.5	56	4 SRAM, 2 × B-43/-61 bombs.
Tactical[f]						
Land-based strike						
F-4E	1962	2,200	2.4	16	440	1 × B-28RG/-43/-57/-61 bombs.
F-111E/F	1967	4,700	2.2/2.5	25	230	3 × B-43/-57/-61 bombs.
F-16	1979	3,800	2+	12–15	456	1 × B-16 (also 1–2 × B-43) bombs.
Carrier-based strike						
A-6E	1963	3,200	0.9	15	170	3 × B-28/-43/-57/-61 bombs.
A-7	1966	2,800	0.9	15	288	4 × B-28/-43/-57/-61 bombs.
F/A-18	1982	1,000	2.2	17	63	2 × B-57/-61 bombs.
S-3	1974	?3,700	0.6	n.a.	110	1 × B-57 depth charge.
ASW						
P-3	1961	2,500	0.4	n.a.	213	2 × B-57 depth charges.
ALCM						
AGM-86B	1982	2,400	2.8	–	1,008	On 84 B-52G. Total excludes reloads.
Rockets (SRAM)						
AGM-69A	1972	55–60	2.2	–	924	200KT W-69. On B-52G/H, FB-111A.
Bombs						
B-28	1958	–	–	–	n.a.	Strategic: 1.45MT, ?28MT. Tactical: 70, 350KT, 1.1MT.
B-43	1960	–	–	–	n.a.	Strategic and tactical: 1MT.
B-57	n.a.	–	–	–	n.a.	Tactical: sub-KT to 10 (?20) KT.
B-61 mod 1	?1972	–	–	–	n.a.	Strategic: MT range.
mods 2/3/4/5	n.a.	–	–	–	n.a.	Tactical: 100–500KT.

AIR			Max speed (Mach)	Weapon load (000 lb)		
Tactical[f]						
Land-based strike						
F-104	1958	2,400	2.2	4	281	FRG, Greece, Netherlands, Italy, Turkey.
F-4E/F	1967/73	2,200	2.4	16	131	FRG, Turkey.
F-16	1982	3,800	2+	12–15	178	Belgium, Denmark, Netherlands, Norway.
Buccaneer	1962	3,700	0.95	12	25	Britain, *Tornado* to replace.
Mirage IVA	1964	3,200	2.2	16	28	1 × AN-22 60KT bomb. France.
Mirage IIIE	1964	2,400	1.8	19	30	(2) × AN-52 15KT bombs. France.
Jaguar	1974	1,600	1.4	10	45	France. (British ac non-nuc.)
Tornado	1981	2,800	0.95	16	223	Britain, FRG, Italy.
Carrier-based strike						
Super Etendard	1980	1,500	1.0	2	36	(2) × AN-52 15KT bombs. France.
ASW						
P-3C	1961	2,500	0.4	n.a.	18	Netherlands, Norway.
Nimrod	1969	9,000	0.75	n.a.	28	Britain.
Atlantic	1965	n.a.	0.4	n.a.	55	France, FRG, Italy.

CHINA

LAND-BASED			Throw-weight (000 lb)[c]	CEP (m)[d]		
Strategic						
ICBM						
Dong Feng (DF)-5	1981	13,000	n.a.	n.a.	2	1 × 5MT.
DF-4	1978/9	10,000	n.a.	n.a.	4	1 × 3MT.
IRBM						
DF-3	1970	5,500	n.a.	n.a.	60	1 × 2MT.
MRBM						
DF-2	1970	1,800	n.a.	n.a.	50	1 × 20KT.

SEA-BASED						
Strategic						
SLBM						
CSS-NX-3	1983/4	2,800	n.a.	n.a.	12	1 × ?2MT

AIR			Max speed (Mach)	Weapon load (000 lb)		
Strategic						
Medium-range Bombers[f]						
H-6	1968/9	n.a.	n.a.	n.a.	120	

No Chinese *tactical* nuclear weapons have been identified.

SOUTH KOREA

LAND-BASED			Throw-weight (000 lb)[c]	CEP (m)[d]		
Tactical						
Artillery						
M-110 203mm SP how	n.a.	20.6	n.a.	n.a.	20	No nuclear warheads are held for these weapons. As ex-US materiel, they have a *theoretical* nuclear capability only.
M-109 155mm SP how	n.a.	18/24/30	0.1	n.a.	100	
SSM						
MGR-1B *Honest John*	n.a.	40	n.a.	n.a.	12	
SAM						
MIM-14B *Nike Hercules*	n.a.	140	1.12	–	100	

Category[a] and type	First year deployed	Range (km)[b]	Throw-weight (000 lb)[c]	CEP (m)[d]	Launcher total 7/84	Warhead details[e] and comments
SOVIET UNION						
LAND-BASED						
Strategic						
ICBM						
SS-11 *Sego* mods 1/2	1966/73	10/13,000	2	1,400	520	1 × 1MT.[f]
mod 3	1975	8,800	2.5	1,100		3 × 100–300KT.[f]
SS-13 *Savage*	1968	10,000	1	2,000	60	1 × 750KT.
SS-17 (RS-16) mod 1	1975	10,000	6	450	150	4 × 750KT MIRV.
(cold mod 2	1977	11,000	3.6	450		1 × 6MT
launch) mod 3	1982	10,000	–	–		4 × 20KT MIRV.[f]
SS-18 (RS-20) mod 1	1975	12,000	16.5	450	308	1 × 20MT.
(cold mod 2	1977	11,000	16.7	450		8 × 900KT MIRV.
launch) mod 3	1979	10,500	16	350		1 × 20MT.
mod 4	1982	11,000	16.7	300		10 × 500KT MIRV.
(mod 5)	(1985)	(9,000)	(16)	(250)		(?10 × 750KT) MIRV.
SS-19 (RS-18) mod 2	1979	10,000	7.5	300	360	1 × 5MT.
(hot launch) mod 3	1982	10,000	8	300		6 × 550KT MIRV.[f]
Intermediate-/medium-range						
I/MRBM						
SS-4 *Sandal*	1959	2,000	3	2,300	224	1 × 1MT. Retiring.
SS-20 mod 1	1977	5,000	n.a.	n.a.	378	1 × 1.5MT.
mod 2	1977	5,000	n.a.	400		3 × 150KT.
Tactical						
SRBM						
SS-1b *Scud* A	1957	150	n.a.	n.a.	?540	1 × KT range. SS-23 replacing.
SS-1c *Scud* B	1965	300	n.a.	n.a.		
FROG-7	1965	70	n.a.	400	?530	1 × 200KT. SS-21 replacing.
SS-12 *Scaleboard*	1969	490–900	n.a.	900	?100	1 × 200KT. Multi-role. SS-22 replacing.
SS-21	1978	120	n.a.	300	?90	1 × 200KT.
SS-22	1979	900	n.a.	300	?40	1 × 500KT.
SS-23	1979/80	500	n.a.	n.a.	?100	1 × KT range.
GLCM						
SS-C-1b *Sepal*	1962	450	n.a.	n.a.	?100	1 × KT range. Coast defence.
Artillery						
M-1976 152mm towed gun	1981	n.a.	n.a.	n.a.	?3,000	?2–5KT. Front.
2-S5 152mm SP gun	1978	n.a.	n.a.	n.a.	n.a.	2–5KT. Army.
S-23 180mm towed gun	1959/55	30	0.2	n.a.	?180	2KT. Army. Retiring.
M-55/D-20 152mm towed gun/how	1955	n.a.	n.a.	n.a.	n.a.	2KT. Div.
M-1973/C2-S3 152mm SP gun/how	?1972	n.a.	n.a.	n.a.	n.a.	Sub-KT–5KT. Div.
M-1975 203mm SP how	1979	18+	n.a.	n.a.	n.a.	2–5KT. Front.
M-1975 240mm SP mor	1979	10	n.a.	n.a.	n.a.	n.a. Front.
SAM						
ABM-1B *Galosh*	1964	300	n.a.	–	32	1 × multi-MT. Moscow only.
Modified ABM-1	1983/84	n.a.	n.a.	–	?	1 warhead. Being deployed.
SA-10	1981	100	n.a.	–	?1,400	1 warhead.
SA-5 *Gammon*	1967	300	n.a.	–	?900	1 warhead.

Category[a] and type	First year deployed	Range (km)[b]	Throw-weight (000 lb)[c]	CEP (m)[d]	Launcher total 7/84	Warhead details[e] and comments
WARSAW PACT (excluding USSR)[k]						
LAND-BASED						
Tactical						
SRBM						
Scud B/C	1965	160–300	n.a.	n.a.	132	1 × KT range. All.
FROG-3/-5/-7	1957/65	40–70	n.a.	400	208	1 × 200KT range. All.
Artillery						
M-55/-D-20 152mm towed gun/how	n.a.	n.a.	n.a.	n.a.	(100)	2KT. East Germany, Hungary, Romania.
AIR			Max speed (Mach)	Weapon load (000 lb)		
Tactical[l]						
Land-based strike						
Su-7 *Fitter* A	1959	1,400	1.7	5.5	95	2 bombs. Czechoslovakia, Poland.
Su-20 *Fitter* C	1974	1,800	1.6	4.0	35	2 bombs. Poland.
MiG-23 *Flogger* F/H	1975/6	?1,400	1.2	9.9	60	2 bombs. Bulgaria, Czechoslovakia, East Germany.

[a] ICBM = range of over 5,500 km; IRBM = 2,400–5,500 km; MRBM = 800–2,400 km; SRBM = 800 km or less.
Long range = over 9,000 km; medium-range = 5,600–9,000 km; bomber = aircraft primarily designed for bombing missions.

[b] Ranges given in km; for nautical miles, divide by 1.852. Use of maximum payload may reduce a missile's operational range by up to 25% of figures shown. Figures for aircraft are theoretical maximum unrefuelled range at optimum altitude and speed. Higher speeds, lower altitudes and full weapons loads reduce range, especially with strike ac; for instance an A-6, at operational height and speed and with typical weapons load, has a combat *radius* of some 1,500 km, compared with a maximum ferry *range* of 4,700 km.

[c] Throw-weight is the weight of post-boost vehicle (warheads, guidance systems, penetration aids) deliverable over a given range.

[d] CEP (circular error probable) = the radius of the circle around a target within which there is a 50% probability that a weapon aimed at that target will fall. For obvious reasons, this is a figure with a rather large degree of uncertainty attached to it.

[e] Warhead yields vary greatly; figures given are estimated maxima. KT range = under 1 MT; MT range = over 1 MT. Yield figures for dual-capable weapons (which can deliver conventional or nuclear warheads) refer to nuclear warheads only.

[f] All the types listed are dual-capable. Total actually available as nuclear strike aircraft may be lower than the figure shown.

[g] Except in Britain and France, nuclear warheads are held in American custody. No nuclear warheads held on Canadian, Danish or Norwegian soil. In few cases is the M-109 likely to have a nuclear role.

[h] All NATO missiles of US origin, except SSBS, *Pluton* and MSBS (French).

[i] *Buccaneer*, *Nimrod* of British origin; A-7, F-4, F-16, F-104, P-3 American; *Mirage*, *Super Etendard*, *Atlantic* French; *Jaguar* Anglo-French; *Tornado* British-German-Italian.

[j] Variable range; some for peripheral targeting.

[k] Nuclear warheads held in Soviet custody. As all of Soviet origin, it is uncertain how many are nuclear capable.

2. NATO/Warsaw Pact Potential Nuclear Weapon Systems, Europe

	NATO			WARSAW PACT	
Category and type	Countries deploying	Launcher total 7/84[a]	Launcher total 7/84	Countries deploying	Type
LAND-BASED					
ICBM					

SEA-BASED							
Strategic							
SLBM							
SS-N-5 *Serb*		1964	1,400	n.a.	2,800	45	1 × 1MT.
SS-N-6	mod 1	1968	2,400	1.5	900	368	1 × 1MT. Liquid-fuel.
Sawfly	mod 2	1973	3,000	n.a.	900		1 × 1MT. Liquid-fuel.
	mod 3	1974	3,000	1.5	1,400		2 warheads. Liquid-fuel.
SS-N-8	mod 1	1972	7,800	1.5	1,300	292	1 × 1MT.
	mod 2	n.a.	9,100	8	900		1 × 800MT.
SS-N-17		1977	3,900	2.5	1,500	12	1 × 1MT. Solid-fuel.
SS-N-18	mod 1	n.a.	6,500	5	1,400	224	3 × ?200KT. Solid-fuel.
	mod 2	1978	8,000	n.a.	600		1 × 450KT.
	mod 3	n.a.	6,500	n.a.	600		7 × 200KT MIRV.
SS-N-20		1981	8,300	n.a.	n.a.	40	9 × ?200KT MIRV.
Tactical							
SLCM							
SS-N-3 *Shaddock*		1962	450	2	n.a.	296	1 × 350KT (800KT, 1MT also reported).
SS-N-7 *Siren*		1968	45	1.2	n.a.	88	1 × 200KT.
SS-N-9		1968/9	280	n.a.	n.a.	200	1 × 200KT.
SS-N-12 *Sandbox*		1973	1,000	2.2	n.a.	96	1 × 350KT.
ASW							
SS-N-14 *Silex*		1974	55	n.a.	n.a.	216	KT range.
SS-N-15 torpedo		1982	45	n.a.	n.a.	?396	?KT range.
SS-N-16 torpedo		1962	n.a.	n.a.	n.a.	?306	?KT range.
SS-N-19		1980	500	n.a.	n.a.	88	1 warhead.
SS-NX-22		1982	n.a.	n.a.	n.a.	28	1 warhead. May be dual-capable.
FRAS-1 rockets (SUW-N-1)		1975	30	n.a.	n.a.	10	?5KT.
Mines		n.a.	–	–	–	n.a.	5–20KT.

AIR			Max speed (Mach)	Weapon load (000 lb)			
Strategic							
Long-range bombers							
Tu-95 *Bear* B/C		1956	12,800	0.78	40	100	1–2 AS-3/-4 ALCM, 2–3 bombs.
Mya-4 *Bison*		1956	11,200	0.87	20	43	4 bombs.
Medium-range bombers							
Tu-16 *Badger*		1955	4,800	0.8	20	410	1–2 AS-2/-3/-6 ALCM, 1 bomb. (*Badger* G carries (?6) AS-5.) Air Force (220), Navy (190).
Tu-22 *Blinder*		1962	4,000	1.5	12	160	1 AS-4 ALCM, 1 bomb. Air Force (125), Navy (35).
Tu-26 *Backfire*		1974	8,000	2.5	17.5	235	1 or 2 AS-4 ALCM, 2 bombs. Air Force (130), Navy (105).
Tactical[f]							
Land-based strike							
Su-7 *Fitter* A		1959	1,400	1.7	5.5	130	2 bombs.
MiG-21 *Fishbed* L		1970	1,100	2.2	2	160	2 bombs.
MiG-27 *Flogger* D/J		1971	1,400	1.7	7.5	730	2 bombs.
Su-17 *Fitter* D/H		1974	1,800	1.6	11	850	2 bombs.
Su-24 *Fencer*		1974	4,000	2.3	8	630	2 bombs.
ASW							
Tu-142 *Bear* F		1972	11,500	0.7	–	50	2 bombs.
Il-38 *May*		1970	7,200	0.5	–	50	(?2) bombs.
Be-12 *Mail*		1965	4,000	0.5	–	90	2 bombs.
***ALCM* (dual-capable)**							
AS-2 *Kipper*		1961	200	2.2	–	90	1 × KT range.
AS-3 *Kangaroo*		1961	650	2	–	(100)	1 × ?800KT.
AS-4 *Kitchen*		1962	300–800	?2	–	up to 830	1 × 200KT.
AS-6 *Kingfish*		1977	250	3	–	up to 820	1 warhead. 350KT.
Bombs		n.a.	–	–	–	n.a.	Strategic: 5, 20, 50MT. Tactical: 250, 350KT.
Depth charges		n.a.	–	–	–	n.a	Known to exist; no details.

				USSR	SS-11/-17/-19
IRBM					
SSBS S-3	France	18	224	USSR	SS-4
			243	USSR	SS-20
GLCM					
BGM-109A *Tomahawk*	USA	32			
MRBM					
Pershing II	USA	48			
SRBM					
Pershing IA	USA	60	(440)	USSR	SS-21/*FROG*
Pershing IA	FRG	72	(500)	USSR	SS-23/*Scud* A/B
Lance	USA	36	(90)	USSR	SS-12/-22
Lance	Allies[c]	56	208	Allies	*FROG*-/-3/-5/-7
Pluton	France	44	132	Allies	*Scud* B/C
Artillery[e]					
M-110	USA	500			
M-110	Allies	436	(3,500)	USSR	M-1976, 2 S-5, S-23, M-55/D-20, M-1973/C2-S3, M-1975 how, M-1975 mor
M-109	USA	500			
M-109	Allies	1,186			
SAM (dual-capable)					
MIM-14B *Nike Hercules*	Allies[c]	644			
SEA-BASED					
SLBM					
UGM-73A *Poseidon* C-3	USA	40[d]	45	USSR	SS-N-5
Polaris A-3	Britain	64			
MSBS M-20	France	80			
SLCM					
			240[d]	USSR	SS-N-3[d]
			88[d]	USSR	SS-N-7[d]
			140[d]	USSR	SS-N-9[d]
			80[d]	USSR	SS-N-12[d]
AIR					
Land-based strike					
F-104	Allies[c]	281	(500)	USSR (Air Force)	Tu-95, Mya-4, Tu-16, Tu-22, Tu-26
F-4E	USA	96			
F-4E/F	Allies[c]	131	(260)	USSR (Navy)	Tu-16, Tu-22, Tu-26
F-111E/F	USA	150			
F-16	USA	72	(2,400)	USSR (Frontal)	Su-7, MiG-21, MiG-27, Su-17 Su-24
F-16	Allies[c]	178			
Buccaneer	Britain	25	95	Allies[c]	Su-7
Mirage IVA	France	28	0435	Poland	Su-20
Mirage IIIE	France	30	0460	Allies[c]	MiG-23
Jaguar	France	45			
Tornado	Allies[c]	223			
Carrier-based strike					
A-7/F-18	USA	48[c]			
Super Etendard	France	36			
ASW					
S-3A	USA	20[c]	(130)	USSR	Tu-142, Il-38, Be-12
P-3	US	(12)			
P-3	Allies[c]	18			
Nimrod	Britain	28			
Atlantic	Allies[c]	55			

[a] Listings for US assume unreinforced deployments except in the case of *Poseidon* SLBM, 40 of which are assumed to be assigned to Supreme Allied Commander Europe from US central systems.

[b] A proportion of the launchers deployed (shown in Table 1) is assigned to peripheral targets.

[c] For detail, see Table 1.

[d] USSR types and totals based on estimated naval deployments and equipment.

[e] Figures assume 2 US carriers in European area.

3. Warsaw Pact and NATO Defence Expenditure 1972–82

(millions of local currency units and US$)

Excluding aid to West Berlin, for which see Table 5.

		1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1982 at 1975 prices	Change 1975–82
Warsaw Pact[a]														
Bulgaria	leva		422	483	548	645		518	649	790	859	901	757	38%
	$		410	488	596	725		617	791	878	1,011	1,287		
Czechoslovakia	koruny	15,920	16,700	17,300	19,280	20,400	18,240	19,450	20,290	22,400	23,100	24,156	22,788	18%
	$	1,951	2,085	2,246	2,835	3,096	3,097	3,430	3,743	4,392	4,812	3,774		
GDR[b]	ostmarks	7,800	8,328	8,900	9,564	10,223	11,020		13,060	13,100	14,116	14,954	13,594	42%
	$	3,197	3,544	4,083	4,665	5,163	5,770		7,637	8,137	9,338	7,312		
Hungary	forints	9,717		10,510	11,258	12,275	13,150	14,416	16,200	16,560	19,060	20,260	15,800	40%
	$	632		735	805	844	929	1,036	1,146	1,240	1,444	1,318		
Poland	zloty		39,210	45,200	47,300	52,928	57,280	58,800	65,300	70,400	76,900	174,000	70,388	49%
	$		2,483	2,850	3,270	3,367	3,672	3,886	4,466	4,996	5,696	6,234		
Romania	lei	7,710	7,900	8,640	9,710	10,570	11,300	12,000	11,835	12,500	10,490	10,755	8,808	–9%
	$	763	792	916	1,093	1,280	1,370	1,517	1,561	1,715	1,509	1,397		
USSR	roubles	17,900	17,854	17,650	17,430	17,430	17,230	17,200	17,200	17,100	17,054	17,050		
NATO[c]														
Belgium	francs	45,183	50,533	57,739	70,899	81,444	89,480	99,726	106,472	115,754	125,689	132,127	82,942	17.0%
	$	1,027	1,297	1,482	1,928	2,110	2,496	3,167	3,632	3,958	3,385	2,892		
Britain	£	2,815	3,512	4,160	5,165	6,132	6,810	7,616	9,029	11,510	12,688	14,534	6,114	18.4%
	$	8,151	8,612	9,731	11,478	11,077	11,887	14,621	19,158	23,356	23,944	24,296		
Canada	$C	2,238	2,405	2,862	3,127	3,589	4,124	4,662	4,825	5,499	6,289	7,655	4,040	29.2%
	$US	2,261	2,404	2,926	3,074	3,640	3,878	4,087	4,119	4,703	5,246	6,205		
Denmark	kroner	3,386	3,520	4,439	5,281	5,680	6,343	7,250	7,990	9,117	10,301	11,669	5,557	5.2%
	$	487	582	728	919	940	1,057	1,315	1,519	1,608	1,446	1,400		
France	francs	37,992	42,284	47,878	55,872	63,889	73,779	85,175	96,439	111,672	129,708	148,021	71,095	27.2%
	$	7,532	9,494	9,954	13,035	13,369	15,016	18,874	22,668	26,425	23,867	22,522		
FRG[d]	DM	28,720	31,908	35,644	37,589	38,922	40,184	43,019	45,415	48,518	52,193	54,234	39,878	6.1%
	$	9,007	11,939	13,773	15,278	15,458	17,304	21,417	24,778	40,850	23,094	22,350		
Greece	drachma	16,809	19,991	31,499	45,936	56,963	67,738	77,861	89,791	96,975	142,865	176,270	55,084	19.9%
	$	560	675	1,048	1,423	1,560	1,839	2,119	2,424	2,276	2,578	2,639		
Italy	lire (bn)	2,162	2,392	2,852	3,104	3,608	4,533	5,301	6,468	8,203	9,868	12,294	4,203	35.4%
	$ (m)	3,707	4,103	4,385	4,755	4,335	5,137	6,242	7,785	9,578	8,681	9,090		
Luxembourg	francs	517	601	710	836	983	1,029	1,154	1,242	1,534	1,715	1,893	1,193	42.7%
	$	12	15	18	23	26	29	37	42	53	46	41		
Netherlands	guilders	4,886	5,360	6,144	7,119	7,662	9,092	9,146	10,106	10,476	11,296	11,921	7,879	10.7%
	$	1,522	1,917	2,285	2,815	2,898	3,707	4,227	5,038	5,269	4,527	4,464		
Norway	kroner	3,239	3,505	3,938	4,771	5,333	5,934	6,854	7,362	8,242	9,468	10,956	5,788	21.3%
	$	492	608	711	913	977	1,115	1,307	1,454	1,669	1,650	1,698		
Portugal	escudos	16,046	16,736	25,108	19,898	18,845	22,082	27,354	34,343	43,440	51,917	63,817	15,915	–20.0%
	$	594	678	988	779	624	577	623	702	868	844	803		
Turkey	liras	9,961	12,192	15,831	30,200	40,691	49,790	66,239	93,268	185,656	313,067	447,790	32,215	6.7%
	$	704	862	1,137	2,091	2,535	2,766	2,728	3,004	2,442	2,815	2,755		
USA	$	77,639	78,358	85,906	90,948	91,013	100,925	109,247	122,279	143,981	169,888	196,345	109,445	20.3%

[a] Warsaw Pact figures must be treated with great caution, since they only represent published statistics or (as in the case of Bulgaria) estimates. Imprecise data on inflation rates make constant-price time series unreliable also. 1975 prices have been calculated from a mix of consumer price indices (IMF, UN and commercial banks). The percentage change in defence expenditure between 1975 and 1982 should therefore be regarded as a general indication only, and not as a precise figure. Dollar conversions use implicit rates.

[b] Includes published budget for internal security forces.

[c] Based on official NATO figures for the NATO definition of defence expenditure and official consumer price deflators.

[d] Excluding aid to West Berlin, for which see Table 4.

4. Average Strength of Military Formations (in thousands)

	Division					Brigade				Squadron
	Armoured		Mechanized		Airborne	Armoured		Mechanized		Fighter aircraft
	Men	Tanks	Men	Tanks	Men	Men	Tanks	Men	Tanks	
United States	18,300	324	18,500	216	16,800	4,500	108	4,800	54	18–24
Soviet Union	11,000	335[a]	14,000	266[a]	7,000	1,300[b]	95[b]	2,300[b]	40[b]	12–15
China	9,200	270	12,700[c]	30[c]	9,000	1,200[b]	90[b]	2,000	—	9–10
Britain[d]	8,500	148	—	—	—	—	—	—	—	8–15
Germany	17,000	300	17,500	250	8–9,000	4,500[e]	110	5,000[e]	54	15–21
India	15,000	200	17,500[c]	—	—	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' may also describe a battalion-size unit, particularly in West European countries. The term 'group', often used in Latin American countries, is imprecise and may apply to a reinforced battalion or understrength brigade with AFV and/or artillery.)

[c] Infantry division.

[d] Britain has reintroduced the brigade organization, but combat formations are battle groups based on an armoured regiment or mechanized battalion. Armoured division strength will rise to 11,500 on mobilization.

[e] Manpower levels currently under review.

5. Comparisons of Defence Expenditure and Military Manpower 1979–84[a]

Country	Defence Expenditure: $ million[b] 1979	1981	1982	$ per capita 1979	1981	1982	% of government spending 1979	1981	1982	% of GDP/GNP[d] 1979	1982	Numbers in armed forces (000) 1979	1983	1984	Est. reservists[e] (000) 1984	Para-military (000) 1984
Warsaw Pact[f]																
Bulgaria	791	1,011	1,287	90	114	141	n.a.	5.6	5.7	2.3–3.0	2.2–2.9	150.0	162.3	147.3	295.0	172.5
Czechoslovakia	3,743	4,812	3,774	246	314	246	7.3	7.4	7.7	3.4–4.0	2.8–5.2	194.0	204.5	207.3	525.0	131.0
GDR	7,637	9,338	7,312	456	558	434	9.3	8.4	8.4	5.0–8.0	3.7–6.5	159.0	167.0	172.0	635.0	82.5
Hungary	1,146	1,444	1,318	107	135	123	3.7	4.0	4.0	2.4	2.4	104.0	105.0	105.0	143.0	75.0
Poland	4,466	5,696	6,234	127	159	172	5.9	5.2	7.1	3.0	3.6–4.0	317.5	340.0	323.0	500.0	218.0
Romania	1,561	1,509	1,397	71	68	62	3.7	4.2	3.7	2.0	1.4	180.5	189.5	189.5	565.0	37.0
Soviet Union					*see pages 15–17*							3,658.0	5,050.0	5,115.0[g]	5,300.0[g]	80.67m
NATO[h]																
Belgium	3,632	3,385	2,892	369	343	294	9.3	8.8	8.3	3.3	3.4	86.8	94.7	93.6	178.5	16.2
Britain	19,697	24,226	24,296	352	434	436	10.6	10.9	11.4	4.6	5.3	322.9	320.6	325.9	284.5	–
Canada	4,119	5,229	6,182	174	215	251	8.6	9.4	9.8	1.8	2.1	80.0	82.9	82.9	17.5	7.8
Denmark	1,519	1,446	1,400	297	282	274	7.4	6.9	6.6	2.3	2.5	34.7	30.7	31.4	308.0	–
France	22,668	23,867	22,522	424	442	415	17.5	20.4	18.1	3.9	4.2	509.3	492.3	471.4	393.0	85.3
FRG	30,995	29,047	28,453	504	471	462	27.9	28.2	28.2	4.1	4.1	495.0	495.0	495.0	750.0	20.0
Greece	2,424	2,578	2,639	257	265	270	30.4	31.2	25.7	6.3	7.0	184.6	185.0	178.0	350.0	29.0
Italy	7,784	8,681	9,090	137	152	162	7.0	6.4	5.9	2.4	2.6	365.0	373.1	375.1	799.0	116.1
Luxembourg	42	46	41	118	128	115	2.9	3.1	3.2	0.8	1.2	0.7	0.7	0.7	–	0.5
Netherlands	5,038	4,527	4,464	359	318	312	9.6	9.3	9.0	3.2	3.3	114.8	103.0	101.9	175.3	–
Norway	1,454	1,650	1,698	357	402	413	9.3	9.6	9.9	3.1	3.0	39.0	43.2	36.8	295.0	–
Portugal	702	844	803	71	85	80	10.4	10.6	11.3	3.5	3.4	60.5	63.5	63.5	169.0	37.3
Spain	4,546	4,577	4,529	122	122	119	17.4	15.4	14.3	2.3	2.5	321.0	347.0	330.0	1,085.0	110.5
Turkey	1,001	2,815	2,755	69	62	59	15.3	20.4	21.6	4.3	5.2	566.0	569.0	602.0	836.0	125.0
USA[i]	122,279	169,888	196,345	543	739	846	24.2	25.8	27.0	5.1	6.5	2,022.6	2,136.4	2,135.9	1,440.4	154.6
Other Europe																
Austria	876	818	844	117	109	112	4.1	3.8	3.9	1.3	1.3	38.0	50.0	50.0	1,128.0	–
Finland	616	765	862	129	159	179	5.5	5.8	6.1	1.5	1.8	39.9	40.4	56.5	700.0	4.1
Ireland	291	340	352	86	99	101	3.9	3.2	3.1	1.9	2.0	13.9	15.2	13.9	15.7	–
Sweden[j]	3,537	4,038	3,156	427	485	379	8.3	9.6	8.1	3.3	3.6	65.9	680.0	65.7	735.5	500.0
Switzerland	2,054	1,912	2,036	323	297	314	20.6	21.4	21.4	2.2	2.1	18.5	20.0	20.0	625.0	480.0
Yugoslavia	3,025	2,928	3,003	136	130	132	46.3	50.9	61.6	4.9[k]	5.2[k]	259.0	239.7	239.7	500.0	3–5m
Middle East																
Algeria	727	807	848	40	41	42	9.7	9.6	9.2	2.2	1.9	88.8	140.0	130.0	100.0	24.0
Egypt	1,715	2,100	2,495	42	48	56	13.1	15.0	14.9	9.5	8.6	395.0	447.0	460.0	335.0	139.0
Iran[c]	9,938	12,914	15,393	270	331	383	11.5	45.3	46.9	11.5	14.2	n.a.	n.a.	555.0	220–5	2,500
Iraq[c]	2,673	4,572	8,127	213	338	580	n.a.	6.8	n.a.	10.0	n.a.	222.0	517.3	642.5	75.0	654.8
Israel[c]	4,517	5,661	6,879	1,192	1,433	1,711	33.0	38.9	44.6	29.8	35.7	165.6	172.0	141.0	328.0	4.5
Jordan	440	490	462	141	146	132	25.7	24.6	24.8	17.2	12.1	67.2	72.8	76.3	35.0	11.1
Kuwait	992	1,590	1,146	769	1,089	735	16.7	8.4	8.0	4.1	5.7	11.1	12.5	12.5	–	2.4
Lebanon	228	245	162	86	91	59	26.3	20.4	13.0	n.a.	n.a.	8.8	27.0	20.3	–	7.5
Libya	473	557	709	165	180	220	n.a.	n.a.	n.a.	1.8	n.a.	42.0	73.0	73.0	40.0	10.0
Morocco	923	986	1,328	47	48	61	16.6	16.4	20.3	5.8	9.0	98.0	144.0	144.0	–	30.0
Oman	779	1,685	1,714	906	1,832	1,804	40.6	47.5	43.4	22.9	23.8	19.2	23.6	21.5	n.a.	4.0
Qatar	482	896[l]	n.a.[l]	2,097	3,732[l]	n.a.[l]	n.a.	23.8[l]	n.a.[l]	n.a.	n.a.[l]	4.7	6.0	6.0	–	–
Saudi Arabia	13,467	24,254	27,062	1,796	2,602	2,796	32.5	27.7	29.6	20.8	17.7	44.5	51.5	51.5	–	43.5[m]
Sudan	242	318	235	14	17	12	15.1	14.2	14.7	3.2	3.7	62.9	58.0	58.0	–	3.5
Syria	2,110	2,389	2,474	244	257	256	36.6	30.8	29.1	21.1	13.4	227.5	262.5	362.5	460.0	38.8
Tunisia	362	211	239	58	32	36	14.8	8.4	9.8	5.0	3.0	22.3	28.5	30.0	–	8.5
UAE	1,180	2,270	2,430	1,714	3,346	3,690	53.3	45.2	47.4	5.6	9.8	25.2	49.0	43.0	–	n.a.
North Yemen	351	444	527	62	75	87	36.5	23.9	27.6	15.7	16.4	36.6	21.6	36.6	–	25.0
South Yemen	116	162	159	61	80	76	52.5	48.3	n.a.	n.a.	n.a.	20.8	25.5	27.5	–	45.0
Africa																
Cameroon	83	93	97	10	11	11	9.2	7.4	7.7	1.0	1.7	8.5	7.3	7.3	–	5.0
Ethiopia	432	440	n.a.	14	14	n.a.	42.2	34.0	n.a.	11.2	n.a.	221.6	250.5	306.0	–	169.0
Ivory Coast	97	92	93	12	11	11	6.8	6.6	7.2	1.1	1.2	4.9	5.1	6.0	–	5.5
Kenya	209	198	240	20	11	13	14.3	10.2	13.5	4.9	4.2	12.4	16.0	13.7	–	1.8
Nigeria	1,858	1,858	1,671	25	23	20	7.9	10	8.8	2.8	2.5	193.0	133.0	133.0	–	–
South Africa	2,458	2,863	2,676	86	95	86	16.7	16.2	15.4	4.3	3.8	61.3	82.4	83.4	157.0	139.0
Tanzania	505	316	307	28	17	16	30.5	19.1	16.4	11.2	6.3	51.7	40.4	40.4	–	51.4
Zaire	105	n.a.	n.a.	4	n.a.	n.a.	6.8	n.a.	n.a.	1.6	n.a.	20.5	26.0	26.0	–	22.0
Zambia	164	326	n.a.	29	55	n.a.	16.1	22.2	n.a.	4.9	n.a.	14.3	14.3	14.3	–	1.2
Zimbabwe	428	406	385	60	53	51	25.9	17.9	10.3	11.2	5.8	21.5	41.3	41.3	–	33.0
Asia																
Australia	3,373	4,901	5,028	232	328	331	8.9	10.3	10.1	2.8	3.2	70.3	72.4	72.3	32.9	–
Bangladesh	157	153	177	2	2	2	20.1	18.4	20.6	1.4	1.6	76.5	81.3	81.3	–	160.0
Burma	190	180	209	6	5	6	24.3	31.2	35.0	3.6	3.5	169.5	179.0	180.5	–	73.0
China	14,598	9,853	9,464	15	10	9	17.8	15.4	15.8	6.8	4.2	4,360.0	4,100.0	4,000.0	5,000.0	12,000.0
India	4,024	5,264	5,556	6	8	8	20.4	22.6	27.6	3.0	3.3	1,096.0	1,120.0	1,120.0	200.0	262.0
Indonesia	1,653	2,713	2,870	12	18	19	13.7	12.3	12.4	3.2	3.3	239.0	281.0	281.0	–	82.0
Japan	9,120	10,728	10,361	79	91	87	5.3	5.2	5.2	0.9	1.0	241.0	241.0	245.0	43.6	–
North Korea	1,363	1,601	1,724	78	87	92	16.0	14.8	14.6	9.8	10.2	672.0	784.5	784.5	3,300.0	4,138.0
South Korea	3,181	4,285	4,324	85	111	110	29.5	36.3	36.0	5.2	6.0	619.0	622.0	622.0	4,830.0	6,220.0
Malaysia	1,165	2,037	2,132	85	141	144	16.0	17.4	17.7	5.7	8.2	64.5	99.7	124.5	61.2	366.3
New Zealand	345	495	476	111	158	151	4.6	5.3	5.1	1.6	2.0	12.7	12.9	12.7	9.9	–
Pakistan	1,278	1,857	1,829	16	22	21	34.9	51.4	45.6	6.4	7.1	429.0	478.6	478.6	513.0	109.1
Philippines	766	832	910	16	17	18	18.9	13.7	14.8	2.6	2.3	103.0	104.8	104.8	118.0	108.5
Singapore	529	789	922	222	323	373	23.4	20.0	22.9	5.7	n.a.	36.0	55.5	55.5	150.0	37.5
Taiwan	3,197	3,544	3,556	183	195	193	37.7	41.8	42.4	7.9	7.8	539.0	464.0	484.0	2,970.0	25.0
Thailand	1,554	1,669	1,822	34	35	38	29.9	25.8	25.3	5.7	5.0	216.0	235.3	235.3	500.0	72.0
Latin America																
Argentina[c]	2,819	8,557	10,099	102	305	354	16.8	23.1	n.a.	2.7	–	132.9	153.0	153.0	250.0	42.0
Bolivia	108	196	103	20	33	17	16.5	23.2	14.7	2.4	1.7	22.5	28.0	27.6	–	–
Brazil[c]	1,800	1,837	1,838	16	15	14	9.3	8.2	7.4	0.8	n.a.	281.0	277.1	274.0	1,115.0	185.0
Chile	1,031	2,103	n.a.	94	186	n.a.	25.2	31.4	n.a.	5.0	n.a.	85.0	96.0	96.0	24.0	27.0
Colombia	282	374	420	11	13	15	7.0	9.5	9.3	1.0	1.1	67.5	70.2	69.7	70.0	50.0
Cuba	1,168	1,272	1,252	120	131	128	5.6	5.4	7.2	10.6	9.7	189.0	153.0	153.0	190.0	748.5
Dominican Republic	108	118	128	20	21	22	10.7	10.8	12.4	2.0	1.6	18.5	23.0	23.0	–	10.0
Ecuador	186	266	208	23	31	23	15.8	10.6	9.5	2.0	1.7	32.8	36.8	39.3	–	0.5
El Salvador	65	117	139	15	24	28	10.3	15.6	16.9	1.9	3.9	6.9	24.7	41.7	n.a.	79.5
Guatemala	105	130	164	15	17	21	13.4	9.4	14.4	1.5	1.9	18.0	21.6	40.0	–	81.6
Mexico[c]	634	1,412	886	9	20	12	2.2	2.8	2.3	0.5	0.5	100.0	120.5	120.5	–	–
Paraguay	47	88	111	15	27	33	17.4	21.6	24.7	1.4	1.9	15.5	16.0	16.9	25.0	1.5
Peru[c]	535	887	1,626	31	49	87	20.6	19.3	28.1	3.9	8.2	92.0	135.5	135.5	–	32.5
Uruguay	186	390	391	64	133	133	17.6	19.7	17.7	2.5	4.2	27.5	30.5	29.8	–	0.7
Venezuela	700	815	1,152	52	57	78	5.6	3.5	5.0	1.4	1.7	41.5	40.5	44.3	–	20.0

[a] Statistical data is constantly under review. Differences between figures given in this issue of *The Military Balance* and those shown in previous issues may be due as much to re-evaluation as to new information.

[b] Current US dollars. These figures are subject to exchange rate fluctuations. Some military outlays include internal security expenses; in other cases research costs or paramilitary costs are borne by other ministries' budgets (e.g. Ministry of Interior).

[c] Based on local currency. This series is designed to show national trends only. International comparisons may be invalidated by differences in the scope of government sector and in budgetary definitions. Where possible, total government outlays (including development or capital expenditure) have been used.

[d] Based on local currency. See country entries. GDP figures are principally used (especially for NATO); or, in their absence, GNP figures. For Warsaw Pact countries, GNP figures derived from NMP are given. Commercial bank estimates have been used where official GDP/GNP figures were not available.

[e] Countries' systems vary. The figures given may include reservists with recent training, active territorial militia and forces available for later mobilization.

[f] The difficulty of calculating suitable exchange rates makes conversion to dollars and international comparisons imprecise. See also Table 3.

[g] See country entry.

[h] Defence expenditures are based on NATO definitions.

[i] Includes aid to West Berlin.

[j] Derived from Gross Material Product.

[k] 18-month budget 1982–3.

SOVIET AEROSPACE ALMANAC



AIR FORCE

The March issue of AIR FORCE Magazine will once again feature The Soviet Aerospace Almanac—a comprehensive examination of Soviet strategic and tactical aerospace forces, including organization, deployment, doctrine, and concepts . . . key military leaders . . . Soviet R&D . . . military space applications . . . analysis of total military related expenditures . . . statistical data on Soviet aerospace forces and budgets . . . a "Jane's" prepared Gallery of Soviet Aerospace Weapon Systems . . . plus other features . . . a must for military planners . . . a year-round reference issue . . . a great advertising opportunity.

Closing for reservations is January 25, copy by February 6.

JANE'S

ALL THE WORLD'S AIRCRAFT SUPPLEMENT

DECEMBER 1984



Prototype of the new ATR 42 twin-turboprop regional transport under development by Aérospatiale of France and Aeritalia of Italy

ATR

AVIONS DE TRANSPORT RÉGIONAL, 316 route de Bayonne, BP 3107, 31026 Toulouse Cédex, France

Launching of the ATR 42 programme was announced at the beginning of November 1981, following a simultaneous decision on 29 October by the boards of directors of Aérospatiale (France) and Aeritalia (Italy) to go ahead with this new twin-turboprop transport aircraft. The decision was confirmed on 4 November 1981 by the signature of a new co-operative agreement for equal sharing of ATR 42 programme work and costs, and for the setting up of a Groupement d'Intérêt Economique (pooling of common economic interest) to manage the programme. This GIE was formally established on 5 February 1982, and has its headquarters in Toulouse.

ATR corresponds to the initial letters of the French and Italian words for 'regional transport aircraft', and 42 to the seating capacity of the basic aircraft at 81 cm (32 in) pitch. A combined Aérospatiale/Aeritalia design group is working at Toulouse to complete the development of the aircraft; computer-aided design and manufacturing techniques are being used throughout.

ATR 42

The ATR 42 is a high-wing twin-turboprop transport aircraft embodying a number of advanced technology features in the fields of aerodynamics, structures, and equipment. Design is to FAR Pt 25 and to European Joint Airworthiness Requirement JAR 25 for the certification of transport aircraft. Choice of the Pratt & Whitney Canada PW120 turboprop as the aircraft's power plant was announced on 8 June 1981.

Basic design targets are good economy, a high level of field performance, Cat. II instrument landing capability, and a wide-body standard of comfort. The fully pressurised cabin will provide four-abreast seating for up to 50 passengers at 76 cm (30 in) pitch, with a galley, toilet, and two baggage/cargo compartments. Development possibilities include an initial 'stretch' (ATR ST) to carry 58 or 62 passengers, a passenger/cargo version, an all-freight version (ATR 42F), maritime patrol and 'mini-AWACS' versions, and commercial or military transport versions with rear loading capability.

Two development aircraft have been built, plus one static and one fatigue test airframe. First flight was made by F-WEGA on 16 August 1984; the second aircraft was flown during October. US (FAR Pt 25) and European (JAR 25) certification is anticipated in the third quarter of 1985, to enable deliveries to begin in the fourth quarter of that year.

Aeritalia is responsible for the entire fuselage, including the tail unit and landing gear; and for the hydraulic, air-conditioning and pressurisation systems. Aérospatiale undertakes design and construction of the wings; layout of the flight deck and cabin; and is also responsible for power plant, electrical system, flight controls and de-icing system installation, and for final assembly and flight testing of the civil passenger versions. Aeritalia will assemble and flight test any cargo/military variants with a rear loading ramp. Initial production plans are for an output of 11 aircraft by the end of 1985, 28 in 1986, and 38 in 1987. Construction of the first 50 aircraft has been authorised, and approval for the next 25 was expected in the Autumn of 1984.

By August 1984 Aérospatiale and Aeritalia had received a total of 41 firm orders and 18 options for the ATR 42.

TYPE: Twin-turboprop regional transport aircraft.

WINGS: Cantilever high-wing monoplane. Aérospatiale RA-XXX-43 wing section, derived from NACA 43 series, with thickness/chord ratio of 18% at root and 13% at tip. Two-spar fail-safe metal wings, constructed of aluminium alloys, with leading-edges of Nida Nomex glassfibre sandwich. Constant chord centre-section and tapered outer panels. Dihedral 2° 30′ on outer panels. No sweepback at quarter-chord. Two-segment double-slotted single-rotation flaps, each segment with its own Ratier-Figeac hydraulic actuator, on each trailing-edge. Ailerons actuated mechanically by cables and push/pull rods; no servos. Flaps and ailerons of carbon/epoxy construction, with aluminium frames and spars. Electrically actuated automatic trim tab in each aileron. Kléber-Colombes pneumatic de-icing of leading-edges outboard of engine nacelles.

FUSELAGE: Conventional semi-monocoque fail-safe structure of light alloy unit construction, employing main and secondary frames and longitudinally disposed skin panels. Basically circular cross-section throughout most of length. Crew, passenger, and baggage/cargo compartments pressurised.

TAIL UNIT: Cantilever structure, with sweptback vertical surfaces (attached to rearmost fuselage frame) and non-swept horizontal surfaces. Fixed incidence tailplane mounted near tip of fin. Construction mainly of aluminium alloys, with fin and tailplane leading-edges of Nida Nomex glassfibre sandwich. Mechanically actuated mass balanced rudder and elevators. Electrically actuated automatic trim tab in rudder and each elevator. Kléber-Colombes pneumatic de-icing of tailplane leading-edges.

LANDING GEAR: Hydraulically retractable tricycle type, of Messier-Hispano-Bugatti/Magnaghi/Nardi trailing-arm design, with twin wheels and oleo-pneumatic shock absorber on each unit. Nose unit retracts forward, main units inward into fuselage and large underfuselage fairing. Goodyear multi-disc brakes and Hydro-Aire anti-skid units on main gear. No brake cooling. Goodyear mainwheel tyres, size 32 × 8.8-10PR, pressure 7.17 bars (104 lb/sq in). Low pressure tyres optional, requiring modification to underfuselage fairing. Goodyear nosewheel tyres, size 450 × 190-5TL, pressure 4.14 bars (60 lb/sq in).

POWER PLANT: Two Pratt & Whitney Canada PW120 turboprop engines, each flat rated at 1,342 kW (1,800 shp) and driving a Hamilton Standard 14SF four-blade propeller with composite material blades. Fuel in two integral tanks formed by wing spar box, total capacity 5,700 litres (1,254 Imp gallons). Single pressure refuelling point in starboard wing leading-edge. Gravity refuelling points in wing upper surface. Oil capacity 40 litres (8.8 Imp gallons).

ACCOMMODATION: Crew of two on flight deck, with optional third seat for observer. Seating for 42 passengers at 81 cm (32 in) pitch; or 46, 48, or 50 passengers at 76 cm (30 in) pitch, in four-abreast layout with central aisle. Passenger door, with integral steps, at rear of cabin on port side. Main baggage/cargo compartment between flight deck and passenger cabin, with access from inside cabin and separate loading door on port side. Rear baggage/cargo compartment, toilet, galley, wardrobe, and seat for cabin attendant, aft of passenger cabin, with service door on starboard side. Additional baggage space provided by overhead bins and underseat stowage. Entire accommodation, including baggage/cargo compartments, pressurised and air-conditioned. Passenger/cargo version (42 passengers or five LD3 containers) fitted with ball transfer plates aft, roller tracks, and anti-crash net at front of cabin. Emergency escape hatch for crew in roof of flight deck. Emergency exit via rear passenger and service doors, and by additional exits on each side at front of cabin.

SYSTEMS: Garrett air-conditioning and Softair pressurisation systems, utilising engine bleed air. Pressurisation system (max differential 0.41 bars; 6.0 lb/sq in) provides cabin altitude of 2,000 m (6,560 ft) at flight altitudes of up to 7,620 m (25,000 ft), and a sea level cabin environment at flight levels up to 4,025 m (13,200 ft). Two independent hydraulic systems, each driven by an electrically operated Abex pump and separated by an interconnecting valve controlled from the flight deck, for actuation of wing flaps, landing gear, propeller braking, wheel brakes, and nosewheel steering. Kléber-Colombes pneumatic system for de-icing of outer wing leading-edges, tailplane leading-edges, and engine air intakes. Main electrical system is 28V DC, supplied by two Auxilec 12kW engine driven starter/generators and a 43Ah nickel-cadmium battery, with two solid state static inverters for 115/26V single-phase AC supply, and a third (standby) inverter for 115V only. A 115/200V three-phase supply from two 20kVA frequency-wild engine driven alternators is used for anti-icing of windscreen, flight deck side windows, stall warning and airspeed indicator pitots, and for de-icing of pitot tubes, propeller blades, and spinners. Garrett APU optional.

AVIONICS: King Gold Crown III com/nav equipment standard. Collins Pro Line II optional. Other standard avionics include Sperry autopilot/flight director, Sperry P-800 weather radar, dual Sperry air data computers and attitude/heading reference system with ASCB, GPWS, radio altimeter, and DFDR. Electronic flight instrumentation system (R/Nav, microwave landing system, Omega nav, and HF com) optional. Standard avionics package includes two VHF, two VOR/ILS/marker beacon receivers, radio compass, radio altimeter, DME, ATC transponder, cockpit voice recorder, intercom, PA system, and equipment to FAR Pt 121.

DIMENSIONS, EXTERNAL:

Wing span	27.05 m (88 ft 9 in)
Wing chord:	
at root	2.57 m (8 ft 5¼ in)
at tip	1.41 m (4 ft 7½ in)
Wing aspect ratio	11.08
Length overall	26.30 m (86 ft 3½ in)
Fuselage: Max width	2.865 m (9 ft 4½ in)
Height overall	7.586 m (24 ft 10¼ in)
Tailplane span	7.31 m (23 ft 11¾ in)
Wheel track (c/l of shock struts)	4.10 m (13 ft 5½ in)
Wheelbase	8.78 m (28 ft 9¼ in)
Propeller diameter	3.96 m (13 ft 0 in)
Distance between propeller centres	8.10 m (26 ft 7 in)
Propeller/fuselage clearance	0.82 m (2 ft 8¼ in)
Passenger door (rear, port):	
Height	1.75 m (5 ft 9 in)
Width	0.75 m (2 ft 5½ in)
Height to sill (at OWE)	1.375 m (4 ft 6¼ in)
Service door (rear, stbd):	
Height	1.22 m (4 ft 0 in)
Width	0.61 m (2 ft 0 in)
Height to sill	1.375 m (4 ft 6¼ in)
Cargo/baggage door (fwd, port):	
Height	1.53 m (5 ft 0¼ in)
Width	1.275 m (4 ft 2¼ in)
Height to sill (at OWE)	1.15 m (3 ft 9¼ in)
Emergency exits (fwd, each):	
Height	0.91 m (3 ft 0 in)
Width	0.51 m (1 ft 8 in)
Crew emergency hatch (flight deck roof):	
Length	0.51 m (1 ft 8 in)
Width	0.483 m (1 ft 7 in)



The ATR 42 is powered by two of Pratt & Whitney's new PW120 turboprops

DIMENSIONS, INTERNAL:

Cabin: Length (excl flight deck, incl baggage compartments)	13.85 m (45 ft 5¼ in)
Max width	2.57 m (8 ft 5¼ in)
Max width at floor	2.26 m (7 ft 5 in)
Max height	1.91 m (6 ft 3¼ in)
Volume	44.8 m³ (1,582 cu ft)
Baggage/cargo compartment volume:	
front (max)	5.8 m³ (204.8 cu ft)
front (50 passengers)	3.5 m³ (123.6 cu ft)
rear	2.7 m³ (95.3 cu ft)
overhead bins	1.5 m³ (53 cu ft)

AREAS:

Wings, gross	54.5 m² (586.6 sq ft)
Vertical tail surfaces (total, excl dorsal fin)	12.5 m² (134.5 sq ft)
Horizontal tail surfaces (total)	10.3 m² (110.9 sq ft)

WEIGHTS AND LOADINGS:

Operating weight empty (incl FAR 121 equipment)	9,609 kg (21,184 lb)
Max fuel load	4,500 kg (9,920 lb)
Max payload	4,891 kg (10,782 lb)
Max T-O weight	15,750 kg (34,725 lb)
Max ramp weight	15,770 kg (34,765 lb)
Max zero-fuel weight	14,500 kg (31,965 lb)
Max landing weight	15,300 kg (33,730 lb)
Max wing loading	288.9 kg/m² (59.17 lb/sq ft)
Max power loading	5.87 kg/kW (9.64 lb/shp)

PERFORMANCE (estimated, to FAR Pt 25, incl Amendment 42, PW120 engines, ISA, except where indicated):

Max cruising speed at 6,100 m (20,000 ft) 275 knots (510 km/h; 317 mph)

Normal max operating speed Mach 0.55 (250 knots; 463 km/h; 288 mph CA
Stalling speed:
flaps up 96 knots (178 km/h; 111 mph)
53° flap 72 knots (133 km/h; 83 mph)
Max rate of climb at S/L 567 m (1,860 ft)/min
Rate of climb at S/L, one engine out 198 m (650 ft)/min
Cruise ceiling (91.5 m; 300 ft/min rate of climb) 7,620 m (25,000 ft)
Service ceiling, one engine out, at 97 per cent of max T-O weight, ISA 4,025 m (13,200 ft)
T-O balanced field length at max T-O weight:
at S/L 1,080 m (3,545 ft)
at 915 m (3,000 ft) (ISA + 10°C) 1,315 m (4,315 ft)
Landing field length at S/L, at max landing weight 960 m (3,150 ft)
Min ground turning radius 17.08 m (56 ft 0½ in)
Max range with 46 passengers, reserves for 87 nm (161 km; 100 mile) diversion and 45 min hold 950 nm (1,760 km; 1,094 miles)
Range with max fuel, reserves as above 2,500 nm (4,633 km; 2,878 miles)
Block time for 200 nm (370 km; 230 mile) stage length at max cruising speed at 6,100 m (20,000 ft), IFR reserves 55 min
Block fuel for above 456 kg (1,005 lb)

SUKHOI

SUKHOI DESIGN BUREAU; USSR

Information received by *Jane's* suggests that designations quoted in the West for some current Soviet combat aircraft do not conform with those used by the Soviet authorities. For example, versions of the variable geometry 'Fitter' tactical fighter in current Soviet service appear to be designated Su-20 and Su-22, whereas these designations were believed to be applicable only to export models. The following revised entry gives what is believed to be correct information on these important aircraft:

SUKHOI Su-17, Su-20, and Su-22

NATO reporting names: Fitter-C, D, E, F, G, H, and J

The prototype of this variable geometry fighter series, designated S-22I or Su-7IG (*Izmenyaemaya Geometriya:* variable geometry), was an R&D aircraft shown at the Soviet Aviation Day display at Domodedovo Airport, Moscow, in July 1967, and was allocated the NATO reporting name 'Fitter-B'. Only some 4.0 m (13 ft) of each wing was pivoted, outboard of a very large fence, the remainder of the airframe being virtually identical with that of the Su-7. An attachment for an external store was built into each wing fence, but the Lyulka AL-7 power plant was unchanged and there was no reason to expect 'Fitter-B' to form the basis of a production aircraft, in view of the modest improvement in overall performance offered by such minimal modification.

Discovery of two squadrons of 'improved Fitter-Bs' in service with the Soviet tactical air forces in 1972 came as a surprise, suggesting that even a small increase in range and endurance by comparison with the Su-7 was considered worthwhile. These initial aircraft were designated **Su-17** in the Soviet Union. They retained the AL-7 engine of the Su-7, had a Sirena 2 radar warning antenna on the fin tip and a parachute brake. After familiarising Soviet pilots to the new design, the Su-17s were exported to Egypt.

They were followed by a new version designated Su-20, with a more powerful engine. Combined with the variable geometry wings, this permitted a doubled external load to be lifted from strips little more than half as long as those needed by the Su-7, and to be carried about 30% further. Added to new avionics, this made the variable geometry 'Fitters' so attractive that about 800 are deployed currently by Soviet tactical air forces, and 35 more by Soviet Naval Aviation units assigned to anti-shipping strike and amphibious support roles in the Baltic Sea area.

Differences between the various uprated versions are as follows:

Su-20 (Fitter-C). Basic single-seat attack aircraft for Soviet tactical air forces, with Lyulka AL-21F-3 turbojet, offering better specific fuel consumption than AL-7F-1 of Su-17. Manual wing sweep control. Additional wing fence on fixed centre-section each side. Curved dorsal fin between tail fin and dorsal spine fairing. Rear fuselage of basically constant diameter between wing and tailplane. Serves also with Soviet Navy. Generally similar aircraft, usually with reduced equipment standard, supplied to Algeria, Czechoslovakia, Iraq, Poland and Viet-Nam.

Su-20M (Fitter-D). Generally similar to 'Fitter-C', but forward fuselage lengthened by about 0.38 m (1 ft 3 in). Added undernose radome for terrain avoidance. Laser marked target seeker in intake centrebody.

Su-20U (Fitter-E). Tandem two-seat trainer for Soviet Air Force. Generally similar to 'Fitter-C' but entire fuselage forward of wing drooped slightly to improve view from rear seat. Port wing root gun deleted.

Su-22 (Fitter-F). Generally similar to 'Fitter-D', with undernose radome, but powered by Tumansky R-29B turbojet, rated at 112.8 kN (25,350 lb st) with afterburning, in increased-diameter rear fuselage. Gun in each wing root. Weapons include 'Atoll' air-to-air missiles. Operators include Soviet and Peruvian Air Forces.

Su-22U (Fitter-G). Developed two-seater, with combat capability. R-29B engine in bulged rear fuselage. Deepened dorsal spine fairing. Drooped front fuselage like 'Fitter-E'. Taller fin with straight top. Shallow ventral fin. Starboard gun only. Laser target seeker fitted in intake centrebody.

Su-22BM (Fitter-H). Improved single-seater with R-29B engine for Soviet tactical air forces. Wide and deep dorsal fairing aft of canopy, almost certainly providing additional fuel tankage. Taller fin of 'Fitter-G', with dorsal fin. Terrain avoidance radar fitted internally in deepened undersurface of nose. Retains both wing root guns. Additional inboard pylon for AS-7 (NATO 'Kerry') air-to-surface missile, or other external store, underwing centre-section on each side. Exported to Libya.

Su-22BKL (Fitter-J). Generally similar to 'Fitter-H', with Tumansky engine. Small ventral fin and angular dorsal fin. 'Atoll' air-to-air missiles. Operators include the air forces of Czechoslovakia, Libya, Peru, Syria, Viet-Nam, North and South Yemen, as well as the Soviet Union.

The following description applies to the Su-20 ('Fitter-C'):

TYPE: Single-seat ground attack fighter.

WINGS: Cantilever mid-wing monoplane, with wide span fixed centre-section and manually operated variable geometry outer panels, with min sweep angle of 28° and max sweep angle of 62° approx. Centre-section appears to be generally similar to inner wings of Su-7, except for slight sweepback on trailing-edge of area-increasing centre-section flaps. Outboard of these flaps, centre-section trailing-edge is swept to align with trailing-edge of outer panels when they are fully swept. Full span leading-edge slats on movable panels. Entire trailing-edge of each movable panel made up of a slotted flap, operable only when the wings are spread, and a slotted aileron operable at all times. Large main fence on each side, at junction of fixed and movable panels, is square-cut at front and incorporates attachments for external stores. Shorter fence above centre-section on each side, inboard of main fence.

FUSELAGE: Conventional all-metal semi-monocoque structure of circular section. Large dorsal spine fairing along top of fuselage, from canopy to fin. Ram air intake in nose, with variable shock-cone centrebody. Four door type airbrakes, at top and bottom on each side of rear fuselage, forward of tailplane. Pitot on port side of nose; transducer to provide data for fire control computer on starboard side.

TAIL UNIT: Cantilever all-metal structure, with sweepback on all surfaces. All-moving horizontal surfaces, with anti-flutter body projecting forward on each side near tip. Conventional rudder. No tabs.

LANDING GEAR: Retractable tricycle type, with single wheel on each unit. Nosewheel retracts forward, requiring blistered door to enclose it. Main units retract inward into centre-section. Container for twin brake-chutes between base of rudder and tailpipe.

POWER PLANT: One Lyulka AL-21F-3 turbojet engine, rated at 76.5 kN (17,200 lb st) dry and 110 kN (24,700 lb st) with afterburning. Fuel capacity increased to 4,550 litres (1,000 Imp gallons) by added tankage in dorsal spine fairing. Provision for carrying up to four 800 litre (176 Imp gallon) drop tanks on outboard wing pylons and under fuselage. When underfuselage tanks are carried, only the two inboard wing pylons may be used for ordnance, to a total weight of 1,000 kg (2,204 lb).

ACCOMMODATION: Pilot only, on ejection seat, under rearward hinged transparent canopy. Rear-view mirror above canopy.

AVIONICS AND EQUIPMENT: SRD-5M (NATO 'High Fix') I-band ranging radar in intake centrebody; ASP-5ND fire control system; Sirena 3 radar homing and warning system providing 360° coverage, with antennae in slim cylindrical housing above brake-chute container and in each centre-section leading-edge, between fences; SRO-2M IFF; SOD-57M ATC/SIF, with transponder housing beneath brake-chute container; RSIU-5/R-831 VHF/UHF and R5B-70 HF.

ARMAMENT: Two 30 mm NR-30 guns, each with 70 rds, in wing root leading-edges. Total of eight weapon pylons (two tandem pairs under fuselage, one under each centre-section leading-edge, one under each main wing fence) for up to 3,000 kg (6,615 lb) of bombs, including nuclear weapons, rocket pods, and guided missiles such as the air-to-surface AS-7 (NATO 'Kerry').



Sukhoi Su-22BM ('Fitter-H') of the Libyan Air Force *(US Navy)*

DIMENSIONS, EXTERNAL (estimated):
- Wing span:
  - fully spread: 14.00 m (45 ft 11¼ in)
  - fully swept: 10.60 m (34 ft 9½ in)
- Wing aspect ratio: fully spread: 4.9
  - fully swept: 3.0
- Length overall, incl probes: 18.75 m (61 ft 6¼ in)
- Fuselage length: 15.40 m (50 ft 6¼ in)
- Height overall: 4.75 m (15 ft 7 in)

AREAS (estimated):
- Wings, gross:
  - fully spread: 40.1 m² (431.6 sq ft)
  - fully swept: 37.2 m² (400.4 sq ft)

WEIGHTS (estimated):
- Weight empty: 10,000 kg (22,046 lb)
- Max internal fuel: 3,700 kg (8,157 lb)
- T-O weight, 'clean': 14,000 kg (30,865 lb)
- Max T-O weight: 17,700 kg (39,020 lb)

PERFORMANCE (estimated for 'clean' aircraft, 60% internal fuel, except where indicated):
- Max level speed at height: Mach 2.09
- Max level speed at S/L: Mach 1.05
- Touchdown speed: 143 knots (265 km/h; 165 mph)
- Max rate of climb at S/L: 13,800 m (45,275 ft)/min
- Service ceiling: 18,000 m (59,050 ft)
- T-O run at AUW of 17,000 kg (37,478 lb): 620 m (2,035 ft)
- T-O to 15 m (50 ft) at AUW of 17,000 kg (37,478 lb): 835 m (2,740 ft)
- Landing run: 600 m (1,970 ft)
- Combat radius with 2,000 kg (4,409 lb) external stores:
  - hi-lo-hi: 340 nm (630 km; 391 miles)
  - lo-lo-lo: 195 nm (360 km; 224 miles)

HAL

HINDUSTAN AERONAUTICS LTD (Bangalore Complex), Indian Express Building, Dr Ambedkar Veedhi, PO Box 5150, Bangalore 560 001, India

HAL HTT-34

Exhibited publicly for the first time at the 1984 Farnborough International Air Show, the HTT-34 is a private venture development of the piston engined HPT-32 ab initio trainer currently in production for the Indian Air Force. First flown on 17 June 1984, the HTT-34 is the third prototype HPT-32 (X2335), retrofitted with an Allison 250-B17D turboprop engine. The airframe is basically unchanged aft of the firewall, but it is intended to convert the fixed tricycle landing gear to retractable configuration at an early stage in the development programme.

The HTT-34 is designed to meet the requirements of FAR Pt 23, is fully aerobatic, and can be used for a wide range of ab initio training duties. In addition, it can be used for communications, search and rescue, reconnaissance, glider towing, and sport flying.

TYPE: Two-seat ab initio trainer, with optional third seat.

WINGS: Cantilever low-wing monoplane. Wing section NACA $64A_1$-212. Dihedral 5° from roots. Incidence 2° 30' at root. No sweepback. Light alloy safe-life wings, of tapered planform, with stressed skin. Light alloy plain ailerons and plain trailing-edge flaps. Balance tab in, and ground adjustable tab on, each aileron.

FUSELAGE: Semi-monocoque safe-life structure of light alloy, with stressed skin.

TAIL UNIT: Cantilever light alloy stressed skin structure, with sweptback vertical surfaces. One-piece elevator. Trim tabs in rudder and starboard half of elevator; balance tabs in rudder and port half of elevator.

LANDING GEAR: Non-retractable (initially) tricycle type, with HAL oleo-pneumatic shock absorber in each unit. Dunlop tyres on all wheels (main size 6.00-6.5, nose size 5.00-5); pressure 2.76–3.10 bars (40–45 lb/sq in) on main units, 2.07–2.41 bars (30–35 lb/sq in) on nose unit. Hydraulic disc brakes on mainwheels.

POWER PLANT: One 313 kW (420 shp) Allison 250-B17D turboprop engine, driving a Hartzell three-blade constant-speed fully-feathering propeller with reverse pitch capability. Total of 220 litres (48.4 Imp gallons) of fuel in four flexible tanks (two in each wing), plus a 9 litre (2 Imp gallon) collector tank in fuselage. Total fuel capacity 229 litres (50.4 Imp gallons).

ACCOMMODATION: Side by side seats for two persons in front, with provision at rear for optional third seat or 20 kg (44 lb) of baggage with tiedown facilities. Rearward sliding jettisonable framed canopy. Front seats adjustable in height by 127 mm (5 in). Full dual controls, and adjustable rudder pedals, for instructor and pupil. Cockpit ventilated.

AVIONICS: VHF com, UHF com, and ADF.

DIMENSIONS, EXTERNAL:
- Wing span: 9.50 m (31 ft 2 in)
- Wing chord:
  - at root: 2.24 m (7 ft 4¼ in)
  - at tip: 0.92 m (3 ft 0¼ in)
- Wing aspect ratio: 6.02
- Length overall: 8.07 m (26 ft 5¾ in)
- Fuselage: Max width: 1.25 m (4 ft 1¼ in)
- Height overall: 2.88 m (9 ft 5½ in)
- Tailplane span: 3.60 m (11 ft 9¾ in)
- Wheel track: 3.45 m (11 ft 4 in)
- Wheelbase: 2.10 m (6 ft 10¾ in)
- Propeller diameter: 2.13 m (7 ft 0 in)
- Propeller ground clearance (static): 0.24 m (9½ in)

AREAS:
- Wings, gross: 15.00 m² (161.5 sq ft)
- Ailerons (total): 1.04 m² (11.19 sq ft)
- Trailing-edge flaps (total): 1.82 m² (19.59 sq ft)
- Vertical tail surfaces (above fuselage reference line): 2.06 m² (22.17 sq ft)
- Rudder (aft of hinge line), incl tabs: 0.75 m² (8.07 sq ft)
- Tailplane: 3.02 m² (32.51 sq ft)
- Elevator (aft of hinge line), incl tabs: 1.08 m² (11.63 sq ft)

WEIGHTS AND LOADINGS:
- Weight empty: 855 kg (1,884 lb)
- Max T-O weight: 1,220 kg (2,689 lb)
- Max wing loading: 81.3 kg/m² (16.7 lb/sq ft)
- Max power loading: 3.89 kg/kW (6.40 lb/shp)

PERFORMANCE (at max T-O weight, ISA):
- Max level speed:
  - at S/L: 170 knots (315 km/h; 195 mph)
  - at 3,050 m (10,000 ft): 140 knots (260 km/h; 161 mph)
- Stalling speed, engine idling:
  - flaps up: 62 knots (115 km/h; 72 mph)
  - flaps down: 58 knots (108 km/h; 67 mph)
- Max rate of climb at S/L: 633 m (2,076 ft)/min
- Service ceiling: 7,925 m (26,000 ft)
- T-O to 15 m (50 ft): 275 m (904 ft)
- Landing from 15 m (50 ft):
  - without propeller reversal: 472 m (1,546 ft)
  - with propeller reversal: 200 m (656 ft)
- Range with max fuel at 3,050 m (10,000 ft): 243 nm (450 km; 279 miles)
- Endurance with max fuel at 3,050 m (10,000 ft): 2 h 30 min
- *g* limits: +6/−3

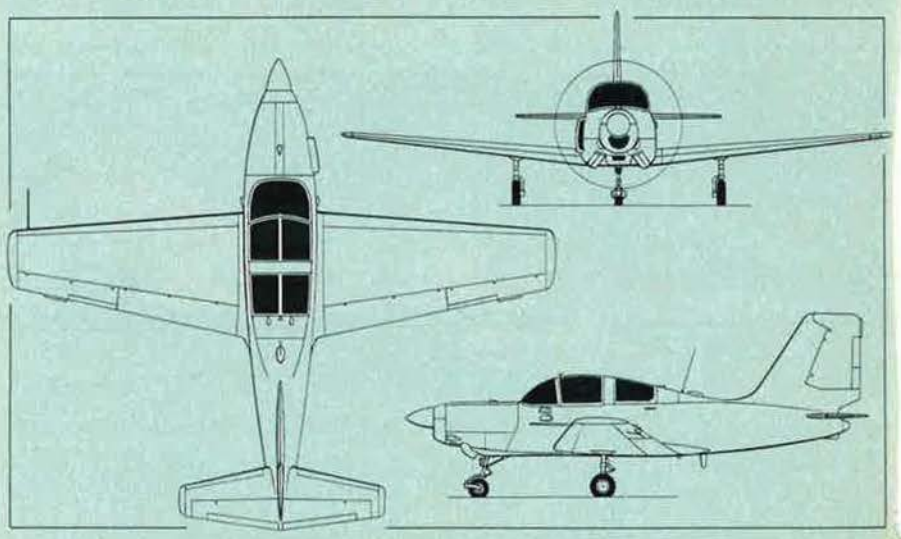


HAL's new HTT-34 ab initio trainer is a turboprop development of the piston engined HPT-32

CALAC

LOCKHEED-CALIFORNIA COMPANY; Burbank, California 91520, USA

In addition to producing the P-3 Orion landbased anti-submarine warfare aircraft, TR-1 high-altitude tactical surveillance and reconnaissance aircraft, and components for Lockheed-Georgia's C-5B Galaxy transport, Lockheed-California is engaged on



The two/three-seat HAL HTT-34 made its debut at the 1984 Farnborough Air Show in England
(Pilot Press)

several research and development programmes. Some are highly classified; details of others have recently been received:

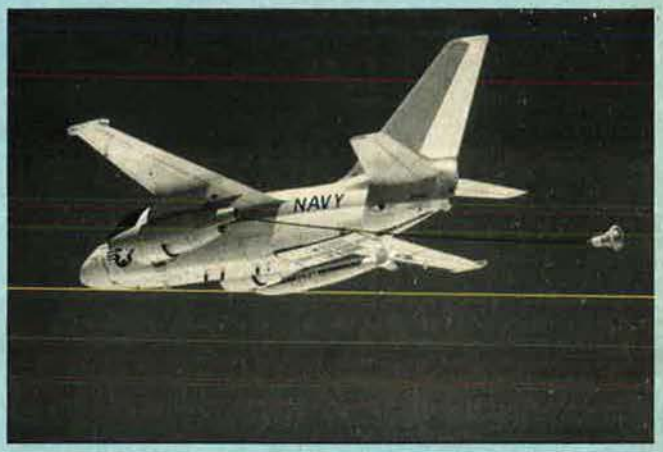
LOCKHEED P-3 (AEW&C)

Combat experience in places like the Bekaa Valley in Lebanon, and the Falkland Islands, has emphasised the key importance of airborne early warning and control (AEW&C) aircraft, to locate precisely and track incoming enemy attack forces, and to direct friendly tactical and air defence aircraft to their targets. In an effort to provide an effective AEW&C system at a more affordable cost than aircraft currently available, Lockheed-California has adapted an ex-Royal Australian Air Force P-3B Orion to carry above its fuselage a 7.32 m (24 ft) diameter Randtron AN/APA-171 rotodome (rotating saucer radome) similar to that fitted to the US Navy's Grumman E-2C Hawkeyes, to house the antenna for General Electric's latest AN/APS-138 search radar.

First flight of this prototype (N91LC) was made on 14 June 1984. After aerodynamic flight testing has been completed, the specialised radar and avionics will be added in 1985, to establish the operational performance capability of the system. The earlier AN/APS-125 radar, from which the APS-138 is developed, is able to detect targets as small as a cruise missile at ranges in excess of 145 nm (268 km; 167 miles), and to monitor movement of enemy ships and land vehicles. Lockheed claims a 14 hour endurance for the P-3 (AEW&C), for which it believes potential customers include Australia, Canada, Japan, and the US Navy. Deliveries could begin 28 months after receipt of adequate orders to make production viable.



The AN/APA-171 rotodome of the P-3 (AEW&C) is similar to that fitted to the US Navy's E-2C Hawkeye



Lockheed S-3A Viking equipped as a 'buddy' in-flight refuelling tanker, with hose and drogue streamed



First Lockheed Viking anti-submarine aircraft updated to S-3B standard began flight testing on 13 September

LOCKHEED VIKING

US Navy designation: S-3

Production of 187 **S-3As** (see 1978–79 *Jane's*) for the US Navy ended in mid-1978. All tooling was then placed in storage at Burbank pending a US Navy decision on further orders, and in early 1980 demonstrator versions of the **US-3A** (COD) and **KS-3A** (tanker) were evaluated by the Navy. In 1982 three of the earlier production S-3As were modified to US-3A configuration. The sole KS-3A was also converted to US-3A configuration in late 1983.

As an alternative to the KS-3A dedicated tanker configuration, tests of an S-3A with a 'buddy' refuelling pack under its port wing were conducted in 1984. This technique, which transfers fuel from the tanker's standard internal tanks, and an external tank under the starboard wing, without affecting its multi-mission capability, may be adopted for operational use.

Lockheed announced on 18 August 1981 the receipt of a full scale engineering development contract, from the US Naval Air Systems Command, for an improved avionics system for S-3A Vikings currently in service with the US Navy. With initial funding of $14.5 million, it follows a contract awarded by the Navy in 1980, under which Lockheed-California developed the specifications for an S-3A weapons system improvement programme (WSIP).

Aircraft modified under the WSIP are redesignated **S-3B.** Improvements include increased acoustic processing capacity, expanded electronic support measure capability, better radar processing, a new sonobuoy telemetry receiver system, and provisions for the Harpoon missile. It is anticipated that a total of 160 S-3As could be retrofitted under the programme. Two S-3As are being modified initially, the first of which has been upgraded and delivered to Palmdale for ground and flight testing. Redelivery to the US Navy is scheduled for October 1985. To equip a projected 15-carrier fleet, Lockheed has also submitted proposals for follow-on production of 82 or 103 new S-3Bs.

AVIONICS, ARMAMENT, AND OPERATIONAL EQUIPMENT (S-3B): Proteus acoustic signal processor; modified Sanders AN/OL-82A post display processor, integrated with IBM AN/UYS-1; updated Sperry Univac AYK-10 air data computer, interfaced with Harpoon air-to-surface missile and other new systems; improved electronic support measures (ESM); Hazeltine AN/ARR-78 sonobuoy receiver system; improved version of Texas Instruments AN/APS-116 radar, incorporating inverse synthetic aperture radar (ISAR) techniques; modified Goodyear AN/ALE-39 chaff/flare dispensing system; and provision for carrying McDonnell Douglas Harpoon standoff air-to-surface missiles.

FOKKER

FOKKER BV, PO Box 1065, 1000 BB, Amsterdam, Netherlands

FOKKER F27 (SURVEILLANCE VERSIONS)

A maritime patrol version of the F27 Friendship transport aircraft, designed to meet the requirements of various coastal agencies throughout the world which require a cost-effective surveillance aircraft for coastal patrol, fishery protection, search and rescue, and similar offshore duties, was defined by Fokker in July 1975; shortly afterwards the company began converting an ex-airline F27 to serve as a prototype/demonstration aircraft (PH-FCX). This prototype made its first flight in February 1976.

Two maritime and two other surveillance versions are now available, as follows:

F27 Maritime. Basic unarmed maritime patrol version, for duties which include coastal surveillance, search and rescue, and environmental control. It is operated by a crew of up to six persons, and its standard fuel capacity gives it an endurance of 10–12 hours, or a range of up to 2,700 nm (5,000 km; 3,107 miles) depending on the mission. Ordered by Peruvian Navy (two), and air forces of Angola (one), Netherlands (two), Nigeria (two), Philippines (three), and Spain (three). Three others, for Royal Thai Navy, are equipped to carry armament, but are not to full Maritime Enforcer standard.

Maritime Enforcer. Maritime version for armed surveillance, anti-submarine, and anti-shipping warfare, with more comprehensive avionics and provisions for carrying external stores (armament chosen and installed by operator). Available with Mk 536-7R or Mk 552 Dart engines, as in standard F27.

Sentinel. Border surveillance and standoff reconnaissance version. Primary sensor is a Motorola AN/APS-135(V) side-looking airborne multi-mode radar (SLAMMR), mounted in an underfuselage pod. Equipped with Doppler moving target indication, and flying at an altitude of 5,490 m (18,000 ft), this can detect large targets up to 81 nm (150 km; 93 miles) distant, or smaller targets at up to 48 nm



Revealed at the 1984 Farnborough Air Show, the Fokker Sentinel is a border surveillance and standoff reconnaissance version of the well known F27 Friendship airliner

(90 km; 56 miles). Onboard data processing via colour CRT display. Standoff photography with Litton/Itek KA-102 long-range oblique photography (LOROP) system, or a Vinten pod containing 70 mm vertical and oblique cameras or an infra-red linescan. Options include an automatic computerised COMINT (communications intelligence) system to intercept, record, and analyse radio signals in the 20–1,000MHz frequency band.

Kingbird. Proposed AEW version, with modified Hughes Aircraft AN/AWG-9 surveillance radar in semi-retractable ventral radome. Capability includes pulse-Doppler search and acquisition modes (for all aircraft within a 120 nm; 222 km; 138 mile radius), plus track-while-scan of up to 24 targets simultaneously. ESM to detect and identify radar-emitting targets within surveillance area. Reduced fuel load.

TYPE: Twin-turboprop surveillance aircraft.

WINGS, FUSELAGE, AND TAIL UNIT: As for standard F27, except that airframe is heavily treated with anti-corrosive measures; in tail unit, only the port elevator has a trim tab; and 'teardrop' windows are fitted to the flight deck.

LANDING GEAR: Retractable tricycle type, as for standard F27 except for tyre pressures of 5.52 bars (80 lb/sq in) on main units and 3.80 bars (55 lb/sq in) on nose unit. With long-stroke main gear fitted, pressure in the low-pressure mainwheel tyres is 4.50 bars (65 lb/sq in), and in tyre on the levered suspension nose unit is 3.80 bars (55 lb/sq in).

POWER PLANT: Two Rolls-Royce Dart turboprop engines, as in standard F27. Four-blade Dowty Rotol propellers. Integral fuel tanks in outer wings, total capacity 5,140 litres (1,130 Imp gallons: 1,357 US gallons). Overwing (gravity) and pressure refuelling. Additional centre-wing tank of 2,310 litres (508 Imp gallons; 610 US gallons) capacity, and two 938 litre (206.5 Imp gallon; 248 US gallon) tanks on underwing pylons, giving overall total fuel capacity of 9,326 litres (2,051 Imp gallons; 2,463 US gallons). Methyl bromide fire extinguishing system, with flame detectors. Water-methanol tank in each engine nacelle, combined capacity 303 litres (67 Imp gallons; 80 US gallons).

ACCOMMODATION: Flight deck seats two pilots side by side, with folding seat for third crew member if required. Main cabin of F27 Maritime fitted out as tactical compartment (for two to four operators), containing advanced avionics, galley, toilet, and crew rest area. Maritime Enforcer accommodates crew of seven including two pilots: tactical co-ordinator (TACCO) responsible for off-airways navigation and overall efforts of mission crew; acoustic sensor operator (ASO) to handle active and passive sonobuoys, acoustic receivers, and processor display system; non-acoustic sensor operator (NASO) controlling search radar and electronic surveillance subsystem; and two observers. Bubble windows for observers are provided at rear of main cabin. Rear cabin door is openable in flight. Standard cargo door at front on port side, with sill at truck-bed height. Cargo holds forward and aft of main cabin.

SYSTEMS: Generally as for standard F27, except that bootstrap cooling system is standard; cabin pressure differential is 0.38 bars (5.5 lb/sq in); secondary electrical system has a third 115V 400Hz AC constant frequency inverter; and oxygen system includes individual supply for each tactical crew member.

AVIONICS AND EQUIPMENT: Com/nav equipment comprises Collins 618T-3 HF transceiver, two Collins 618M-3 VHF transceivers (three in Enforcer and Sentinel), Collins AN/ARC-159 UHF transceiver (VHF/UHF in Enforcer), interphone, crew address system (Enforcer), Litton LTN-72 inertial navigation system, IDC air data computer, dual Sperry C-9 gyro compasses (not in Enforcer), Collins DF-206 radio compass (not in Sentinel and Kingbird), Collins 51Z-4 marker beacon receiver, Honeywell AN/APN-198 radio altimeter (two in Enforcer, none in Sentinel), Collins DF-301E VHF/UHF direction finder (UHF/VHF-AM/FM in Enforcer, none in Sentinel), two Collins 51RV-4 VOR/ILS receivers, two Collins HSIs (F27 Maritime only), Smiths SEP-2E/M autopilot (single in F27 Maritime, dual in Kingbird, none in Enforcer or Sentinel), Collins 621A-6A ATC transponder (F27 Maritime only). Additional avionics include dual Sperry SPZ-600 AFCS (Enforcer and Sentinel), Omega/VLF nav (Enforcer and Sentinel), AHRS (Enforcer only), weather radar (all except F27 Maritime), IFF transponder (all except F27 Maritime), low altitude warning system (Enforcer), Tacan (Sentinel and Kingbird), and dual LF/ADF (Kingbird).

OPERATIONAL EQUIPMENT (F27 Maritime and Enforcer): Both versions fitted with Litton AN/APS-504(V)2 or -5 360° search radar in ventral radome. Additional mission equipment in Enforcer includes GEC Avionics central tactical computer and display system, radar detection and display system, on-top position indicator/receiver, dual sonobuoy signal receivers, GEC Avionics AQS 902 (LAPADS) sonar, and sonobuoy processing system. Both passive and active sonobuoys are carried (up to 40 of SSQ-36, SSQ-41B, or SSQ-47B type, up to 120 smaller buoys, or a mixture of both sizes), and launched from the internal stores area in the rear of the cabin. Marconi Defence Systems electronic surveillance and monitoring equipment to detect radar transmissions, which can be classified and recorded and their bearings transferred to the tactical display. Teledyne Electronics MAD in tailboom; FLIR camera in 'chin' turret optional. A data link with available ground or shipborne systems can be provided. Searchlight pod optional, on central starboard wing pylon.

ARMAMENT (Enforcer): Fokker installs provisions for armament only: weapon mix and purchase is up to customer. There are two 907 kg (2,000 lb) stores attachments on the fuselage and three under each wing (capacities 295 kg; 650 lb inboard, 680 kg; 1,500 lb in centre, and 113 kg; 250 lb outboard). Typical ASW armament can include two or four Mk 44, Mk 46, Sting Ray, or A244/S torpedoes and/or depth bombs. For anti-shipping warfare, two AM39 Exocet, AGM-84A Harpoon, Sea Skua, Sea Eagle, or similar air-to-surface missiles can be carried. Auxiliary fuel tanks can be attached on the central underwing pylons. Alkan stores management system.

WEIGHTS AND LOADINGS (A: Maritime, B: Enforcer, C: Sentinel, D: Kingbird):

Manufacturer's weight empty:

A	12,519 kg (27,600 lb)
B	13,725 kg (30,260 lb)

Operating weight empty:

A	13,314 kg (29,352 lb)
B (typical)	14,568 kg (32,117 lb)
C	14,515 kg (32,000 lb)
D	15,422 kg (34,000 lb)

Max fuel (incl pylon tanks):

A	7,257 kg (16,000 lb)
B	7,511 kg (16,560 lb)
C	7,484 kg (16,500 lb)
D	5,978 kg (13,180 lb)

Normal max T-O weight:

all	20,410 kg (45,000 lb)

Operational necessity weight:

A, C, D	21,545 kg (47,500 lb)
B	21,320 kg (47,000 lb)

Emergency overload T-O weight:

B	22,680 kg (50,000 lb)

Max landing weight:

all	18,600 kg (41,000 lb)

Max zero-fuel weight:

all	17,900 kg (39,500 lb)

Wing loading at normal max T-O weight:

all	291.6 kg/m² (59.75 lb/sq ft)

Power loading at normal max T-O weight:

all	6.39 kg/kW (10.5 lb/shp)

PERFORMANCE (at normal max T-O weight, clean configuration, except where indicated; estimated for Kingbird):

Never-exceed speed, AUW of 17,237 kg (38,000 lb), S/L to 6,100 m (20,000 ft):

A	259 knots (480 km/h; 298 mph) CAS
B, C	256 knots (474 km/h; 294 mph) CAS

Normal cruising speed at 6,100 m (20,000 ft), AUW of 17,237 kg (38,000 lb):

all	250 knots (463 km/h; 287 mph)

Normal operating speed at 6,100 m (20,000 ft), AUW of 17,237 kg (38,000 lb):

A	227 knots (420 km/h; 261 mph) CAS

Patrol speed at 457 m (1,500 ft):

A	150–180 knots (277–333 km/h; 172–207 mph)
B, D	145–175 knots (268–324 km/h; 167–202 mph)



Loading sonobuoys into the Maritime Enforcer's eight-shot rotary launcher



Mission consoles for (right to left) the NASO, TACCO, and ASO on board the Maritime Enforcer

Stalling speed, flaps up:
A 96 knots (178 km/h; 111 mph) CAS
Max rate of climb at S/L, ISA, AUW of 18,143 kg (40,000 lb):
A 442 m (1,450 ft)/min
Time to 6,100 m (20,000 ft):
B, C 27 min
Time to 6,705 m (22,000 ft), ISA + 10°C, at operational necessity weight:
D 47 min
Service ceiling:
A 8,990 m (29,500 ft)
B, C 7,620 m (25,000 ft)
Service ceiling, one engine out:
A 3,565 m (11,700 ft)
T-O run at S/L, ISA:
A at 20,410 kg (45,000 lb) T-O weight 975 m (3,200 ft)
B at 21,320 kg (47,000 lb) T-O weight 1,525 m (5,000 ft)
C, D, at 20,410 kg (45,000 lb) T-O weight 1,018 m (3,340 ft)
Landing distance (unfactored, ISA at S/L):
A at landing weight of 19,731 kg (43,500 lb) 610 m (2,000 ft)
A at landing weight of 13,607 kg (30,000 lb) 530 m (1,740 ft)
B at landing weight of 15,422 kg (34,000 lb) 500 m (1,640 ft)
C, D, at landing weight of 15,422 kg (34,000 lb) 564 m (1,850 ft)
Ferry range at 6,100 m (20,000 ft) with 4,536 kg (10,000 lb) payload, 30 min loiter and 5% reserves:
A 1,000 nm (1,850 km; 1,150 miles)
Max range at 7,010–7,620 m (23,000–25,000 ft), reserves for 30 min hold, 5% flight fuel remaining:
B, C 2,700 nm (5,000 km; 3,107 miles)
D 2,400 nm (4,448 km; 2,763 miles)
Max endurance at emergency overload T-O weight:
B 10 h

PILATUS

PILATUS FLUGZEUGWERKE AG, CH-6370 Stans, near Lucerne, Switzerland

PILATUS PC-9

Design of the PC-9, as an advanced, high performance turboprop trainer suitable for all aspects from basic through to advanced flying, began in May 1982. Despite an external similarity to the PC-7, it has only about 10 per cent structural commonality with that aircraft, differences including a more powerful engine, 'stepped' tandem cockpits with ejection seats, a ventral airbrake, modified wing profiles and tips, new ailerons, a longer dorsal fin, mainwheel doors, and larger wheels with high pressure tyres. The PC-9 complies with the requirements of FAR Pt 23 in the Aerobatic and Utility categories, and with a selected group of US military specifications in the Trainer category.

Flight testing of major components, and aerodynamic optimisation of the new design, were completed during 1982–83 on a PC-7 technology demonstration aircraft, and have been followed by the manufacture of two pre-production PC-9s. The first of these (HB-HPA) made its initial flight, fitted temporarily with a Hartzell three-blade propeller, on 7 May 1984. The second (HB-HPB), first flown on 20 July 1984, is more fully representative of the production version, its cockpits each being equipped with two Collins CRT displays (electronic ADI and HSI), a Lear Siegler head-up display, and King nav/com equipment. Flight testing, and certification by the Swiss Federal Office for Civil Aviation, are planned to be completed by December 1985, and first customer deliveries are scheduled for early 1986.

The PC-9 was one of four aircraft short-listed by the British Ministry of Defence in 1984 as final contenders for a Jet Provost replacement for the Royal Air Force. If selected, PC-9s for the RAF would be co-produced with British Aerospace under a memorandum of understanding signed on 15 March 1984. This arrangement provides for a 50–50 work split between the two companies, with final assembly in the UK, probably at Brough.

TYPE: Single/two-seat training aircraft.

WINGS: Cantilever low-wing monoplane. Wing section PIL15M825 at root, PIL12M850 at tip. Dihedral 7° on outer panels. Incidence 1° at root, washout −2° at tip. Sweepback 1° at quarter-chord. One-piece all-metal single-spar primary structure with auxiliary spar, ribs, and stringer-reinforced skin. Constant chord centre-section and tapered outer panels. Alclad aluminium alloy (2024) skin, reinforced by stringers; some fairings of GRP. Mass balanced plain ailerons; trailing-edge split flaps extending under fuselage with plate type airbrake at centre. Flaps and airbrake actuated hydraulically, ailerons mechanically by pushrods. Aileron trim is by an electrically actuated, variable load centering spring on the control column.

FUSELAGE: All-metal semi-monocoque structure with stringers, bulkheads, and aluminium alloy skin. Some fairings of GRP.

TAIL UNIT: Cantilever all-metal structure with mass balanced, cable operated rudder and elevator. Trim tab in starboard half of elevator, and trim/anti-balance tab in rudder, both mass balanced and electrically actuated.

LANDING GEAR: Retractable tricycle type, with hydraulic actuation in both normal and emergency modes. Mainwheels retract inward into wing centre-section, nosewheel rearward; all units enclosed by doors when retracted. Oleo-pneumatic shock absorber in each leg unit. Hydraulically actuated nosewheel steering. Goodrich wheels and tyres, with Goodrich multi-piston hydraulic disc brakes on mainwheels. Parking brake.



Seen here with a Hawk advanced trainer, the PC-9 is one of four candidates short-listed to meet an RAF basic training requirement

POWER PLANT: One 857 kW (1,150 shp) Pratt & Whitney Canada PT6A-62 turboprop engine, flat rated at 708 kW (950 shp), driving a Hartzell HC-D4N-3/D9512 four-blade constant-speed fully-feathering propeller with spinner. Fuel in two integral tanks in wing leading-edges, total usable capacity 508 litres (112 Imp gallons). Overwing refuelling point on each side. Fuel system includes a 12 litre (2.6 Imp gallon) aerobatics tank in fuselage, forward of front cockpit, which permits up to 60 s of inverted flight. Provision for two 152 or 240 litre (33.4 or 52.8 Imp gallon) drop tanks on the centre underwing attachment points. Total oil capacity 16 litres (3.5 Imp gallons).

ACCOMMODATION: Martin-Baker Mk CH 11A adjustable ejection seats for two persons, in 'stepped' tandem arrangement with rear seat elevated 15 cm (6.3 in). Seats operable, through canopy, at zero height and speeds down to 60 knots (112 km/h; 70 mph). One-piece acrylic Perspex windscreen; one-piece framed canopy, incorporating rollover bar, opens sideways to starboard. Dual controls standard. Cockpit heating, ventilation, and canopy demisting standard. Space for 25 kg (55 lb) of baggage aft of seats, with external access.

SYSTEMS: Normalair-Garrett environmental control system, using air cycle and engine bleed air, for cockpit heating/ventilation and canopy demisting. Fairey Hydraulics hydraulic system, pressure 207 bars (3,000 lb/sq in), for actuation of landing gear, mainwheel doors, nosewheel steering, and airbrake. Nitrogen pressurised accumulator to provide hydraulic power for emergency operation of flaps and landing gear. Primary electrical system (28V DC operational, 24V nominal) powered by a Lear Siegler 30V 200A starter/generator and a 24V 40Ah battery; two static inverters supply 115/26V AC power at 400Hz. Ground power receptacle provided. Electric anti-icing of pitot tube, static ports, and AOA transmitter standard; electric de-icing of propeller blades optional. Diluter demand oxygen system, selected and controlled individually from a panel in each cockpit.

AVIONICS AND EQUIPMENT: Both cockpits fully instrumented to standard customer specifications. Single or dual system VHF, UHF, and/or HF to customer's requirements. Audio integrating system controls audio services from com, nav, and interphone systems. Customer-specified equipment provides flight environmental, attitude and direction data, and ground-transmitted position determining information. Retractable 250W landing/taxying light in each main landing gear leg bay. Optional equipment includes emergency battery, encoding altimeter, emergency locator transmitter, IFR hood, anti-*g* system, propeller electric de-icing, and underwing drop tanks.

OPERATIONAL EQUIPMENT: Three hardpoints are provided under each wing for the carriage of external stores, up to a weight of 250 kg (551 lb) each on the inboard and central locations and 110 kg (242 lb) each on the outboard pair, subject to a max external stores load of 1,040 kg (2,293 lb). Centre point each side is 'wet' for carriage of auxiliary fuel tanks.

DIMENSIONS, EXTERNAL:

Wing span	10.12 m (33 ft 2½ in)
Wing chord:	
mean aerodynamic	1.64 m (5 ft 4½ in)
mean geometric	1.61 m (5 ft 3½ in)
Wing aspect ratio	6.29
Length overall	10.05 m (32 ft 11¾ in)
Height overall	3.26 m (10 ft 8⅓ in)
Wheel track	2.54 m (8 ft 4 in)
Propeller diameter	2.44 m (8 ft 0 in)

AREAS:

Wings, gross	16.29 m² (175.3 sq ft)
Ailerons (total)	1.57 m² (16.90 sq ft)
Trailing-edge flaps (total)	1.77 m² (19.05 sq ft)
Airbrake	0.30 m² (3.23 sq ft)
Fin	0.86 m² (9.26 sq ft)
Rudder, incl tab	0.90 m² (9.69 sq ft)
Tailplane	1.80 m² (19.38 sq ft)
Elevator, incl tab	1.60 m² (17.22 sq ft)

WEIGHTS AND LOADINGS (A: Aerobatic, U: Utility):

Basic weight empty	approx 1,620 kg (3,571 lb)
Weight empty, equipped	approx 1,685 kg (3,715 lb)
Max T-O weight: A	2,250 kg (4,960 lb)
U (with underwing loads)	3,200 kg (7,055 lb)
Max ramp weight: A	2,260 kg (4,982 lb)
U (with underwing loads)	3,210 kg (7,077 lb)
Max landing weight: A	2,250 kg (4,960 lb)
U (with underwing loads)	3,100 kg (6,834 lb)
Max zero-fuel weight: A	1,900 kg (4,188 lb)
Max wing loading: A	138.1 kg/m² (28.3 lb/sq ft)
U	196.4 kg/m² (40.2 lb/sq ft)
Max power loading: A	3.18 kg/kW (5.22 lb/shp)
U	4.52 kg/kW (7.42 lb/shp)

PERFORMANCE (at appropriate max T-O weight, ISA, propeller speed 2,000 rpm):

Max permissible diving speed:
- A: Mach 0.73 (360 knots; 667 km/h; 414 mph EAS)
- U: Mach 0.55 (300 knots; 556 km/h; 345 mph EAS)

Max operating speed:
- A: Mach 0.68 (320 knots; 593 km/h; 368 mph EAS)
- U: Mach 0.50 (270 knots; 500 km/h; 311 mph EAS)

Max level speed:
- A at S/L: 268 knots (496 km/h; 308 mph)
- A at 6,100 m (20,000 ft): 300 knots (556 km/h; 345 mph)





TOP: Front cockpit of first pre-production Pilatus PC-9. ABOVE: Rear cockpit of second pre-production PC-9, equipped with EFIS displays

Max cruising speed:
- A at 5,485 m (18,000 ft): 300 knots (556 km/h; 345 mph)

Manoeuvring speed:
- A: 210 knots (389 km/h; 242 mph) EAS
- U: 200 knots (370 km/h; 230 mph) EAS

Max speed with flaps and/or landing gear down:
- A and U: 150 knots (278 km/h; 172 mph) EAS

Stalling speed, engine idling:
- A, flaps and landing gear up: 79 knots (147 km/h; 91 mph) EAS
- U, flaps and landing gear up: 94 knots (175 km/h; 109 mph) EAS
- A, flaps and landing gear down: 70 knots (130 km/h; 81 mph) EAS
- U, flaps and landing gear down: 83 knots (154 km/h; 96 mph) EAS

Max rate of climb at S/L:
- A: 1,220 m (4,000 ft)/min

Time to 4,575 m (15,000 ft): A: 4 min 30 s

Max operating altitude: 7,620 m (25,000 ft)

Service ceiling: 11,580 m (38,000 ft)

T-O run at S/L: A: 240 m (788 ft)

T-O to 15 m (50 ft) at S/L: A: 430 m (1,411 ft)

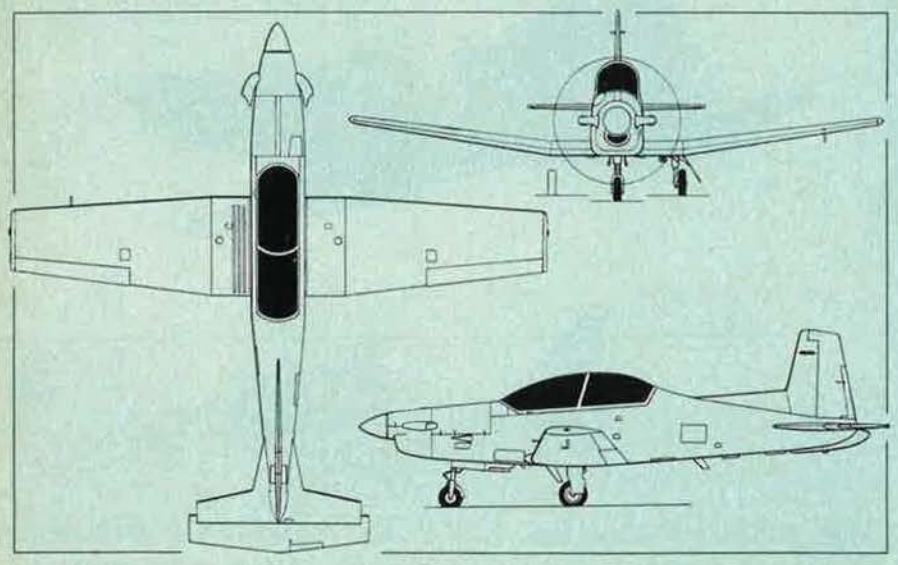
Landing from 15 m (50 ft) at S/L:
- A: 495 m (1,624 ft)

Landing run at S/L: A: 260 m (853 ft)

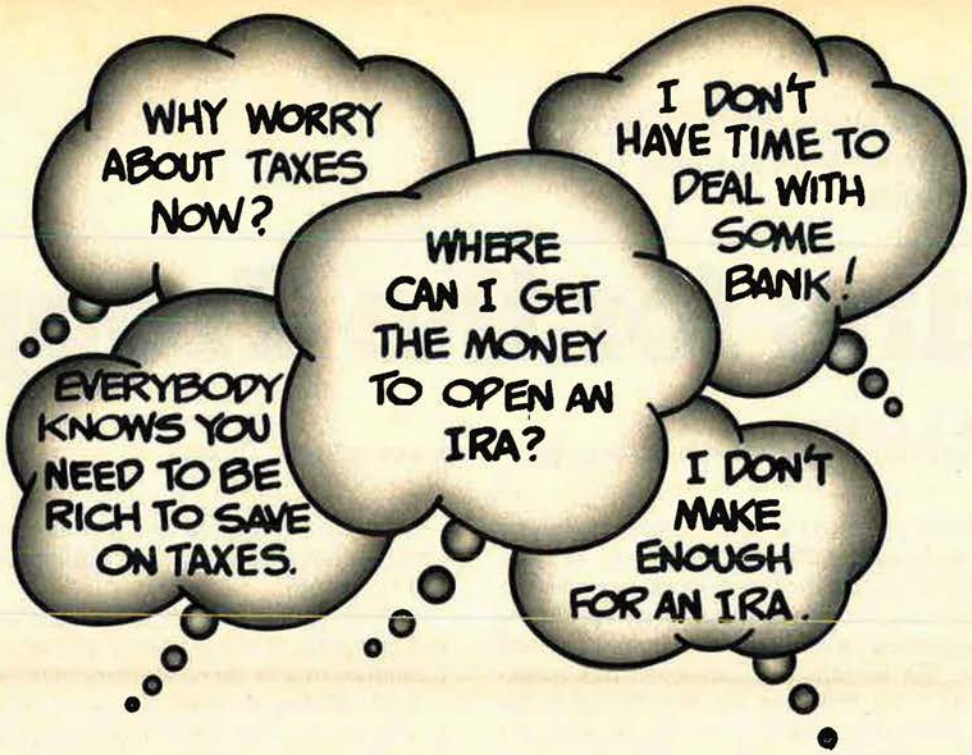
Max range at cruise power at 5,000 m (16,400 ft), 5% plus 20 min reserves: 830 nm (1,538 km; 955 miles)

Endurance (typical mission power settings) 2 sorties of 1 h duration plus 20 min reserves

g limits:
- A: +7.0/−3.5
- U: +4.5/−2.25



Pilatus PC-9 trainer (Pratt & Whitney Canada PT6A-62 turboprop engine) *(Pilot Press)*



NOW THERE'S NO EXCUSE FOR PAYING TOO MUCH IN TAXES.

Because you can open a PFCU IRA with just $25.

To open many Individual Retirement Accounts, you need a full $1,000 in cash. Not with PFCU, where you can open an IRA any time with as little as $25.

You can add to your PFCU IRA every payday.

You decide how much you want to contribute. PFCU will deduct that amount from your paycheck and add it to your IRA automatically. And with a PFCU IRA, you'll earn a consistently high rate, compounded quarterly.

Earn tax-deferred dividends for your future and reduce your taxes now.

An IRA helps you save for retirement. And it saves you money on taxes, as well. It works like this: If you make $25,000 a year and you put $2,000 in an IRA, your taxable income is reduced to $23,000. That simple change saves you $452 in taxes.

Tax laws allow you to contribute up to the following:

- $2,000 annually if you are employed
- $2,250 if your spouse is not working
- $4,000 if you and your spouse both work
- $15,000 if you are self-employed

You'll pay no taxes on the money you contribute or the dividends you earn until you withdraw that money from your IRA.

You can open and add to your IRA up to the date you file your 1984 federal tax return, provided this is on or before April 15, 1985.

Now that we've made it so easy to save on taxes while you save for your future, there's really no excuse not to open a PFCU IRA today.

For more information see your PFCU representative, use the coupon, or call our toll-free number.

The following (and members of their family) are eligible to join PFCU: active duty, Reserve, National Guard and Retired Army and Air Force Commissioned and Warrant Officers; Army and Air Force enlisted and civilian personnel, and OSD civilian personnel who are not eligible to join another credit union; employees at the Pentagon; members of the Armed Forces who are eligible to receive and are receiving benefits or services from the Presidio of San Francisco; Army Reserve and Army National Guard members assigned to or stationed at or whose duties include activities within the geographic command of the Presidio of San Francisco; persons retired from the above employment; and certain other persons with DoD affiliations (contact PFCU for details).

Call **800-248-SAVE** (In Washington, D.C. area, call 683-7786) or mail to: Pentagon Federal Credit Union, Box 1432, Alexandria, VA 22313.

Yes, I'd like to consider a PFCU IRA. Send more information to:

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP or APO _____

☐ I am a PFCU member. My account number is _____.

☐ I am not a member, please send me a membership application. My spouse who is ☐ is not ☐ a member is also interested in a PFCU IRA. (Check the appropriate answer if you wish an additional IRA request mailed for your spouse.)

544P

50 years **Pentagon Federal Credit Union**

NCUA Each member account is insured up to $100,000 by National Credit Union Administration, an agency of the U.S. Government.

Main Office: Box 1432, Alexandria, VA 22313; **Washington Area Offices:** Pentagon; Rosslyn; Hoffman Bldg. #2, Alexandria; Nassif Bldg., Bailey's Crossroads; Defense Communications Agency, Arlington; Walter Reed AMC. Offices also in **TX** (San Antonio) and **CA** (San Francisco). **Other offices in Europe and the Pacific.**

The second session of the Ninety-eighth Congress was a good one for military benefits.

Gains for the Troops

BY BENJAMIN S. CATLIN
AFA ASSISTANT EXECUTIVE DIRECTOR FOR DEFENSE MANPOWER AND RESERVE AFFAIRS

WHEN the Ninety-eighth Congress began its second session last January, official Washington was still recoiling from the impact of the Grace Commission—the President's Private Sector Survey group that had, among other things, suggested radical cutbacks in military and federal benefits. Six months ago, however, this magazine reported *(see "In Prospect for People," July '84 issue)* that the prevailing trends were less gloomy and doomy than they might seem. By the time Congress adjourned, it was apparent that the second session of the Ninety-eighth had been, so far as gains for the troops were concerned, one of the best in a long time.

* * *

• **Pay Raise.** All Air Force members except E-1s with less than four months of service will receive a four percent pay raise on January 1 in both base pay and in Basic Allowance for Subsistence (BAS).

• **BAQ/VHA Increased.** Congress passed a complicated formula for computing Variable Housing Allowance (VHA), tying it to Basic Allowance for Quarters (BAQ). However, most Air Force members will receive an increase. The previous ceilings of $800 for members with dependents and $600 for singles were repealed.

• **Increase in PCS Mileage.** On January 1, the mileage allowance for Permanent Change of Station (PCS) travel will be increased from thirteen cents to fifteen cents per mile.

• **Space-Available Dental Care.** Effective July 1, space-available dental care will be authorized for the dependents of active-duty personnel in the continental United States.

• **Eye Examination for Dependents.** The Authorization bill provides for the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) to pay for one eye examination per person per year.

• **New GI Bill.** A three-year test of a new, contributory GI Bill begins on July 1 *(see also "The Bulletin Board," p. 184)*. Unless recruits joining after that date opt out of the program, $100 a month will be held from their pay for their first year of service. In return, they will be entitled to educational benefits of $250 a month for thirty-six months after a two-year enlistment and $300 a month for thirty-six months after a three-year enlistment. As recruitment incentives go, this may give an edge to the other services, which offer shorter enlistment terms than USAF's four-year minimum. Active-duty people who extend their enlistments will be eligible for benefits without being required to contribute, and those joining a reserve component are to be eligible for benefits of up to $140 a month.

• **Privatization of Commissaries.** Congress dropped a test proposal to allow private grocery chains to operate commissaries in three metropolitan areas.

• **IRS Ruling Delayed.** A "Sense of the Senate" resolution was passed deploring a possible IRS ruling that would disallow income-tax deductions on home mortgages to the extent that military homeowners made their payments with tax-free housing allowances. The Treasury Department has agreed to delay the ruling to allow the new Congress time to consider permanent legislation.

• **User Fee Defeated.** For the second year in a row, the proposed $10 "user" fee for dependents and military retirees at military medical facilities was withdrawn.

• **Military Retirement Changes.** The President delayed action on recommendations from the Grace Commission and the Fifth Quadrennial Review of Military Compensation for changes to the military retirement system. These changes were opposed unanimously by the Joint Chiefs of Staff. However, the President did instruct the Department of Defense to continue its evaluation and to report back.

• **COLA Restored.** Retirees under age sixty-two, who were previously restricted to one-half the regular annual cost of living allowance, will now get the same COLA as other retirees. The next scheduled COLA is on January 1 and will probably be three percent.

• **COLA Offset.** Congress repealed a 1983 provision that reduced the Civil Service pay of a military retiree working for the federal government by the amount of the retiree's cost of living allowance (COLA).

• **State Income Tax.** Service Secretaries are now authorized to enter into agreements with states to withhold state income taxes from the pay of retirees who request such withholding.

• **Survivor Benefits Program.** Effective July 1, Survivor Benefits program recipients who are eligible for Social Security benefits as the result of their own Social Security contributions—as opposed to those of their deceased spouses—will no longer have their SBP benefits offset.

• **GI Bill Increase.** Veterans already receiving Vietnam GI Bill benefits will receive a ten percent increase, retroactive to October 1, 1984. ■

INDUSTRIAL ASSOCIATES OF THE AIR FORCE ASSOCIATION

Listed below are the Industrial Associates of the Air Force Association. Through this affiliation, these companies support the objectives of AFA as they relate to the responsible use of aerospace technology for the betterment of society and the maintenance of adequate aerospace power as a requisite of national security and international amity.

Acurex Corp.
Advanced Technology Div. of Tritronics, Inc.
Aerojet ElectroSystems Co.
Aerojet-General Corp.
Aerojet Strategic Propulsion Co.
Aerojet TechSystems Co.
Aerospace Corp.
Aerospatiale, Inc.
Aircraft Porous Media, Inc.
Alkan U.S.A., Inc.
Allied Corp., Bendix Aerospace
American Airlines Training Corp.
American Cyanamid Co.
American Electronic Laboratories, Inc.
Amex Systems, Inc.
Ampex Corp., Data Systems Div.
Analytic Services Inc. (ANSER)
Anheuser-Busch, Inc.
Arco Engineering Co.
Aster Engineering Corp.
Astronautics Corp. of America
AT&T Communications
AT&T Information Systems
AT&T Technologies
Avco Corp.
Battelle Memorial Institute
BDM Corp., The
Beech Aircraft Corp.
BEI Defense Systems Co., Inc.
Bell Aerospace Textron
Bell Atlantic
Bell Helicopter Textron
Boeing Aerospace Co.
Boeing Co., The
Boeing Military Airplane Co.
British Aerospace, Inc.
British Aerospace Dynamics Group
Brunswick Corp., Defense Div.
Budd Co., The
California Microwave, Inc., Communication Systems Operation
Calspan Corp., Advanced Technology Center
Canadair, Inc.
Canadian Marconi Co.
Cessna Aircraft Co.
Chamberlain Manufacturing Corp.
Clearprint Paper Co., Inc.
Clifton Precision, Instruments & Life Support Div.
Colt Industries, Inc.
Computer Sciences Corp.
Comtech Government Systems Div.
Conrac Corp.
Continental Page Engineers, Inc.
Control Data Corp.
Cryomec, Inc.
Cubic Corp.
Cypress International, Inc.
Data General Corp.
Datatape, Inc.
Douglas Aircraft Co., McDonnell Douglas Corp.
Dowty
Durakon, Inc.
Dynalectron Corp.
Eastman Kodak Co.
Eaton Associates, Inc.
Eaton Corp., AIL Div.
ECI Div., E-Systems, Inc.
EDO Corp., Government Systems Div.
Educational Computer Corp.
E. I. du Pont de Nemours & Co.
Electronic Data Systems Corp.
Emerson Electric Co.
E-Systems, Inc.
Euromissile
Ex-Cell-O Corp., Aerospace Div.
Fairchild Industries, Inc.
Fairchild Weston Systems, Inc.
Falcon Jet Corp.
Ferranti plc
Fluids Control Div. of LFE Corp.
Ford Aerospace & Communications Corp.
GA Technologies, Inc.
Garrett Corp., The
Gates Learjet Corp.
General Defense Corp., Systems Div.
General Dynamics Corp.
General Dynamics, Electronics Div.
General Dynamics, Fort Worth Div.
General Electric Co.
General Electric Co., AEBG
GMC, Allison Gas Turbine Div.
GMC, Delco Systems Operations
Goodyear Aerospace Corp.
Gould Inc., Computer Systems Div.
Gould Inc., Defense Systems Group
Grumman Aerospace Corp.
Grumman Data Systems Corp.
GTE Government Systems Corp.
GTE Government Systems Corp., Communications Systems Div.
GTE Government Systems Corp., Strategic Systems Div.
Gulfstream Aerospace Corp.
Hamilton Technology, Inc.
Harris Government Communications Group
Harris Government Support Systems Div.
Harris Government Systems Sector
Hayes International Corp.
Hazeltine Corp.
Hercules Aerospace Div.
Honeycomb Co. of America, Inc.
Honeywell, Inc., Aerospace & Defense Group
Honeywell, Inc., Defense Systems Div.
Howell Instruments, Inc.
HR Textron, Inc.
Hughes Aircraft Co.
IBM Corp., Federal Systems Div.
IBM National Accounts Div.
Information Systems & Networks Corp.
Ingersoll-Rand Co.
Intercontinental Publications, Inc.
Intermetrics, Inc.
Interstate Electronics Corp.
Israel Aircraft Industries Int'l, Inc.
Itek Optical Systems, A Division of Litton Industries
ITT Defense Communications Div.
ITT Defense-Space Group
ITT Federal Electric Corp.
Jane's
John Deere Technologies Int'l, Inc.
Kelsey-Hayes Co.
King Radio Corp.
Kollsman Instrument Co.
Lear Siegler, Inc.
Lear Siegler, Inc., Avionic Systems Div.
Lewis Engineering Co., Inc.
Litton-Amecom
Litton, Applied Technology
Litton Data Systems
Litton, Guidance & Control Systems
Litton Industries
Lockheed Corp.
Lockheed Aircraft Service Co.
Lockheed California Co.
Lockheed Electronics Co.
Lockheed Engineering & Management Services Co., Inc.
Lockheed Georgia Co.
Lockheed Missiles & Space Co.
Lockheed Space Operations Co.
Logicon, Inc.
Loral Corp.
LTV Aerospace & Defense Co.
LTV Aerospace & Defense Co., Sierra Research Div.
Lucas Industries Inc.
Magnavox Advanced Products & Systems Co.
M.A.N. Truck & Bus Corp.
Marconi Avionics, Inc.
Marquardt Co., The
Martin Marietta Aerospace
Martin Marietta Denver Aerospace
Martin Marietta Orlando Aerospace
MBB
McDonnell Aircraft Co.
McDonnell Douglas Astronautics Co.
McDonnell Douglas Corp.
Midland-Ross Corp./Grimes Div.
MITRE Corp., The
Morton Thiokol, Inc.
Motorola, Inc., Government Electronics Div.
NORDAM
Northern Telecom, Inc.
Northrop Corp.
Northrop Corp., Aircraft Div.
Northrop Corp., Electronics Div.
Odetics, Inc.
OEA, Inc.
O. Miller Associates
Orbital Sciences Corp.
ORI, Inc.
Oshkosh Truck Corp.
Over-Lowe Co.
Pacific Car and Foundry Co.
Pan Am World Services, Inc., Aerospace Services Div.
Planning Research Corp.
Products Research & Chemical Corp.
Rand Corp.
Raytheon Co.
RCA, Government Systems Div.
RECON/OPTICAL, Inc., CAI Div.
Rediffusion Simulation, Inc.
Republic Electronics, Inc.
Rockwell Int'l Corp.
Rockwell Int'l Collins Government Avionics Div.
Rockwell Int'l Defense Electronics Operations
Rockwell Int'l North American Aircraft Operations
Rockwell Int'l North American Space Operations
Rockwell Int'l Rocketdyne Div.
Rohr Industries, Inc.
Rolls-Royce, Inc.
ROLM Corp., Mil-Spec Computers Div.
Rosemount Inc.
Sabreliner Corp.
Sanders Associates, Inc.
Science Applications, Inc.
SENTEC
Short Brothers USA, Inc.
Simmonds Precision
Singer Co., The
Smiths Industries, Aerospace & Defence Systems Co.
SofTech
Sonicraft, Inc.
Space Applications Corp.
Space Communications Co.
Space Ordnance Systems
Sperry Corp.
SRS Industries, Inc.
Standard Manufacturing Co., Inc.
Stencel Aero Engineering Corp.
Sundstrand Corp.
Sverdrup Corp.
Syscon Co.
System Development Corp., A Burroughs Co.
Systems Control Technology, Inc.
Systems Research Laboratories, Inc.
Systron Donner, Safety Systems Div.
Tandem Computers Inc.
Teledyne, Inc.
Teledyne CAE
Teledyne Ryan Aeronautical
Texas Instruments Equipment Group
Thomson-CSF, Inc.
Time & Space Processing, Inc.
Top Brass Enterprises, Inc.
Tracor, Inc.
Trident Data Systems
TRW Electronics & Defense Sector
TRW Space & Technology Group
Turbomach Div. of Solar Turbines, Inc.
United Technologies Corp.
UTC, Chemical Systems
UTC, Hamilton Standard
UTC, Norden Systems, Inc.
UTC, Pratt & Whitney
UTC, Research Center
UTC, Sikorsky Aircraft
Varo, Inc.
Vega Precision Laboratories
V. Garber Int'l Associates, Inc.
Vitro Corp.
Western Gear Corp.
Western Union Telegraph Co., Government Systems Div.
Westinghouse Electric Corp.
Westinghouse Electric Corp., Baltimore Div.
Wild Heerbrugg Instruments, Inc.
Williams International
Wyman-Gordon Co.
Xerox Corp.

AIRMAN'S BOOKSHELF

On Thin Ice

Maritime Strategy or Coalition Defense? by Robert W. Komer. Abt Books, Cambridge, Mass., 1984. 116 pages. $19.

Former Ambassador and Assistant Secretary of Defense Robert Komer has written a new book—*Maritime Strategy or Coalition Defense?*—that summarizes what the author promises to examine in detail in a work now being prepared. Considering the timing for release of this summary volume and its championing of the previous administration's defense policies, including vigorous support for the policies of Dr. Harold Brown over those of incumbent Secretary of the Navy John Lehman, it is clear at the outset that the reader has in hand both tools and timber to shape a defense "plank" in the Democratic Party platform. For this reason alone, this work is important.

Throughout the author's sweeping and all-encompassing conclusions about conventional warfare is a common thread: We need to do better with less and to encourage our allies to do more. Though the author recognizes difficulties, his optimism that solutions will be found is thinly supported and occurs too frequently for comfort.

Coalition defense, with all of its shortcomings, is judged to be the "way to go." But even that is judged to be unaffordable unless cost offsets can be realized by drastic cuts in areas heretofore sidestepped as service sacred cows. Large carriers, along with their supporting ships, for example, are singled out as unneeded luxuries, easily replaced by shore-based air—a consistent conviction of the author and the subject of his lengthy Rand Corp. report in 1975.

The author identifies the Navy's current objective of a 600-ship, fifteen-carrier fleet as an effort to direct the country toward a maritime strategy and away from the purer coalition-defense strategy of four years ago. Deleting the high unit costs of the carriers and their air groups would, in his view, pay for the commodities deemed more useful to a coalition defense. Thus the use of the word "or" in the title—*Maritime Strategy "or" Coalition Defense?*

Aside from many long-standing differences in professional judgment between the author and this reviewer, his use of the word "or" brings me out of my cage quickly. These two concepts are not mutually exclusive. The current effort is to reestablish sufficient maritime capability to make coalition defense a workable proposition. It does not compete with coalition defense, and it certainly does not deserve so grand a title as maritime strategy.

Trafalgar did not defeat Napoleon. Trafalgar helped, but Waterloo was decisive. And in the Pacific campaigns of World War II, Korea, and Vietnam, naval victory and control of the sea did not eliminate the need to confront the enemy on the ground.

The author makes the solid point that Soviet forces can literally take a bus to any front, while the United States must either fly or float. Safe arrival is a prerequisite to effective employment of forces. If, as the author suggests, certain maritime tools become too expensive to assure safe arrival, then we and our coalition partners are in deeper trouble than we realize. The author focuses on this pivotal point, offering Democratic rather than Republican solutions. This is tragic. Solutions must be professional, not political. Our armed services are instruments of national policy. They must never become identified with other than the nation's best interests.

Here the ice gets exceedingly thin. For example, there are sobering hints that defending the NATO flanks would be so hard that they would probably have to be written off. There also are suggestions that NATO's strategy of flexible response, newly named horizontal escalation, would not work at all. The suggestion is made that neither side would have the intestinal fortitude to escalate deliberately for fear of unwanted counterescalation by the initial offender. The degree of intestinal distress that such postulations are likely to generate among our allies can only be imagined. It most certainly will not be good news in our embassies and military headquarters around the world.

Proposed alternatives include greater flexibility for army and air forces worldwide; more, but smaller, ships for navies; greater emphasis on capabilities to respond in important areas external to the coalition, such as the Middle East; and rejection of what the author perceives as an emerging maritime strategy that emphasizes carrier air attacks against the periphery of the Soviet landmass to frighten the USSR into tractable behavior (with but fifteen carriers?). This last point doesn't track in this abbreviated text. More than forty carriers had their hands full with the Axis. More than twenty certainly did not paralyze Hanoi.

This review has touched on only a few of the more stirring points made by this brilliant and thought-provoking author. Each page is heavily freighted with good stuff, accompanied by firm convictions on the widest possible range of the most controversial defense issues of the last forty years. I look forward to the full text and the promised expanded rationale on the host of propositions which, standing alone, are disquieting, if nothing else.

Second-guessing professionals who have the *de facto* responsibility for winning or losing has become a fashionable pastime. Better ways to win must continuously be sought from the young as well as from experienced "has-beens."

On the other hand, other ways to try to win—unproven but potentially attractive (cheaper?)—have buoyed channels to defeat for centuries. Both our national and coalition stakes are just too high for other than the most careful navigation. While serving as our Assistant Defense Secretary for Policy, the author himself followed the foregoing tenets scrupulously. His questions and challenges are not new. They must be reviewed and answered again and again. Such exer-

cises are the process of progress.

—Reviewed by Adm. Isaac Kidd, USN (Ret.). Admiral Kidd was Supreme Allied Commander, Atlantic, and Commander in Chief, US Atlantic Command, before his retirement.

Air Activities in Alaska

Top Cover for America, The Air Force in Alaska: 1920 to 1983, by John Haile Cloe and Michael F. Monaghan. Anchorage Chapter of the Air Force Association and Pictorial Histories Publishing Co., 713 S. Third St. W., Missoula, Mont. 59801, 1984. 260 pages with more than 300 photographs and twenty-seven maps. $13.95 (plus $1.95 postage and handling).

John Cloe and Mike Monaghan have provided a well-written and interesting account of the Air Force in Alaska. Their story is also a history of Alaska and the development of aviation in a state where the terrain is so rugged and forbidding that flying is the best means of travel.

Cloe serves as Historian of the Alaskan Air Command, and Mike Monaghan grew up in Alaska and served in the Air Force there. The two of them and the Air Force Association chapter at Anchorage have amassed hundreds of interesting photographs and many of the interesting stories of the commanders and personalities in Alaskan aviation history.

Not nearly enough has been written about the contribution of Alaska in World War II. This book provides excellent coverage of the Alaskan campaigns and of the problems of trying to fly and fight in some of the worst weather and over some of the most forbidding terrain in the world. It tells the dramatic story of the Japanese invasion of the Aleutians and of our attempts to drive them out. The retaking of the islands of Attu and Kiska were the key battles. The campaign on Attu ranks as one of the costliest battles of World War II. In terms of the ratio of American casualties to Japanese, this battle was second only to Iwo Jima.

The Air Force missions during these campaigns are accurately portrayed, and the challenges of flying in exceptionally bad weather on missions at the extreme end of the performance envelope are graphically covered. The pictures of the planes, the airfields, and the people involved make the story even more interesting.

The development and evolution of the commands in Alaska in the period after the war are well documented, but there are perhaps too many details about the command name changes, the successive commanders, and the changes in aircraft. However, there is excellent coverage of the air defense mission in Alaska. There is even the story of how the Command developed its motto, "Top Cover for America." The chapter on rescue operations in Alaska could be a whole book. The heroism and determination of the people involved in rescue operations is legendary, but deserves telling one more time.

I recommend this book. Most books about military commands tend to become unit histories and wind up on the shelves of libraries, but this one is an exception. It is a worthwhile addition to any collection of Air Force stories and a *must* for all who served in Alaska. It merits a hearty "well done." There should be more books about Air Force commands like this one.

—Reviewed by Benjamin S. Catlin, AFA Assistant Executive Director for Defense Manpower and Reserve Affairs.

New Books in Brief

Jane's Avionics 1984–85, edited by Michael Wilson. The task of keeping track of all the arcane electronic equipment stuffing airframes these days is made much easier by this comprehensive Jane's yearbook. This, only the third edition, covers the black-box world from communications and warning systems to data processing and electronic warfare with the reliability and attention to detail that are Jane's hallmarks. In his foreword, editor Wilson cites the development of very-high-speed integrated circuits—VHSIC—as the future "foundation for just about everything electronic." With photographs and index. Jane's Publishing Inc., New York, N. Y., 1984. 446 pages. $100.

National Interests and the Military Use of Space, edited by William J. Durch. Produced under the auspices of Harvard University's Center for Science and International Affairs, this book is a collection of scholarly essays dealing with the policy aspects of the "weaponization" of space. The authors examine such topics as space and US and Soviet military planning, space system vulnerabilities and countermeasures, space-based weapons, and legal implications for the military exploitation of space. On the whole, the essays are thoughtful and balanced, undergirding the emotional debate over "Star Wars" defenses with a framework of rational analysis. With notes and references, figures, and index. Ballinger Publishing Co., Cambridge, Mass., 1984. 304 pages. $28.

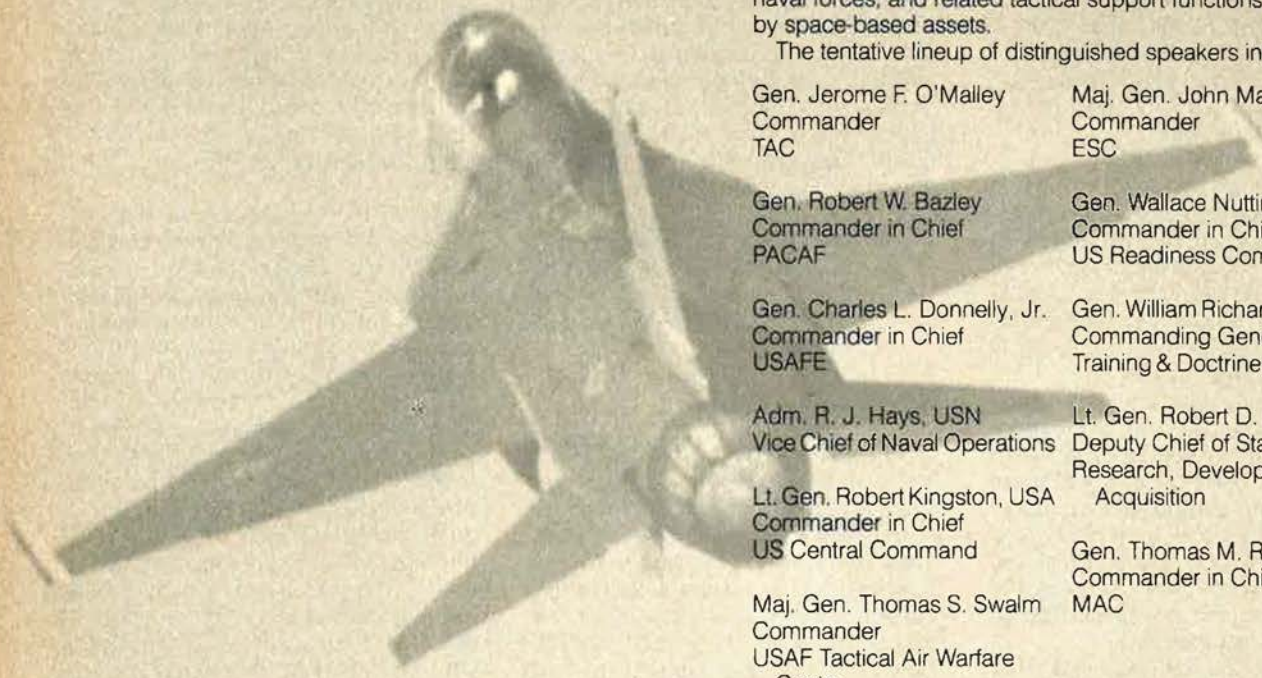
Ragwings and Heavy Iron, by Martin Caidin. Author Caidin is a member of that small fraternity of fanatical pilots who restore and fly warbirds of days gone by. He has written here with rollicking good humor of his experiences on the ground and in the air, flying such aircraft as the T-6, the Messerschmitt 108, and his own *Iron Annie,* a Junkers Ju-52 bomber-transport. Those who have never shaken the romance of flight will delight in Caidin's well-spun tales of aerial derring-do. With photographs and index. Houghton Mifflin Co., Boston, Mass., 1984. 293 pages. $16.95.

S.I.O.P.: The Secret U.S. Plan for Nuclear War, by Peter Pringle and William Arkin. The somewhat sensationalistic title betrays a persistent bias by the authors; namely, nuclear war is too horrible to be contemplated, and those who prepare to fight such a war—should it come—are deluding themselves that it can be managed. Past this bias, however, the reader will find a fascinating examination of the SIOP—the Single Integrated Operational Plan, the US's contingency plan for responding to an enemy nuclear attack. Of particular interest will be the authors' account of the 1982 SIOP exercise, Ivy League, which pointed up the need for hardened command and control. With notes, bibliography, and index. W. W. Norton & Co., New York, N. Y., 1983. 287 pages. $16.95.

Vertical Flight: The Age of the Helicopter, edited by Walter J. Boyne and Donald S. Lopez. Though the helicopter can claim a venerable heritage from Chinese flying tops of the fourth century B.C. and da Vinci's lifting airscrew of the Renaissance, only in the last four decades has the world witnessed the advent of the "age of the helicopter." This book surveys the forty years of the rotary-wing revolution in its well-chosen selection of articles by such experts as Sergei Sikorsky and Charles H. Kaman. A valuable bonus for scholars is the book's concluding chapter, which features a helicopter bibliography and research guide. With illustrations. Smithsonian Institution Press, Washington, D. C., 1984. 258 pages. $10.95.

—Reviewed by Hugh Winkler, Assistant Managing Editor.

Tactical Air Warfare—Status and Prospects



An Air Force Association National Symposium

January 17–18, 1985
The Buena Vista Palace Hotel, Orlando, Fla.

You won't want to miss this one! AFA, in conjunction with the Tactical Air Command, is arranging this timely program to illuminate the host of issues that drive and shape the requirements of tactical air warfare. Major emphasis will be on such issues as theater air defense, USAF's interaction with ground and naval forces, and related tactical support functions performed by space-based assets.

The tentative lineup of distinguished speakers includes:

Gen. Jerome F. O'Malley
Commander
TAC

Gen. Robert W. Bazley
Commander in Chief
PACAF

Gen. Charles L. Donnelly, Jr.
Commander in Chief
USAFE

Adm. R. J. Hays, USN
Vice Chief of Naval Operations

Lt. Gen. Robert Kingston, USA
Commander in Chief
US Central Command

Maj. Gen. Thomas S. Swalm
Commander
USAF Tactical Air Warfare Center

Maj. Gen. John Marks, Jr.
Commander
ESC

Gen. Wallace Nutting, USA
Commander in Chief
US Readiness Command

Gen. William Richardson, USA
Commanding General
Training & Doctrine Command

Lt. Gen. Robert D. Russ
Deputy Chief of Staff
Research, Development & Acquisition

Gen. Thomas M. Ryan, Jr.
Commander in Chief
MAC

Also, the event includes a Thursday evening dinner. Dinner speaker will be former Secretary of State and former SACEUR Alexander M. Haig, Jr.

We know you will want to take advantage of this topical, important symposium as well as the many attractions in the Orlando area. Space is expected to be limited, so sign up now. Registration for all Symposium events is $175 ($200 for non-AFA members).

For information and registration, call Jim McDonnell, Dottie Flanagan, or Sara Ciccoli at (703) 247-5800.

Special Note: AFA's Florida state AFA organization is sponsoring the first annual Florida Salute to the Tactical Air Forces. This black-tie dinner dance will be held Friday evening, January 18. For information, call Mr. Norman Abramson at (305) 356-6560 or Mr. John Combs (305) 869-8134.

Valley of the Shadow

On October 6, 1918, two young airmen faced almost certain disaster in their final attempt to save the Lost Battalion.

BY JOHN L. FRISBEE

As THE last page of 1917's blood-stained calendar was torn from the wall, the German General Staff became immersed in planning for a massive spring offensive. The Allies had to be defeated, or at the least forced to accept a negotiated settlement, before slowly mobilizing American manpower and industry could reinforce the staggering British and French armies on the Western Front.

Everything looked favorable to Gen. Erich Ludendorff, the dominant member of Germany's Supreme Command. Allied morale, particularly in France, was faltering after the costly and near-disastrous campaigns of 1917. The Russians had dropped out of the war a few months after the March revolution, enabling Ludendorff to move nearly eighty divisions to the Western Front, where, for the first time, Germany was superior to the Allies in both manpower and materiel.

A series of gigantic offensives, begun in March 1918, drove to within thirty-seven miles of Paris before the overextended German armies ground to a halt and an Allied counteroffensive could be launched in July. By mid-September, Gen. John J. Pershing had forty-two American divisions, each twice the size of other Allied divisions, on the line in the Meuse-Argonne sector, some fifty miles east of Reims. There were about 600 planes in American squadrons augmented by 200 Allied aircraft, operating under the control of Brig. Gen. Billy Mitchell in support of Pershing's First Army offensive that kicked off on September 26.

Several American bombardment and observation squadrons were equipped with British-designed DH-4s, the only American-manufactured aircraft to reach the front lines during the war. The 50th Observation Squadron was one of those flying the often-maligned DH-4 "Flaming Coffin," which, in truth, was no more vulnerable to fire than any other combat plane of that time.

On October 2, Pershing ordered his 77th Division to drive into the Argonne Forest. The 1st and 2d Battalions of the 308th Infantry, their left flank uncovered, soon were cut off and surrounded by strong German forces in a ravine deep within the Argonne. Known to history as *the* Lost Battalion, the units, commanded by Maj. Charles Whittlesey and Capt. George McMurtry, were soon out of food and medical supplies. Half their troops were dead or wounded, and they were running out of ammunition to repel continuous German attacks on the seventy-five- by 350-yard pocket. It was to be six days of horrible suffering before American forces could break through to their rescue.

On October 5, the 77th Division commander called on Capt. Daniel Morse's 50th Squadron to succor the beleaguered defenders who were being cut to shreds by machine-gun fire from the heights surrounding the ravine and by grenades, flame throwers, and even misdirected rounds of friendly artillery. The squadron responded in what is believed to be the first sustained attempt at aerial resupply of a ground unit.



Lt. Harold E. Goettler (above) and his observer-gunner were World War I recipients of the Medal of Honor.

Flying through fog and rain, pilots of the 50th pinpointed the surrounded men. Intense ground fire downed three DH-4s, which crashed near Allied lines—none of them afire—with one dead and two wounded crewmen. On the morning of the sixth, a DH-4 flown by Lt. Harold E. Goettler with 2d Lt. Erwin R. Bleckley as observer-gunner tried again, unsuccessfully, to drop food and ammunition into the ravine. After their battle-damaged plane had been patched up, they returned to the forest late in the afternoon, hoping to come in at 1,000 feet. Clouds and fog forced them into low-level runs through a barrage of enemy fire. Finally, determined to get their small load of supplies to the desperate infantrymen, Goettler dove into the ravine at treetop height with enemy machine guns firing down at the plane from cliffs along the ravine. Both men were fatally wounded, but Goettler managed to fly the battered DH-4 to a crash landing near French lines.

Harold Goettler and Erwin Bleckley, both awarded the Medal of Honor posthumously, were among four American airmen of World War I to be so honored. The other two were Lt. Frank Luke (posthumously) and Capt. Eddie Rickenbacker. Three officers of the Lost Battalion(s)—Major Whittlesey, Captain McMurtry, and Capt. Nelson Holderman—were also among some 100 World War I heroes to win the nation's highest decoration for valor.

The story of the Lost Battalion, though no more than a page in the long history of World War I, is the stuff of which legends are made. Two very young and courageous airmen who are forever a part of the Air Force heritage played a seldom-recalled part in that heroic action. ■

THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

New GI Bill Becomes Law

A long-awaited GI Bill—educational assistance for the All-Volunteer Force—has been signed into law. *(See also "The Bulletin Board," p. 100, August '84 issue.)* It is a compromise of many conflicting recommendations.

Rep. G. V. "Sonny" Montgomery (D-Miss.), longtime advocate of a peacetime GI Bill, says he is "satisfied with the compromise." He notes that a recent Brookings Institute study concluded that the military may soon have to attract as many as two out of every three eligible young people to fill its ranks, given the decline in births some two decades ago. Congressman Montgomery says, "This critical shortage will mandate a return to the draft unless we offer what has long been . . . the most attractive incentive to sign up and stay in: an education."

How well this new legislation will do this is still open to debate. An Air Force spokesman, asked for reaction to the measure, told AIR FORCE Magazine that "it's still too early to tell how this will affect the Air Force." Privately, however, some Air Force personnel officials voice concern that the absence of a "transferability" feature—where careerists can designate family members as recipients of the benefit—and the necessity for an individual to get out to get the education benefits work against long-range Air Force interests.

In any event, the new program will go into effect for recruits entering service between June 30, 1985, and July 1, 1988. Eligible recruits are enrolled automatically unless they request otherwise.

Highlights include:

- A pay reduction of $100 per month for the first twelve months of basic pay for eligible people enlisting for at least three years of service. Payback would be $300 per month for up to thirty-six months.
- Those enlisting for two years would be charged at the same rate and get back $250 per month for up to thirty-six months.
- DoD can sweeten the benefits for hard-to-fill career fields by offering an additional $400 per month as a "kicker." Also, someone who served eight years could earn another $300 per month as a "supplemental" benefit.
- The Guard and Reserve provision remains unchanged from the original Montgomery/House plan. With a six-year enlistment or reenlistment/extension and after six months of service, Guard and Reserve people receive a basic entitlement of $140 per month for thirty-six months.

No new enrollments will be allowed under the current VEAP during the July 1985–June 1988 period. Those on active duty as of July 1985 who stay on another three years would get full benefits without further pay deductions.



AFA Executive Director Russell E. Dougherty (left) met at Louisville, Ky., last summer with Gen. William C. Westmoreland, USA (Ret.), just before a statewide meeting of the Vietnam Veterans Leadership Program. AFA strongly supports the nationwide objectives of the VVLP. General Westmoreland has actively furthered the program's goals. For more on VVLP, see July '84 "Bulletin Board."

Musical Chairs

Early this month, Col. Arnald D. Gabriel, Commander and Conductor of the USAF Band for the past twenty years, will direct his last performance when the Band plays its annual Washington, D. C., Christmas concert.

Colonel Gabriel, ending on a high note, is finishing a thirty-six-year military career. Under his direction, the 204-member musical aggregation, called by many observers the "best military band of all," played at many White House functions, performed overseas, and fulfilled uncounted engagements throughout the US in support of Air Force recruiting and community-relations programs.

The Air Force Band's major component groups include the Strolling Strings, the Singing Sergeants, the Concert Band, the "Mach One" rock group, and the unit that has strong ties to the World War II Maj. Glenn Miller group, the Airmen of Note. The Band has had only four musical leaders since the organization of its predecessor, the Bolling Field Army Air Forces Band, in the 1940s. Warming up his baton as the fifth is Colonel Gabriel's present deputy, Maj. James M. "Mike" Bankhead *(see photo)*.

Major Bankhead, who is currently finishing up his work for a doctorate in music, began his Air Force music career in 1969 as an airman oboist at

Lowry AFB, Colo. After being commissioned, he served as deputy commander of the Air Force Academy Band and as commander of the band at McChord AFB, Wash. He came to his USAF Band position after a stint in the Pentagon as Chief of the Air Force Bands and Music Branch in the Office of the Secretary of the Air Force Office of Public Affairs.

AFA wishes Colonel Gabriel all the best. Over the years, thousands of AFAers have thrilled to his music. Major Bankhead is also familiar to many AFAers, as he has led the Band on many tours throughout the world. *(For more on Colonel Gabriel and the USAF Band, see "From Valley Forge to Gabriel" on p. 74 of this issue.)*



Maj. James M. Bankhead, who this month succeeds Col. Arnold D. Gabriel as Commander of the USAF Band, here conducts the Band at one of their summer concerts at the US Capitol in Washington, D. C., as listeners relax behind him.

Commissary News

Narrowly headed off as the Ninety-eighth Congress shut down was a plan to test—probably in the Washington, D. C., and two other metropolitan areas—the "privatization" of armed forces commissaries.

This concept—which, in brief, would see a civilian food-store operator move into the existing commissary base facilities, run the operation using civilian employees, and split the profits with the military—was one of the proposals of the recent Grace Commission. Congress was somewhat enamored of this suggestion, and plans were afoot to test the concept. However, in the rush to adjourn, too many details remained to be worked out, and the plan was shelved. Knowledgeable observers look for it to surface again next year.

AFA delegates at the National Convention in September went on record as unanimously opposing any contracting out of the management or control of commissary stores.

Meanwhile, the Air Force Commissary Service (AFCOMS) was recently presented the Air Force Outstanding Unit Award, a first for the organization. *(See photo.)* Maj. Gen. George C. Lynch, AFCOMS Commander, accepted the award while giving full credit to the employees of the system for "doing things smarter, not harder." The award recognized the "effective operational innovations and organizational streamlining" of the unique organization.

For example, AFCOMS officials estimate that more than $900 million in savings were racked up by customers in 1984 as the result of vendor price reductions, cents-off coupons, and special sales negotiated by store managers. Some $30 million in coupon exchange alone was rung up.

In addition to helping customers save money, AFCOMS opened ten new stores and made major modifications at twenty other sites. Eleven of these projects won USAF design awards in competition with all other new Air Force construction.



Maj. Gen. George C. Lynch steadies the Air Force Commissary Service's flag while Maj. Gen. Clifton D. Wright, Jr., director of Air Force Engineering and Services, attaches the Air Force Outstanding Unit Award streamer in a ceremony at Kelly AFB, Tex. See accompanying item. (USAF photo)

Changes in Retirement Benefits

The Ninety-eighth Congress left behind some significant changes to the retirement benefits of both military and civilian government employees. For example, military retirees will now find that they receive their monthly annuity checks on the first business day of each month. Previously, government retainer checks were paid to retirees on the last calendar day of each month. A curious side effect of this new procedure is that retirees' 1984 W-2s will only list eleven months' income. This will affect taxable income computations.

For military retirees employed by Civil Service, the new law repeals the required reduction in civilian pay to offset military retirement cost-of-living adjustments. Further, military retirees who now enter federal civilian employment will be required to continue under Social Security. These people will also be covered through 1985 by a special retirement program, with a reduced employee contribu-

tion, to supplement Social Security. By January 1, 1986, it is anticipated that a permanent contributory system will be set up to supplement the Social Security retirement program.

VA Study Shows Veterans Earn More

In a recent study, the Veterans Administration determined that, in general, male war veterans have higher personal income and higher educational attainment than their nonveteran counterparts.

The veterans studied served during World Wars I and II, Korea, and Vietnam. The median personal income of the veterans is $18,760, nearly fifty percent higher than the $12,710 median income for nonveterans. Some of the differences in median income levels can be attributed to age, since veterans are "overrepresented" in the relatively high-income-earning middle and older age groups.

For example, Vietnam-era vets, aged twenty-five to thirty-nine, bring home an average of $19,640, compared to an average of $16,870 for nonvets. However, in the age group of twenty-five to twenty-nine, veterans fare worse, probably because of the advantages nonveterans have in getting an early start in the civilian labor force.

In the education area, the median number of years of education for veterans is 12.5, compared to 12.2 for nonveterans. This trend is expected eventually to reverse itself since the proportion of Vietnam veterans with college education is smaller than that for a comparable group of nonveterans of the same age.

Studies on women veterans are being launched.

Coming and Going

The Air Force has added two new critical skills to the Voluntary Reserve Officer Recall Program. Those with specialty codes 65XX (Acquisition Contracting/Manufacturing) and 80XX (Intelligence) will find a warm greeting awaiting their request for reentry.

The Air Force also is looking for officers in other skills—about eighty people in all—to come back on active duty. These shortage areas include pilots, navigators, air weapons controllers, and logistics planners or programmers. Those applying for recall must be able to qualify for active-duty retirement, *i.e.*, complete twenty years of service within twenty-eight years and thirty days from date of commission. Further, the program is limited to those who left the service voluntarily and who were not passed over for promotion while on active duty.

Those interested and qualified can find out more by calling toll-free to Randolph AFB, Tex., 1-800-531-5809. If you're in Texas, call 1-800-292-5355.

Meanwhile, Headquarters has announced that eligible officers and enlisted members who are due for separation from December 11, 1984, through January 6, 1985, may, in general, separate any time during that period, upon request. Commanders can block these Christmas requests if they feel the mission will suffer—additionally, members facing some type of administrative or judicial action are barred from exiting this way.

THE BULLETIN BOARD

New CHAMPUS Rules

As part of a broad program revision, CHAMPUS has instituted some sweeping changes in its reimbursement coverage for alcoholism and mental-health programs and residential treatment centers.

In the alcoholism treatment areas, the CHAMPUS policy is now more closely akin to that of private health-benefits plans. Basically, it requires that all therapy take place in an alcohol treatment center and be prescribed by a medical doctor or other mental-health-care provider. Detoxification, rehabilitation, outpatient care, and family therapy are all covered benefits. During a patient's lifetime, treatment is limited to three benefit periods of 365 days each.

CHAMPUS will continue to cost-share prescriptions for Antabuse—a drug that causes violent illness if alcohol is consumed—but will not cover the hospital bills if the patient is admitted only to receive Antabuse. Further, CHAMPUS will not cover cost of halfway houses; aversion therapy, in which a therapist uses electric shock or drugs to condition patients to avoid drinking; or any counseling that is not deemed medically or psychologically necessary.

In the mental-health area, the new rules clearly spell out what has, in reality, been long-standing CHAMPUS policy—that is, only "significant" professionally recognized mental disorders qualify for coverage. Such disorders must not only cause distress but also impair a patient's ability to function. The rules also restrict eligibility when use is made of certain treatment locations for care, and they provide for more extensive review by professionals to determine whether or not the care is necessary.

Finally, new rules on residential treatment centers (RTCs) stiffen the



Winner of the best year-round United Services Organization (USO) public-relations program worldwide is Rita Hardy, director of the public-relations committee of the James S. McDonnell USO at St. Louis's Lambert International Airport, Mo. Here she receives her award from Dennis P. Long, President and Chief Operating Officer of Anheuser-Busch, Inc., recently elected chairman of the worldwide USO (see box, p. 119, August '84 issue, in "Intercom"). A total of 160 USO facilities competed for the award.

admission standards for children with mental disorders and set specific requirements for RTCs. Long at issue within CHAMPUS policy debates has been the difficult distinction between children with social environment problems, either at home or school, and those who suffer from signficant emotional disorders. The new rules call for a clear demonstration of mental disorder in order to qualify for the expensive RTC treatment. Further, the streamlined rules emphasize that treatment must be aimed at improving the patient's ability to function outside of a structured and protected environment.

All of the new requirements went into effect last month. Prospective patients in any of these areas should check first with their local Hospital Benefits Advisor at any base hospital before incurring expenses.

Short Bursts

The largest single construction contract ever awarded by the VA—$115 million—has gone to the M. A. Mortenson Co. of Minneapolis **to build a replacement VA Medical Center** in that city. It will take about three years and serve some 520,000 veterans in the Minneapolis-St. Paul area.

DoD's **Dependents School System,** which serves some 147,000 overseas minor dependents in twenty foreign countries, has chalked up a ninth straight year in which its **students scored higher than the national average on the Scholastic Aptitude Test.** DoD's students averaged 440 in verbal skills—fourteen points better than the national norm—and 477 in mathematics, beating Stateside students by six points.

The US Jaycees have picked **Maj. Marsha L. Lutz,** a squadron commander at Castle AFB, Calif., as **one of the ten Healthy American Fitness Leaders for 1984.** Major Lutz, selected both as an individual competitor and for her efforts to make quality fitness and health programs available to others, is a twelve-time US National Masters AAU diving champion. She spends much of her off-duty time working with local high-school and college diving teams and has coached both handicapped children and "over-age-seventy" swimmers.

The VA reminds veterans that, if they follow a growing national trend of making funeral and burial arrangements ahead of time, **they cannot collect VA burial benefits early.** These may be paid only after death and to the person who bears the expense of the burial.

The Air Force, which has reigned for two years as **Armed Forces Chess Team Champion,** finally lost out **this year to Army.** Its 33.5 points brought it in second to Army's 39. Sea Services was third with 26.5. Air Force **Sgt. Emory A. Tate,** Fort Meade, Md., did win individual honors for the second year in a row. The Air Force has produced the individual champion sixteen times out of the twenty-five national tournaments held.



Members of the 384th Bomb Group Association, representing former members of the World War II Eighth Air Force unit, recently donated to DoD a photo of the stained glass window in the parish church of St. James the Apostle, Grafton Underwood, Northamptonshire, England. The window shows a B-17 returning from a bombing mission. Here Lt. Gen. E. A. Chavarrie, USAF, Deputy Ass't Secretary of Defense for Military Personnel and Force Management, accepts the photo from Lloyd W. Whitelow (right), Senior Vice President of the 384th Bomb Group Assn.

Yes, **the Pentagon is big.** How big? Total land area, including parking, covers 583 acres. The original land cost was just over $2 million, impossible to duplicate in the greater D. C. area today. If you were to walk every mile of its corridors, you'd cover 17.5 miles.

Brig. Gen. Richard S. Beyea, Jr., Commander, Air Force Office of Special Investigations, is the **only DoD investigator honored by the Association of Federal Investigators** in 1984. They've named him to receive the Law Enforcement Leadership Award. He's been recognized for pioneering the use of undercover agents in military investigations and for recovering more than $13 million in assets through OSI work in fraud cases.

If you're a **VA pensioner** and haven't received **an income questionnaire,** call your local VA office immediately. If you've received it, **fill it out and send it back.** The questionnaire, required by law, must be completed and returned to VA by January 1, 1985, or monthly checks may stop. If you need help in filling it out, call your local VA office, listed in the phone book under "US Government."

The **three hottest toy items** for under the Christmas tree this year, according to the Army and Air Force Exchange Service, are the **Cabbage Patch Doll, Trivial Pursuit, and Care Bears.** The most interesting new items are robots. BXs are selling five different kinds, including Verbot, a talking android.

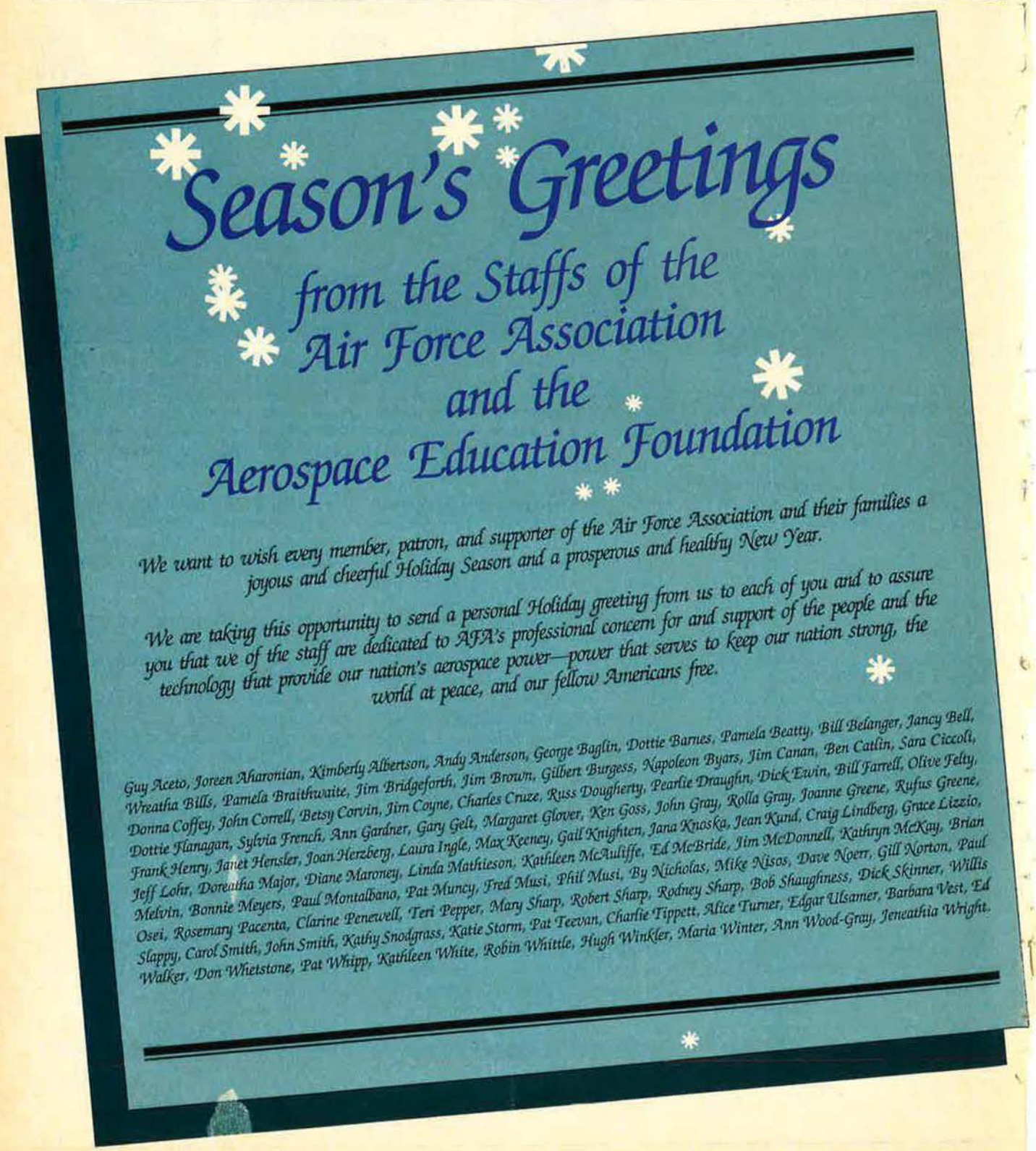
Senior Staff Changes

CHANGE: B/G Wesley Clark, from Vice Cmdr., 1st Space Wing, Hq. SPACECOM, Peterson AFB, Colo., to Ass't DCS for Plans, Hq. SPACECOM, Peterson AFB, Colo.

SENIOR ENLISTED ADVISOR CHANGE: CMSgt. Jack E. Bowerman, to SEA, Hq. AFLC, Wright-Patterson AFB, Ohio, replacing CMSgt. Robert E. Rogers. ■

AFA INTERCOM

By Robin L. Whittle, AFA DIRECTOR OF COMMUNICATIONS



AFA Chapters Salute Air Force Enlisted People

Jack Douglas, Associate Editor of the Fort Worth *Star-Telegram*, devoted most of his September 10 "Military Focus" column to the Fort Worth Chapter's "Salute to Enlisted Personnel" held September 6 at Carswell AFB, Tex. Featured speaker was CMSAF Sam Parish, who noted that America's best defenses are the quality of the people serving in the armed forces, the tools they are given to fulfill their missions, and the backing they receive from the civilian population. Despite improved enlistment and retention levels, Chief Parish said that more needs to be done to build up the pride and confidence that are necessary for improved morale and higher quality. Chief Parish, who joined the Air Force at age seventeen and has served for thirty years, was introduced at the event by former CMSAF Thomas N. Barnes, who held the top enlisted position from 1973 to 1977 and who now resides in Fort Worth.

Fort Worth Chapter President Dan Heth, who was installed during the evening along with the 1985 officer slate, said that Chief Parish "praised the work of AFA nationwide." The Chief reminded the more than 275 in attendance "of AFA's strong, significant voice in support of enlisted personnel," Mr. Heth said. (Other Fort Worth Chapter officers installed by Texas AFA President Bryan Murphy were Buck Webber, vice president for operations; Sam Keith, vice president for programs; Bob Copley, secretary; and A. B. Curfman, treasurer.)

The Fort Worth event is the latest in a series of AFA chapter functions that have highlighted and honored Air Force enlisted personnel. Earlier this year, AFA's Fran Parker Chapter sponsored an "Enlisted Awards Banquet" honoring outstanding airmen at Holloman AFB, N. M. The event featured the first Chief Master Sergeant of the Air Force, Paul W. Airey (1967–69), as speaker. Joe Turner, then National Vice President for the Southwest Region, and Lou Evers, New Mexico State President, helped present the honors.

AFA's Scott Memorial Chapter in Illinois hosted its second annual "Salute to Our Enlisted Force" at the Scott AFB NCO Club last March. Sixteen outstanding enlisted people—two from each major unit at Scott—were honored at the dinner, which featured CMSAF Sam Parish as guest speaker. During the evening, Scott Memorial Chapter President Hugh



Dan Heth, right, President of AFA's Fort Worth Chapter, welcomes Chief Master Sergeant of the Air Force Sam E. Parish, center, and former CMSAF Thomas N. Barnes (1973–77) to the Chapter's "Salute to Enlisted Personnel" held in September at Carswell AFB, Tex.



Chief Master Sergeant of the Air Force Sam E. Parish presents an award to TSgt. Susan M. Sadler of the 932d Aeromedical Airlift Group (AFRES Assoc.), Scott AFB, Ill., during the Scott Memorial Chapter's second annual "Salute to Our Enlisted Force" held last spring. At the podium is Hugh L. Enyart, then Chapter President and now National Vice President (Great Lakes Region).

Enyart inducted Chief Parish into the honorary "Red Coat Society" by presenting him with the Scott Chapter's red blazer.

The Scott Chapter received the 1984 Donald W. Steele, Sr., Memorial Award as AFA's Outstanding Unit of the Year in conjunction with the Colorado Springs/Lance Sijan Chapter. Mr. Enyart was awarded AFA's Presidential Citation during the 1984 National Convention.

INTERCOM

Wright Chapter Seeks AFA Support for Air Force Museum Addition

AFA's Wright Memorial Chapter in Dayton, Ohio, has launched a nationwide fund-raising campaign to support a multimillion-dollar addition to the Air Force Museum at Wright-Patterson AFB. In August, Chapter Presi-



A $2,000 check—the result of the Wright Memorial Chapter's successful August fund-raising campaign to support an addition to the Air Force Museum at Wright-Patterson AFB, Ohio—is presented by Chapter President Sid Hill, right, to Col. Richard L. Uppstrom, USAF, center, Museum Director, while Lt. Gen. James T. Stewart, USAF (Ret.), campaign coordinator, beams his approval. The Chapter is challenging all AFA units to top its August results.



Field leaders from AFA's North Central Region ("Strategic Country") pause during their tour of AFA's new National Headquarters Building. The occasion was the twentieth annual AFA State Presidents Orientation Meeting. Pictured, from left, are James Crawford, North Dakota State President; Jan Laitos, National Vice President (North Central Region); Paul Markgraf, Minnesota State President; and John Kittelson, South Dakota State President. (Photo by Eddie McCrossan)

dent Sid Hill presented a $2,000 check to Col. Richard L. Uppstrom, Museum Director. The check was the result of donations by AFA leaders and members in Dayton during the month of August.

"I ask every AFA chapter to match or exceed our contribution—$2,000 is only the beginning. The Wright Memorial Chapter hopes to give more," Mr. Hill said. He has sent personal letters to every state and chapter president throughout AFA, asking them to join in the Air Force Museum Foundation's effort to build an addition. This major expansion program will double the Museum's present size at a cost of $10.8 million. Half the funds will come from the federal government; the other $5.4 million must be raised by the Museum Foundation.

AFA members will recall that the Museum Foundation raised some $7 million in the 1960s to build the current Museum building, which was donated to the Air Force in 1971. Museum Director Uppstrom says the collection of artifacts and aircraft has nearly doubled since 1971; many important historic aircraft are outdoors or are stored at a hangar almost a mile from the main display. He estimates that only about ten percent of the millions who visit the Museum each year see these aircraft. There is also concern that many of these aircraft are deteriorating outdoors.

AFA's Wright Memorial Chapter has always had a keen interest in the Museum and is making the fund-raising campaign a priority for 1985. Maj. Gen. William J. Kelly, USAF (Ret.), has agreed to help in the effort. AFA's first National President, Lt. Gen. Jimmy Doolittle, USAF (Ret.), and actor and retired Air Force Brig. Gen. James Stewart are serving as National Honorary Co-Chairmen of the fund drive.

"The Air Force Museum is a national treasure, and the current project to continue its development benefits all of us who believe in aerospace power," Mr. Hill concluded.

Excitement in the Sky at General Robert F. Travis Chapter Air Fair

More than 10,000 people from as far away as Nevada trekked to the Travis AFB, Calif., area on Saturday, September 29, for the General Robert F. Travis Chapter's seventh "Vacaville Air Fair," which was cosponsored by the Vacaville Chamber of Commerce. John Higgins, staff writer for the Vacaville *Reporter,* said the fair offered a "second by second thrill with 'oohs,' 'ahs,' and assorted gasps as, one after another, a talented lineup of



AFA National President Martin H. Harris, right, and National Secretary Sherman W. Wilkins get a close-up look at the AFA grandfather clock. The clocks are available exclusively to AFA members at a price of $800 each. (Photo by Eddie McCrossan)



The agenda for this year's AFA State Presidents Orientation Meeting included a tour of AFA's new National Headquarters Building. Visiting the data processing facility are, from left, Richard C. Doom, National Vice President (Far West Region); Morgan S. Tyler, Jr., National Vice President (Southeast Region); Jim LeBlanc, Louisiana State President; Chester Richardson, Ohio State President; and Robert G. McCullough, Under-40 National Director. (Photo by Eddie McCrossan)

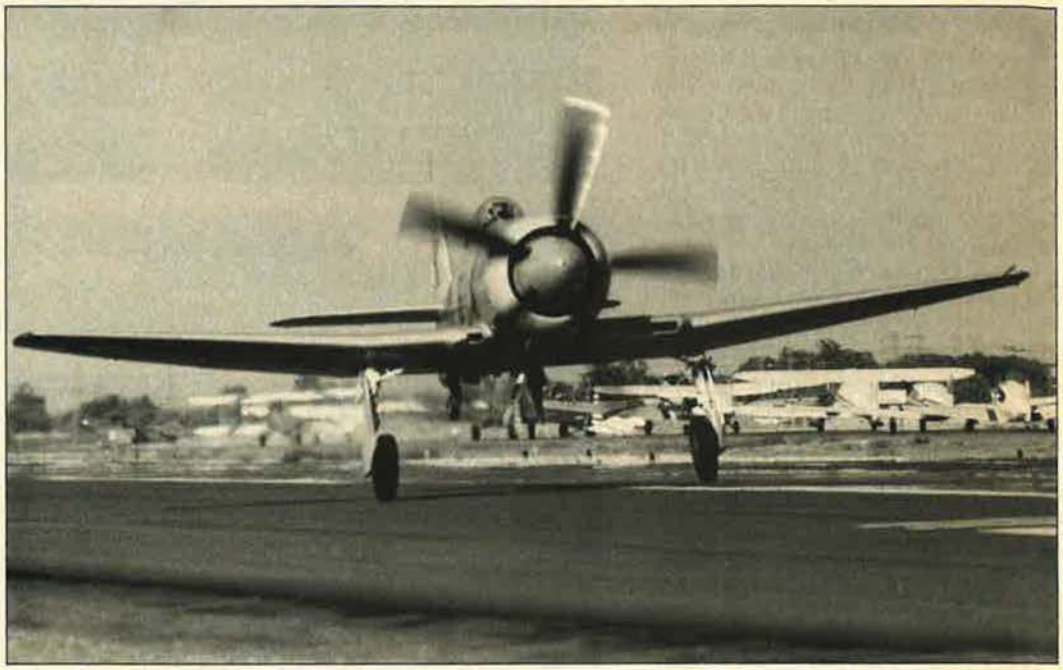


The opening ceremonies at the 1984 Vacaville Air Fair featured a stirring salute to the flag by the Square Shooter Skydivers. Shown here is Skydiver Becky Livingston. (Photo by Steve Lomba)

flyers performed gut-wrenching, death-defying maneuvers in a variety of airplanes."

The Air Show boasted a variety of classic aircraft, including four North American P-51 Mustangs, six restored North American AT-6s and Navy SNJs, Ryan PT-22s, Stearman PT-17s, a Beech AT-11, a Vultee BT-13, a Hawker Sea Fury (a British carrier-based fighter that was built in Great Britain in 1951 for the Royal Australian Navy), a Bücker Jungmeister of the German Luftwaffe, a P-40 Warhawk, Navy Corsairs, and twin-boom P-38 Lightnings. More than forty aircraft filled out the show's schedule.

But the real drama was in the sky, according to Air Fair Chairman Art Littman, who cited some twelve aerobatic performances that one reporter described as "sizzling, sky-cleaving exhibitions of skill and control." Some of the most popular aerobatic feats were performed by the Tahoe

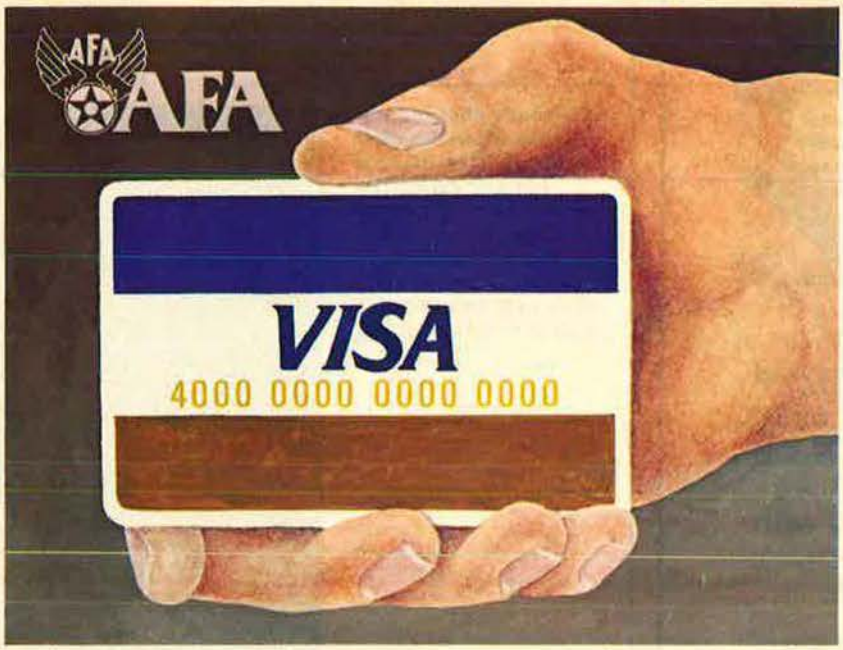


Adding international flavor to the Vacaville Air Fair was a Hawker Sea Fury, a British carrier-based fighter. This model was built in Great Britain in 1951 for the Royal Australian Navy. At the controls was Ellsworth "Getch" Getchell. (Photo by Steve Lomba)



A USAF C-5 Galaxy flies low over Nut Tree Airport during the Vacaville Air Fair. More than 10,000 people attended the 1984 Air Fair, which was cosponsored by AFA's General Robert F. Travis Chapter and the Vacaville Chamber of Commerce. (Photo by Dean Freeman)

Coming soon for Air Force Association members and their families!



AFA and VISA bring you the credit and convenience you've earned

Early in 1985, Air Force Association and Central Fidelity Bank of Virginia will join forces to bring AFA members and their families their own, exclusive VISA Card with exceptional advantages and features.

Every member will receive a personal, mailed invitation to apply. However, we felt members would appreciate a brief preview of some of the remarkable features of this AFA membership benefit. They include:

- NO first year annual fee, and a low, $15 annual fee thereafter.
- FREE Common Carrier Travel Insurance up to $400,000 when tickets are charged to your AFA VISA Card.
- HIGH credit limits, appropriate to members' professional standing.
- WAIVER of all liability for unauthorized charges on lost or stolen AFA VISA Cards.
- LOW interest rates . . . a one-time 12% APR on balances transferred from other credit cards (MasterCard and VISA) and just 18% APR on new purchases.
- AND AS A FUTURE SPECIAL BENEFIT: Members will be able to authorize automatic billing of AFA membership renewals, and/or premiums on AFA insurance coverage to their AFA VISA account . . . so there'll never be any danger of lapsed membership or insurance.

WATCH THE MAIL FOR COMPLETE INFORMATION EARLY IN 1985

AFA
AFA
Air Force Association

1501 Lee Highway
Arlington, Virginia 22209-1198

THE PERFECT GIFT

ORIGINAL WWI
&
WWII POSTERS



"KEEP 'EM FLYING"
IS OUR BATTLE CRY!

DO YOUR PART
FOR
DUTY - HONOR - COUNTRY

For catalog with over 350 illustrations send $2.00 to:

MEEHAN FINE ARTS
980 Fifth Avenue #27
New York, N.Y. 10021
(212) 734-5683

INTERCOM



Aerobatic pilot Ted Anderson shows his stuff in his Christen Eagle II biplane during the Vacaville Air Fair. In the aerobatic world, few planes are more respected than the relatively new, tiny Christen Eagle II. (Photo by Steve Lomba)

Aces, Bob Oliver and Mike Van Wagenen. Other performers included Kirk McKee in an AT-6; Don Carter in a Bücker Jungmeister; Jim Rust, at age seventeen America's youngest licensed stunt pilot, in a Cessna 152A; Bob Oliver in a Pitts Special; Julie Clark, who was described in promotional material as approaching the fringes of her T-34's operating envelope by bending technically correct aerobatic maneuvers into a graceful rendition of aerial choreography; and Barney Register and Ted Anderson in a Christen Eagle II. Formation aerobatics were performed by Bob Farrell (T-34), Kirk McKee (AT-6), and Chuck Lisher (Marchetti).

In addition to Warbird formations and radio-controlled models, the sky was full of skydivers, sometimes ten to twelve falling in formation at once. Particularly stirring was an in-flight salute to the flag by the Square Shooter Skydivers. At one point late in the afternoon, a C-5 Galaxy and C-141 StarLifter thrilled the crowd with a low-altitude flyby, which was followed by Ted Anderson in his Christen Eagle II biplane in an aerial ballet performed to the music of German opera composer Richard Wagner's dramatic "Ride of the Valkyries." Finally, Tahoe Aces Bob Oliver and Mike Van Wagenen created a smoked-edged heart.

And that's only part of the seven-hour spectacle that occurred at the Nut Tree Airport in Vacaville on a summer-like Saturday in September. Said Chapter President Walt Scott, who served as co-chairman of the event: "We've got an outstanding program

BLACKBIRD™
AEROSPACE SHIRTS
MACH 3+



SR-71

Available Designs:
SR-71
F-4
F-14
F-15
F-16
F-18
F-20
F-111
A-10
T-38
B-1B
B-52
C-5B
C-130
C-141
AH-64
UH-60
NASA

$15 ea.

Catalog $1.00

Sizes: S (34-36), M (38-40), L (42-44), XL (46-48)

Shipping: Add the following

	First Shirt	Ea. Addt'l
USA	$1.50	$ .50
Canada	$2.50	$1.00
Others	$5.00	$2.50

Delivery: 2 to 3 weeks

UNIQUE CHRISTMAS GIFTS!

The First and only name in Aerospace shirts, around the world.

Electrifying high technology visual illustrations of the world's most exotic and advanced aircraft, screen printed in brilliant colors on the front and back of Black Hanes 100% Cotton Beefy-T's.

VISA MasterCard AMERICAN EXPRESS

If paying by credit card include card no. and exp. date

1·602·966·7384

BLACKBIRD
DEPARTMENT 444
P.O. BOX 8607
SCOTTSDALE,
ARIZONA
85252

™

La Mode Du Golf



COTTON CLASSICS!

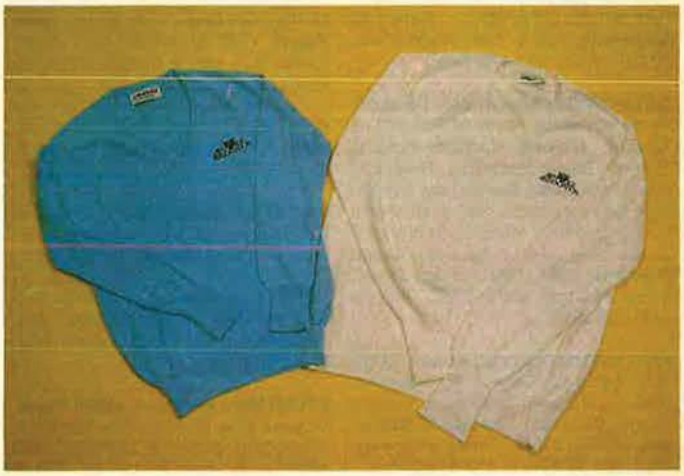
Style #1910, $18.50
Features: *4 button placket; 2 pieced fused collar; Pearl buttons; Right side pocket with flap; Double needle tailoring; collar stays; Full golfer cut.*
Sizes: *S-M-L-XL-XXL*
Colors: *White, Navy, Camel, Red, Kelly Green*

Style #2400, $15.50
Features: *Ladies version-2 Button placket; Fashion knit collar; Banded sleeves; Long rear tail.*
Sizes: *S-M-L-XL*
Colors: *White, Bone, Navy, Kelly Green, Lavender*

CASHMERLON™!

Style # 1001, $22.50
Features: *Full turnback cuff; fully fashioned saddle shoulder; full golfer cut.*
Sizes: *S-M-L-XL-XXL*
Colors: *White, Navy, Chocolate, Burgundy*

Style #2001, $22.00
Features: *Ladies Version-Full turnback cuff; fully fashioned; raglan sleeve.*
Sizes: *S-M-L-XL*
Colors: *White, Lt. Blue, Navy and Plum*





ALL WEATHER WEAR!

Style #JK 1700, $31.00
Features: *100% nylon water repellent rain jacket; noise resistant fabric; heavy zippers; hidden hood; action knit under arms allows for free and easy movement; Two front zip pockets.*
Sizes: *S-M-L-XL-XXL*
Colors: *Lt. Blue, Navy, Camel*

Style #JK 2700, $30.00
Features: *Ladies version of JK1700*
Sizes: *S-M-L-XL*
Colors: *Yellow, Navy, Plum*

Style #	Color	Size	Quantity	Price
		Shipping and handling		3.00
		TOTAL AMOUNT ENCLOSED		$

Enclose check or money order made payable to the Air Force Association and send to AFA, 1501 Lee Highway, Arlington, VA 22209-1198. (Virginia residents please add 4 percent sales tax.)(Please allow six to eight weeks for delivery.)

12-84

SHIP TO:

Name

Address

City/State/Zip Code

AFA State Contacts

Following each state name, in parentheses, are the names of the communities 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 appropriate contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Jim Patterson,** 802 Brickell Rd., N.W., Huntsville, Ala. 35805 (phone 205-837-5087).

ALASKA (Anchorage, Fairbanks): **Michael T. Cook,** 1001 Noble St., Fairbanks, Alaska 99701 (phone 907-456-7762).

ARIZONA (Phoenix, Sedona, Sun City, Tucson): **Meryll Frost,** 7426 E. Random Ridge Drive, Tucson, Ariz. 85710 (phone 602-298-1580).

ARKANSAS (Blytheville, Fayetteville, Fort Smith, Little Rock): **Aaron E. Dickerson,** 710 S. 12th, Rogers, Ark. 72756 (phone 501-636-7460).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hermosa Beach, Los Angeles, Merced, Monterey, Novato, Orange County, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Jose, Santa Barbara, Santa Monica, Sunnyvale, Vandenberg AFB, Yuba City): **David Graham,** 29611 Vista Plaza Drive, Laguna Niguel, Calif. 92677 (phone 714-495-4622).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Fort Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **Thomas W. Ratteree,** P.O. Box 26029, Colorado Springs, Colo. 80936 (phone 303-599-0143).

CONNECTICUT (East Hartford, North Haven, Storrs, Stratford, Westport, Windsor Locks): **Raymond E. Choquette,** 16 Tonica Springs Trail, Manchester, Conn. 06040 (phone 203-646-4818).

DELAWARE (Dover, Wilmington): **Joseph H. Allen, Jr.,** 31 Muirfield Court, Dover, Del. 19901 (phone 302-674-3400).

DISTRICT OF COLUMBIA (Washington, D. C.): **David J. Smith,** 1501 Lee Highway, Arlington, Va. 22209-1198 (phone 703-247-5820).

FLORIDA (Avon Park, Brandon, Cape Coral, Daytona Beach, Fort Walton Beach, Gainesville, Homestead, Jacksonville, Leesburg, Naples, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa, West Palm Beach, Winter Haven): **H. Lake Hamrick,** 206 Sotir Ave., Fort Walton Beach, Fla. 32548 (phone 904-862-5067).

GEORGIA (Athens, Atlanta, Columbus, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **Wilbur H. Keck,** 116 Stillwood Drive, Warner Robins, Ga. 31093 (phone 912-922-0655).

GUAM (Agana): **Joe Gyulavics,** P. O. Box 21543, Guam 96921 (phone 671-734-2369).

HAWAII (Honolulu): **Don J. Daley,** P. O. Box 3200, Honolulu, Hawaii 96847 (phone 808-525-6296).

IDAHO (Boise, Mountain Home, Twin Falls): **Stanley I. Anderson,** Box 45, Gowen Field, Boise, Idaho 83709 (phone 208-362-9360).

ILLINOIS (Belleville, Champaign, Chicago, Elmhurst, Peoria, Springfield-Decatur): **Kyle Robeson,** P.O. Box 697, Champaign, Ill. 61820 (phone 217-352-3936).

INDIANA (Bloomfield, Fort Wayne, Indianapolis, Lafayette, Logansport, Marion, Mentone, South Bend): **John Kagel,** 1029 Riverside Drive, South Bend, Ind. 46616 (phone 219-234-8855).

IOWA (Des Moines): **Carl B. Zimmerman,** 608 Waterloo Bldg., Waterloo, Iowa 50701 (phone 319-232-2650).

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum,** 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-683-3963).

KENTUCKY (Lexington, Louisville): **Carl D. Black,** 11500 Redwood Way, Anchorage, Ky. 40223 (phone 502-245-7697).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **James P. LeBlanc,** 3645 Monroe St., Mandeville, La. 70448 (phone 504-626-4516).

MAINE (Bangor, Limestone, N. Berwick): **Alban E. Cyr, Sr.,** P. O. Box 160, Caribou, Me. 04736 (phone 207-496-3331).

MARYLAND (Andrews AFB area, Baltimore, Rockville): **James M. Kennedy,** 304 Tantallon Drive, Fort Washington, Md. 20744 (phone 301-292-6066).

MASSACHUSETTS (Bedford, Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **John F. White,** 49 West Eagle St., East Boston, Mass. 02128 (phone 617-567-1592).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Marquette, Mount Clemens, Oscoda, Petoskey, Southfield): **Robert J. Schaetzl,** 42247 Trotwood Court, Canton, Mich. 48187 (phone 313-552-3280).

MINNESOTA (Duluth, Minneapolis-St. Paul): **Paul G. Markgraf,** 2101 E. 3d St., St. Paul, Minn. 55119 (phone 612-735-4411).

MISSISSIPPI (Biloxi, Columbus, Jackson): **R. E. Smith,** Route 3, Box 282, Columbus, Miss. 39701 (phone 601-327-4422).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **James R. Hopkins,** 316 Hillcrest Drive, Warrensburg, Mo. 64093 (phone 816-747-6087).

MONTANA (Great Falls): **John Phillips,** P. O. Box 685, Great Falls, Mont. 59403 (phone 406-761-3989).

NEBRASKA (Lincoln, Omaha): **Edward A. Crouchley,** 1314 Douglas On the Mall, Omaha, Neb. 68102 (phone 402-633-2125).

NEVADA (Las Vegas, Reno): **William J. Becker,** 1709 Valmora, Las Vegas, Nev. 89102 (phone 702-873-5945).

NEW HAMPSHIRE (Manchester, Pease AFB): **Robert N. McChesney,** Scruton Pond Rd., Barrington, N. H. 03825 (phone 603-664-5090).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Middlesex County, Newark, Old Bridge, Trenton, Wallington, West Orange, Whitehouse Station): **Gilbert Freeman,** 42 Weirimus Lane, Hillsdale, N. J. 07642 (phone 201-666-5379).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Louie T. Evers,** P. O. Box 1946, Clovis, N. M. 88101 (phone 505-762-1798).

NEW YORK (Albany, Brooklyn, Buffalo, Chautauqua, Garden City, Hempstead, Hudson Valley, New York City, Niagara Falls, Plattsburgh, Queens, Rochester, Rome/Utica, Southern Tier, Staten Island, Suffolk County, Syosset, Syracuse, Westchester): **Robert H. Root,** 57 Wynnwood Ave., Tonawanda, N. Y. 14150 (phone 716-692-2100).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Greensboro, Kitty Hawk, Raleigh): **Bobby G. Suggs,** 501 Bloomfield Drive, Fayetteville, N. C. 28301 (phone 919-323-5281).

NORTH DAKOTA (Concrete, Fargo, Grand Forks, Minot): **James M. Crawford,** 1720 9th St., S. W., Minot, N. D. 58701 (phone 701-838-0010).

OHIO (Akron, Cincinnati, Cleveland, Columbus, Dayton, Newark, Youngstown): **Charles B. Spencer,** 333 West 1st St., Suite 252, Dayton, Ohio 45402 (phone 513-228-1175).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **G. G. Atkinson,** P.O. Box 25858, Oklahoma City, Okla. 73125 (phone 405-231-6213).

OREGON (Eugene, Portland): **Zane R. Harper,** 5360 SW Dover Lane, Portland, Ore. 97225 (phone 503-244-4561).

PENNSYLVANIA (Allentown, Beaver Falls, Coraopolis, Drexel Hill, Erie, Harrisburg, Homestead, Johnstown, Lewistown, Philadelphia, Pittsburgh, Scranton, State College, Washington, Willow Grove, York): **Jack B. Flaig,** P.O. Box 375, Lemont, Pa. 16851 (phone 814-238-4212).

PUERTO RICO (San Juan): **Fred Brown,** 1991 Jose F. Diaz, Rio Piedras, P. R. 00928 (phone 809-790-5288).

RHODE ISLAND (Warwick): **King Odell,** 413 Atlantic Ave., Warwick, R. I. 02888 (phone 401-941-5472).

SOUTH CAROLINA (Charleston, Clemson, Columbia, Myrtle Beach, Sumter): **James Catlngton,** 2122 Gin Branch Rd., Sumter, S. C. 29154 (phone 803-481-2634).

SOUTH DAKOTA (Rapid City, Sioux Falls): **John E. Kittelson,** 141 N. Main, Suite 308, Sioux Falls, S. D. 57102 (phone 605-336-2498).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Jack K. Westbrook,** P. O. Box 1801, Knoxville, Tenn. 37901 (phone 615-523-6000).

TEXAS (Abilene, Amarillo, Austin, Big Spring, College Station, Commerce, Corpus Christi, Dallas, Del Rio, Denton, El Paso, Fort Worth, Harlingen, Houston, Kerrville, Laredo, Lubbock, San Angelo, San Antonio, Waco, Wichita Falls): **Bryan L. Murphy, Jr.,** General Dynamics, P. O. Box 748 MZ 1221, Fort Worth, Tex. 76101 (phone 817-429-0693).

UTAH (Brigham City, Clearfield, Ogden, Provo, Salt Lake City): **Jack Certain,** 2369 N. 2600 East, Layton, Utah 84041 (phone 801-777-7235).

VERMONT (Burlington): **John D. Nevin,** 6 Belwood Ave., Chochester, Vt. 05446 (phone 802-863-1510).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **C. W. Scott,** 6368 Brampton Court, Alexandria, Va. 22304 (phone 703-370-2702).

WASHINGTON (Bellingham, Seattle, Spokane, Tacoma, Yakima): **David Anderson,** 915 E. Lake Sammamish Shore Lane, SE, Issaquah, Wash. 98027 (phone 206-342-1943).

WEST VIRGINIA (Huntington): **David Bush,** 2317 S. Walnut Drive, St. Albans, W. Va. 25177 (phone 304-722-3583).

WISCONSIN (Madison, Milwaukee): **Charles Marotske,** 7945 S. Verdev Drive, Oak Creek, Wis. 53154 (phone 414-762-4383).

WYOMING (Cheyenne): **Al Guidotti,** P. O. Box 811, Cheyenne, Wyo. 82001 (phone 307-638-3361).

INTERCOM

and a larger crowd than last year that has given us excellent support. This isn't a money-making venture for us, but more of a public service. And if the crowd is going to support us like this, we're going to continue to do it."

Not only do people support this event through attendance, but many have signed up as loyal, active members of AFA's General Robert F. Travis Chapter as a result.

UNIT REUNIONS

Merced Army Airfield
Personnel who served at the Merced Army Airfield from 1941–46 will hold a reunion on May 3–5, 1985, in Merced, Calif. **Contact:** Lee E. Barrett, P. O. Box 25, Winton, Calif. 95388. Phone: (209) 358-3994. John L. Blair, 1530 W. 23d St., Merced, Calif. 95340. Phone: (209) 722-1668.

Class 43-D
Members of Class 43-D will hold their second reunion on April 19–22, 1985, in Washington, D. C. **Contact:** Gene Causey, 3914 W. Shore Rd., Edgewater, Md. 21037. Phone: (301) 798-0341.

308th Bomb Wing
The 308th Bomb Wing will hold its fourth reunion on May 10–12, 1985, in San Antonio, Tex. **Contact:** Allan T. Stein, 2 Hacienda Lane, Houston, Tex. 77024.

314th Fighter Squadron
The 314th Fighter Squadron, 324th Fighter Group, will hold a reunion on May 17–19, 1985, at the Ramada Inn at Bradley IAP in Windsor Locks, Conn. **Contact:** Eugene P. Rouse, 122 Sheraton Rd., Syracuse, N. Y. 13219.

Stalags Luft I and III
Former prisoners of war of Stalags Luft One and Three are planning to hold a reunion in May 1985 in Barth, East Germany.
Please contact the address below.
Phil Gibbons
549 N. E. Eighth Ave.
Deerfield Beach, Fla. 33441

6th Bomb Group
Former members of the 6th Bomb Group, which included the 24th, 39th, and 40th Bomb Squadrons, are trying to organize a reunion to be held in the summer of 1985 to commemorate the fortieth anniversary of the war in the Pacific.
Please contact the address below.
Newell W. Penniman, Jr.
6 Porter Lane
South Hamilton, Mass. 01982

18th TFW
Plans are being made to hold a reunion in April 1986 for former members of this unique wing, one of the few in USAF in service since January 1927.
Please contact the address below.
Cletus J. Pottebaum
6503 E. Murdock
Wichita, Kan. 67206
Phone: (316) 683-3963

69th Fighter Squadron
I am trying to locate all World War II personnel of the 69th Fighter Squadron, 58th Fighter Group, for the purpose of planning a fortieth anniversary reunion in the fall of 1985.
Please contact the address below.
George E. Mayer
7445 Thomas Ave., S.
Richfield, Minn. 55423
Phone: (612) 866-6073

468th Fighter Squadron
I am attempting to locate former members of the 468th Fighter Squadron, 508th Fighter Group, for the purpose of holding a reunion in 1985.
Please contact the address below.
Jack Ehlers
1217 Riley Rd., R-1
Kendallville, Ind. 46755

578th SMS
I am trying to locate members of the 578th Strategic Missile Squadron for the purpose of holding a reunion in 1985.
The 578th, which was activated in 1961 and deactivated in 1965, was part of the 96th Strategic Aerospace Wing at Dyess AFB, Tex.
Former members should contact the address below.
Col. Walter Liss, USAF
12822 El Dorado Dr.
Universal City, Tex. 78148

782d Bomb Squadron
I am trying to locate members of the 782d Bomb Squadron, 465th Bomb Group, 55th Bomb Wing of the Fifteenth Air Force for the purpose of holding a reunion in the summer of 1985.
Please contact the address below.
William F. Bruce, Jr.
1683 Eggert Rd.
Eggertsville, N. Y. 14226
Phone: (716) 834-8144

877th AC&W Squadron
I would like to hear from members of the 877th Aircraft Control and Warning Squadron who served in Elizondo, Spain, and who are interested in holding a reunion.
William B. Hayes
Rte. 2, Box 461
Fayetteville, Ark. 72701
Phone: (501) 442-5057



At Last!
The Aircrew Tie

Silver on deep blue with light-blue-silver-light-blue stripes. 100% polyster.
Proceeds go to the Air Force Historical Foundation for Fellowships and Scholarships.

Send your check for $15.00, name and address to:
AEROSPACE HISTORIAN
Eisenhower Hall
Manhattan, KS 66506, USA



FOR THE COLLECTOR . . .
Our durable, custom-designed Library Case, in blue simulated leather with silver embossed spine, allows you to organize your valuable back issues of AIR FORCE chronologically while protecting them from dust and wear.

Mail to: Jesse Jones Box Corp.
P.O. Box 5120, Dept. AF
Philadelphia, PA 19141

Please send me _____ Library Cases $6.95 each, 3 for $20, 6 for $36. (Postage and handling included.)

My check (or money order) for $ _____ is enclosed.

Name _____

Address _____

City _____

State _____ Zip _____

Allow four weeks for delivery. Orders outside the U. S. add $1.00 for each case for postage and handling.

AFA CHAMPLUS® .... Strong Protectio

When a Single Accident or Illness Could Cost *You* Thousands of Dollars, You Need AFA CHAMPLUS®. . . for *Strong* Protection against Costs CHAMPUS Doesn't Cover!

For military retirees and their dependents . . . and dependents of active-duty personnel . . . more and more medical care is being provided through the government CHAMPUS program.

And, of course CHAMPUS pays 75% of allowable charges.

But today's soaring hospital costs—*up to $500 a day* in some major metropolitan medical centers—can run up a $20,000 bill for even a moderately serious accident or illness.

Your 25% of $20,000 is no joke!

AFA CHAMPLUS® protects you against that kind of financial catastrophe *and* covers most of your share of routine medical expenses as well.

HOW AFA CHAMPLUS® WORKS FOR YOU!

WHO IS ELIGIBLE?

1) All AFA members under 65 years of age who are currently receiving military retired pay and are eligible for benefits under Public Law 89-614 (CHAMPUS), their spouses under age 65 and their unmarried dependent children under age 21 (or age 23 if in college).
2) All eligible dependents of AFA members on active duty. Eligible dependents are spouses under age 65 and unmarried dependent children under age 21 (or age 23 if in college).

EXCEPTIONAL BENEFIT PLAN

(See chart at right)

FOUR YEAR BASIC BENEFIT. Benefits for most injuries or illnesses may be paid for up to a four-year period.

PLUS THESE SPECIAL BENEFITS . . .

1) Up to 45 consecutive days of in-hospital care for mental, nervous, or emotional disorders. Outpatient care may include up to 20 visits of a physician or $500 per insured person each year.
2) Up to 30 days care per insured per year in a Skilled Nursing Facility.
3) Up to 30 days care per insured per year and up to 60 days lifetime in a CHAMPUS-approved Residential Treatment Center.
4) Up to 30 days care per insured per year and up to 60 days lifetime in a CHAMPUS-approved Special Treatment Facility.
5) Up to 5 visits per insured per year to Marriage and Family Counselors under conditions defined by CHAMPUS.

YOUR INSURANCE IS NON-CANCELLABLE

As long as you are a member of the Force Association, pay your premiums time, and the master contract remains force, your insurance cannot be ca celled.

ADMINISTERED BY YOUR ASSOCIATION . . . UNDERWRITTEN BY MUTUAL OF OMAHA

AFA CHAMPLUS® insurance is admi istered by trained insurance profession on your Association staff. You get prom reliable, courteous service from peo who know your needs and know ev detail of your coverage. Your insuranc underwritten by Mutual of Omaha, largest individual and family health ins ance company in the world.

AFA OFFERS YOU HOSPITAL BENEFITS AFTER AGE 65

Once you reach Age 65 and are cover under Medicare, AFA offers you prote tion against hospital expenses not co ered by Medicare through the *Senior A Benefit Plan* of AFA Hospital Indemn Insurance. Members enrolled in A CHAMPLUS® will automatically recei full information about AFA's Medicare su plement program upon attainment of Ag 65 so there will be no lapse in coverag

AFA CHAMPLUS® BENEFIT SCHEDULE

Care	*CHAMPUS Pays*	*AFA CHAMPLUS® Pays*
	For Military Retirees Under Age 65 and Their Dependents	
Inpatient civilian hospital care	CHAMPUS pays 75% of allowable charges.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $6.55 per day subsistence fee, not covered by CHAMPUS.	CHAMPLUS® pays the $6.55 per day subsistence fee.
Outpatient care	CHAMPUS COVERS 75% of outpatient care fees after an annual deductible of $50 per person ($100 maximum per family) is satisfied.	CHAMPLUS® pays the 25% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.
	For Dependents of Active-Duty Military Personnel	
Inpatient civilian hospital care	CHAMPUS pays all covered services and supplies furnished by a hospital less $25 or $6.55 per day, whichever is greater.	CHAMPLUS® pays the greater of $6.55 per day or $25 of the reasonable hospital charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $6.55 per day fee, not covered by CHAMPUS.	CHAMPLUS® pays the $6.55 per day subsistence fee.
Outpatient care	CHAMPUS covers 80% of outpatient care fees after an annual deductible of $50 per person ($100 maximum per family) is satisfied.	CHAMPLUS® pays the 20% of allowable charges not covered by CHAMPUS after the deductible has been satisfied.

NOTE: Outpatient benefits cover emergency room treatment, doctor bills, pharmaceuticals, and other professional services.

There are some reasonable limitations and exclusions for both inpatient and outpatient coverage. Please note these elsewhere in the plan description.

Against Costs CHAMPUS Doesn't Cover

APPLY TODAY!
JST FOLLOW THESE STEPS

hoose either AFA CHAMPLUS® Inpatient overage or combined Inpatient and Outatient coverage for yourself. Determine ie coverage you want for dependent iembers of your family. Complete the enosed application form in full. Total the emium for the coverage you select from e premium tables on this page. Mail the pplication with your check or money rder for your initial premium payment, ayable to AFA.

AFA's CHAMPLUS®

IMITATIONS

overage will not be provided for condiions for which treatment has been reeived during the 12-month period prior o the effective date of insurance until the xpiration of 12 consecutive months of nsurance coverage without further treatent. *After coverage has been in force for 4 consecutive months, pre-existing* conitions will be covered regardless of prior treatment.

XCLUSIONS

This plan does not cover and no payment shall be made for:

) routine physical examinations or immuizations

) domiciliary or custodial care

) dental care (except as required as a ecessary adjunct to medical or surgical treatment)

) routine care of the newborn or well-aby care

injuries or sickness resulting from eclared or undeclared war or any act ereof

) injuries or sickness due to acts of intenional self-destruction or attempted suicide, while sane or insane

) treatment for prevention or cure of alcoholism or drug addiction

eye refraction examinations

Prosthetic devices (other than artificial mbs and artificial eyes), hearing aids, rthopedic footwear, eyeglasses and conct lenses

) expenses for which benefits are or may e payable under Public Law 89-614 CHAMPUS)

PREMIUM SCHEDULE

Plan 1—For military retirees and dependents (Quarterly Premiums)

Inpatient Benefits

Member's Attained Age	Member	Spouse	Each Child
Under 50	$19.03	$23.30	$14.85
50–54	$26.16	$32.01	$14.85
55–59	$36.16	$44.28	$14.85
60–64	$43.62	$53.41	$14.85

Inpatient and Outpatient Benefits

Under 50	$26.80	$31.05	$37.13
50–54	$36.83	$42.68	$37.13
55–59	$50.92	$59.02	$37.13
60–64	$61.41	$71.20	$37.13

Plan 2—For dependents of active-duty personnel (Annual Premiums)

Inpatient Only	None	$ 9.68	$ 5.94
Inpatient and Outpatient	None	$38.72	$29.70

APPLICATION FOR AFA CHAMPLUS®

Group Policy GMG-FC70
Mutual of Omaha 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 _____ Current Age ____ Height ____ Weight ____ Soc. Sec. No. _____
Month/Day/Year

This insurance coverage may only be issued to AFA members. Please check the appropriate box below:

☐ I am currently an AFA Member.

☐ I enclose $15 for annual AFA membership dues (includes subscription ($14) to AIR FORCE Magazine).

PLAN & TYPE OF COVERAGE REQUESTED

Plan Requested (Check One)
☐ AFA CHAMPLUS® PLAN I (for military retirees & dependents)
☐ AFA CHAMPLUS® PLAN II (for dependents of active-duty personnel)

Coverage Requested (Check One)
☐ Inpatient Benefits Only
☐ Inpatient and Outpatient Benefits

Person(s) to be insured (Check One)
☐ Member Only
☐ Spouse Only
☐ Member & Spouse
☐ Member & Children
☐ Spouse & Children
☐ Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Plan I premium payments are normally paid on a quarterly basis but, if desired, they may be made on either a semi-annual (multiply by 2), or annual (multiply by 4) basis.

Quarterly (annual) premium for member (age ____) $_____

Quarterly (annual) premium for spouse (based on member's age) $_____

Quarterly (annual) premium for ____ children @ $ $_____

Total premium enclosed $_____

If this application requests coverage for your spouse and/or eligible children, please complete the following information for each person for whom you are requesting coverage.

Names of Dependents to be Insured	Relationship to Member	Date of Birth (Month/Day/Year)

(To list additional dependents, please use a separate sheet.)

In applying for this coverage, I understand and agree that (a) coverage shall become effective on the last day of the calendar month during which my application together with the proper amount is mailed to AFA, (b) only hospital confinements (both inpatient and outpatient) or other CHAMPUS-approved services commencing after the effective date of insurance are covered and (c) any conditions for which I or my eligible dependents received medical treatment or advice or have taken prescribed drugs or medicine within 12 months prior to the effective date of this insurance coverage will not be covered until the expiration of 12 consecutive months of insurance coverage without medical treatment or advice or having taken prescribed drugs or medicine for such conditions. I also understand and agree that all such pre-existing conditions will be covered after this insurance has been in effect for 24 consecutive months.

Date _____, 19 ____ _____
Member's Signature

12/84

NOTE: Application must be accompanied by check or money order.
Send remittance to:
Insurance Division, AFA, 1501 Lee Highway • Arlington, Virginia 22209-1198

Form 6173GH App.

Bob Stevens'

"There I was..."

CREWS OF CARGO/TRANSPORT BIRDS CAN GET PRETTY BORED ON LONG HAULS. FIENDISH SCENARIOS LIKE THE ONE DEPICTED BELOW KILL TIME BETWEEN REPORTING POINTS...

(NOTE: THIS ROUTINE CALLS FOR A JOHN IN THE REAR, LIKE THE OL' C-46's and 47's)

STEP 1: SEND AN ***EXTRA*** RATED CREWMAN AFT.



STEP 2: AFTER A LENGTHY PERIOD OF WAITING FOR THE "CO-PILOT" TO RETURN, THE PILOT BACKS OUT OF THE FRONT OFFICE.



STEP 3: SET UP THE MARK.



STEP 4: RECOVERY (AFTER MARK IS REDUCED TO JELLY).



Mobile C³I power. Without a hitch.

C³I shelters no longer need to drag around diesel power generators and separate cooling and heating systems. Because Garrett's new Integrated Power and Environmental Control System (IPECS) provides battlefield mobility and transportability in a gas turbine unit half the size and weight of a diesel rig.

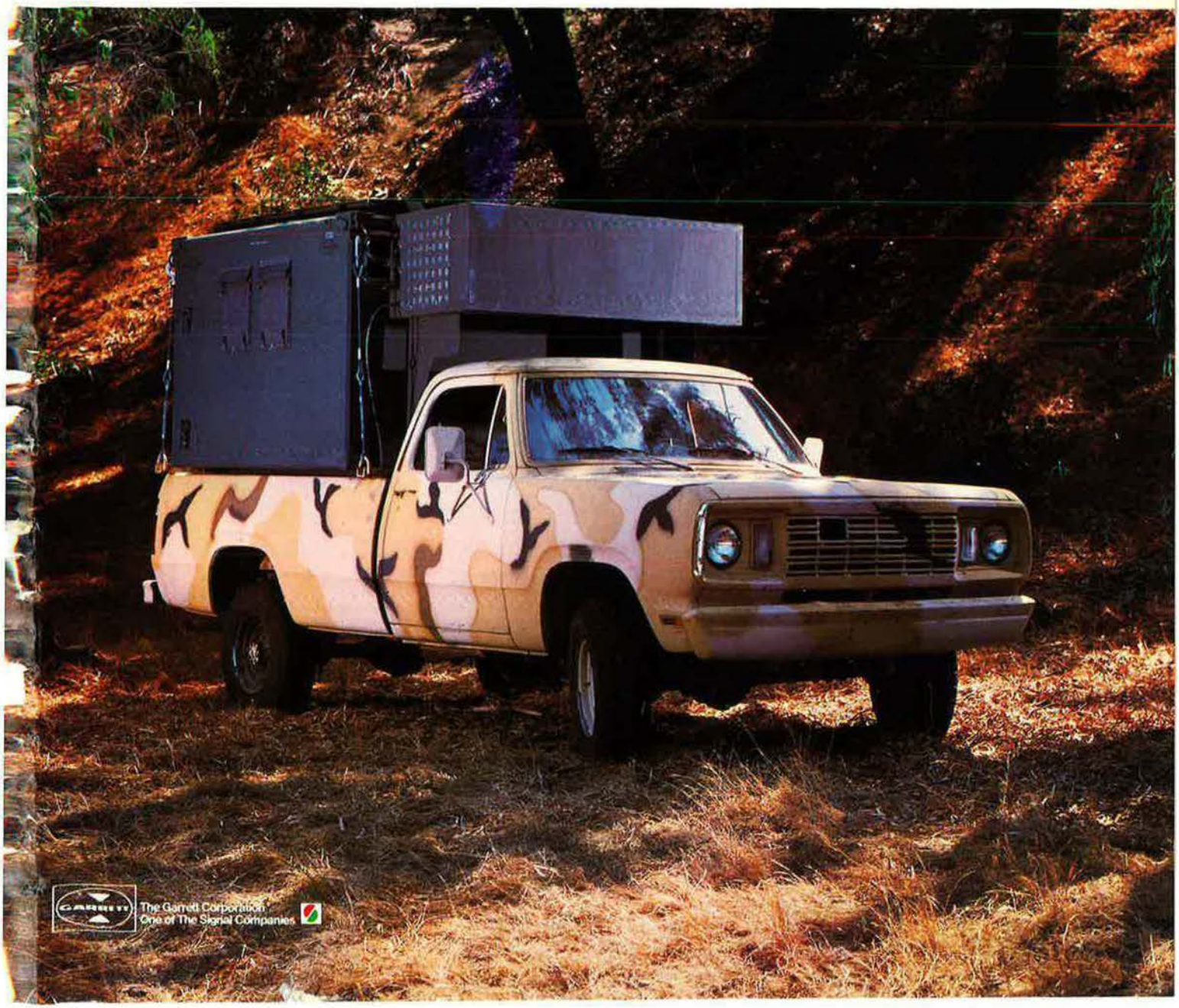
IPECS will let you transport a C³I shelter anywhere. With far more mobility than the diesel powered systems. IPECS also makes it possible to start cold. As low as −65 degrees Fahrenheit. And IPECS does not require additional equipment to provide heating.

Garrett has found a way to make IPECS almost vibration-free, and as quiet as it is powerful. It runs on a variety of readily available fuels: diesel, kerosene and all jet fuels. And, fitting NBC protection to the system couldn't be easier.

In fact, when it comes to system integration, Garrett has no peers in technology, experience and leadership in the power/ECS arena. And since Garrett's IPECS is a Non-Developmental Item, with no start-up cost to the Government, it is now available for all new designs as well as retrofit. Without a hitch.

For detailed information, contact: Garrett Turbine Engine Company, P.O. Box 5217, Phoenix, Arizona 85010. (602) 231-1959.

GARRETT



WHAT'S THE MOST EFFICIENT WAY TO KEEP THE THREAT FROM GAINING GROUND?

Right now, America has many tactical defense needs.

We have to be ready for deep interdiction missions, to thwart an aggressor's attack at the source.

We must have systems with the adaptability, range and precision to succeed against mobile targets.

And most important, we must be able to operate around the clock in bad weather.

There's one tactical defense system that goes a long way toward meeting all those needs efficiently and effectively: The LANTIRN-equipped F-15E dual role fighter.

The air-to-air, air-to-ground Eagle can deliver up to 12 tons of armament on a deep interdiction mission, fighting its way there and back. Its speed, endurance, range and mobility make it a nimble and precise adversary against any threat.

And the F-15 is America's confident reply to any airborne threat. It owns the skies day and night, in good weather or bad. With its lookdown, shootdown capability, advanced countermeasures, APG-70 radar and advanced cockpit displays, the F-15 can meet and beat any fighter the threat has, or has planned through the end of the century.

When our defense needs challenge planners, one answer is simple: The F-15E dual role fighter.



MCDONNELL DOUGLAS