DECEMBER 1981/$3

AIR FORCE MAGAZINE

PUBLISHED BY THE AIR FORCE ASSOCIATION

THE MILITARY BALANCE 1981/82

The GE technology edge: durable fighter turbofans with turbojet characteristics.

General Electric's new supersonic fighter turbofans benefit from technology that is *five years more advanced than any competitive engine.* And these advances are proven by endurance testing far more severe than previous standards. Accelerated Mission Testing (AMT), for example, subjects an engine to over 30 times the number of full throttle cycles and 12 times as many afterburner lights as traditional 150-hour qualification tests.

The F404 is a 16,000 lb. thrust engine in production for the U.S. Navy F/A-18 multi-mission aircraft. It has also been selected for the Canadian CF-18, the Australian F/A-18, the Swedish JAS aircraft, and is being offered in several other fighter competitions. The F404 has also been selected for the new F-5G intermediate fighter.

The F101 DFE, a derivative of the F101 developed for the U.S. Air Force B-1, is in the 27-30,000 lb. thrust class. It has been funded by the USAF and USN in a development and flight test program to provide competitive production alternatives in the large fighter engine thrust class. This engine has met all its fixed price contract requirements, completed its flight clearance tests, and conducted outstandingly successful flight test programs in both the USAF F-16 and USN F-14.

F404-powered McDonnell Douglas F/A-18 — Production

F101 DFE-powered General Dynamics F-16 — Flight Test

General Electric is truly setting *new standards* for fighter turbofans:

• **OPERABILITY:** Exceptionally stall-free engine operation and stable afterburner operation through the entire fighter envelope, with no throttle restrictions. Pilots report that F404 and F101 DFE turbofans behave like General Electric's famed J79 fighter turbojet. As one pilot said, "I can really fly the aircraft up to its capabilities." Said another, "Amazing response for a turbofan — as good as a turbojet."

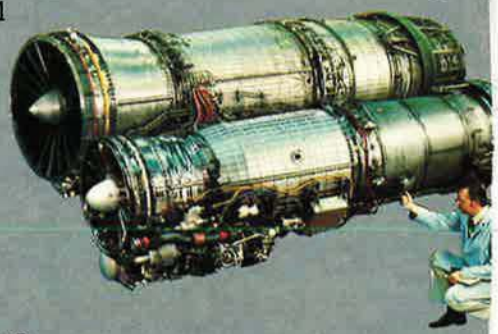
• **DURABILITY AND RELIABILITY:** Proven by record-breaking AMT tests on both engines. Hot section lives equivalent to 2,000 mission hours of the toughest fighter operation were demonstrated on the F101 DFE without significant distress — and the parts will be put back in engines for more testing. With their preeminent hot section technology, GE engines offer *twice* the hot section life of any other engine in service.

• **OPERATING COSTS:** From simpler design through advanced technology. For example, GE engines feature single-stage turbines, machined ring combustors, mixed flow afterburners, and thousands of fewer parts than other engines. Simplicity *plus* durability provide low maintenance costs. This is a direct result of low engine removal rates, where General Electric's engines have a preeminent record: The J79 removal rate in the F-4 is three per 1,000 flight hours. The TF34 in the A-10 is under two per 1,000. And the F404 and F101 DFE are on track for two per 1,000. Truly new industry standards!

F101 DFE-powered Grumman F-14 — Flight Test

When you need advanced fighter capability, GE gives you the technology edge...durable turbofans with turbojet characteristics.

Great Engines From General Electric's Advanced Technology



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F-5G TIGERSHARK

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under 60 seconds. Compared with average of contemporary fighters, Tigershark requires 52 percent less maintenance manpower. New F404 engine has 7,700 fewer parts than J79. Half the weight. Modular construction for quick repair. In actual service current F-5s have recorded in-commission rate of 80 percent. Tigershark will be even more reliable.

Numbers. In a dogfight, pilots have proven that the only thing better than one high-performance combat capable fighter is two high-performance combat capable fighters. The Tigershark is those two.

Economical to purchase, economical to maintain. Consumes 53 percent less fuel and has 63 percent lower operating and maintenance costs than average of other contemporary fighters. The proven F-5 in-commission rate is second to none. F-5G Tigershark is the most recent version of the F-5 series, now serving 28 nations. The first Tigershark will be available for delivery July, 1983.

F-5G Tigershark. The essential element for force effectiveness.

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This Month

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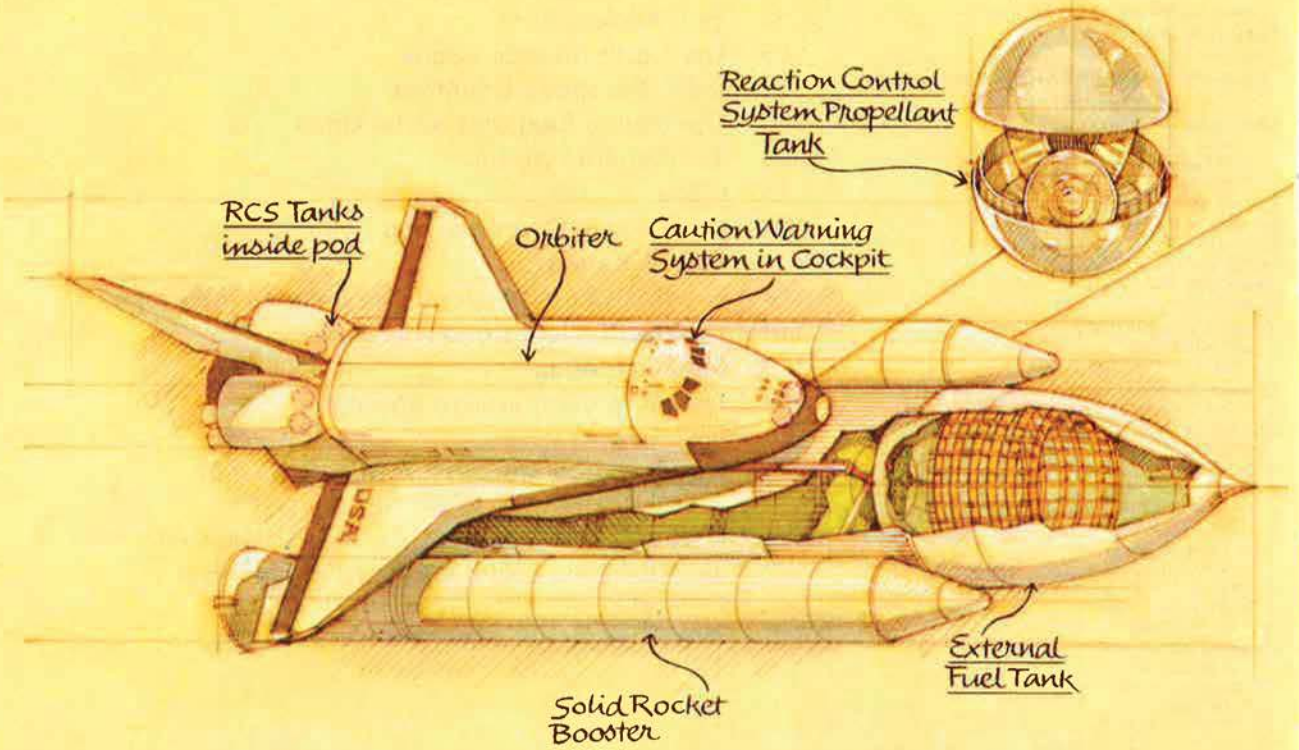
ABOUT THE COVER

This issue presents "The Military Balance 1981/82," as compiled by The International Institute for Strategic Studies in London. But this quantitative listing cannot weigh the essence of military strength—people. The medieval knight becomes a modern fighter pilot in the cover painting by artist Jack Pardue.

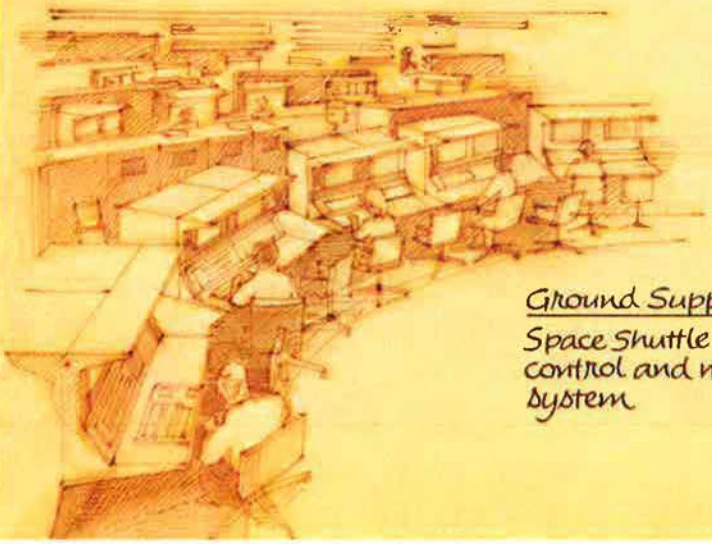
Departments

How do you help maintain U.S. leadership in space?

Help the Space Shuttle succeed.

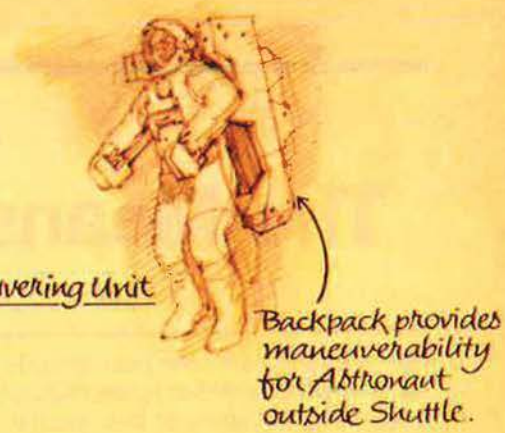


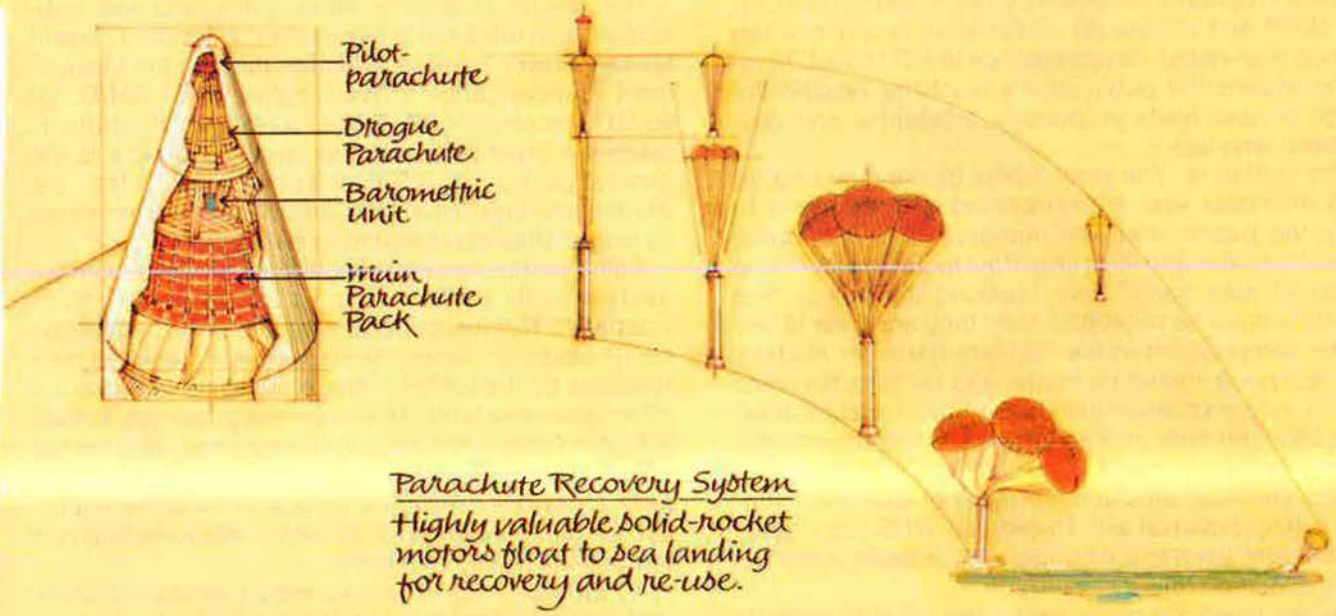
Space Shuttle



Ground Support

Space Shuttle checkout, control and monitoring system





Parachute Recovery System
Highly valuable solid-rocket motors float to sea landing for recovery and re-use.

The new era in man's exploration and use of space is here.

Its cornerstone is the Space Shuttle, the unusual manned vehicle that can fly satellites and scientific equipment into orbit, return to repair and resupply them, and later bring them back to Earth. Its cargo bay can be used as a research laboratory as well as to carry materials to build huge space stations.

Martin Marietta has been involved in Space Shuttle development from its inception, as a partner to both NASA and the Department of Defense. We supply the mammoth, 154-foot external tank to fuel the Shuttle's main engines at launch. In addition, we produce the parachute recovery system for the twin solid-rocket motors; an electronic warning system to alert astronauts to malfunctions; the fuel tanks for the craft's control thrusters; and the pyrotechnic controls to arm and fire the ordnance mechanisms.

For ground operations we produced the computerized checkout, control and monitor system for the launch control centers. And for the Department of Defense we act as payload integrator, ensuring that satellite and cargo designs are Shuttle-compatible, as well as performing ground services support for the West Coast launch site.

For orbital operations we've designed a backpack to allow astronauts to maneuver and work outside the Shuttle's main cabin.

The Space Shuttle is our country's major space vehicle for the decades ahead. Our broad involvement in space and defense programs has given us the knowledge, experience, and technical resources to help meet the nation's needs in this new era.

MARTIN MARIETTA

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AN EDITORIAL

The Means to Maintain Awareness

THIS year, as for the past decade, AIR FORCE Magazine's December issue features "The Military Balance." The keystone of this special issue is the reproduction of the 1981–82 *Military Balance*, prepared annually by The International Institute for Strategic Studies in London. Released by IISS in late September, the study and worldwide compilation is a useful reference year-round. Its appearance in AIR FORCE Magazine widens the publication's reach far beyond the range of specialists in industry, academia, and government who use it.

The "balance" this year makes gloomy reading for AFA members who are concerned with the need to keep the peace, and who recognize that undoubted US military strength is an important factor in preventing potential adversaries from breaking the peace. The points will not be reiterated here; they are clear to see in the compilations in the "Military Balance" section. But one point should be made, and not forgotten: The day is long past when the United States and its allies can count on time and geography to help them overcome an enemy thrust. The time cushion no longer exists. The sea lanes and highways of space are subject to interdiction at will. The so-called US "qualitative advantage" used to cut budgets for so many years has gone a-glimmering.

So the times are tense, and if the US is to keep its world leadership and keep the peace, it must do something about the situation that has been allowed to overtake this nation and its allies. Thus, President Reagan's decisions in the national security context, including prudent spending increases and the package of strategic decisions, begin to take steps to redress the imbalance. But the spending has not all been approved, the strategic decisions are undergoing debate, and meanwhile the "window of vulnerability" continues to slide open. During the period before the US can slam it shut again—several years hence—this nation does indeed face a perilous time.

Therefore, it is especially important for AFA members, who understand these topics better than most, to be aware of the actions that have been taken and that are in prospect. Of course, AFAers already have an appreciation of the imbalance now existing.and have spoken out individually and as an organization on the dangers faced. But other citizens are not as conversant. They need the facts stated clearly and baldly. Too often, most Americans get the information on vital national security issues filtered through some pundit's pen, shortcut by sloganeering, or compressed and distorted by the demands of broadcasting time constraints. The upshot is a tendency for the people to be tranquilized through the peculiarities of the mass media into a complacency that is unwarranted. Those who point out the clear dangers tend to get stereotyped and their messages unheard. That is hazardous these days, and AFAers can help overcome the limitations of the mass media by being informed and informing others of facts, not shadowy fabrications.

That brings us to consideration of a landmark publication also released in September. It is called "Soviet Military Power," and is available through the Government Printing Office in Washington, D. C. 20402, for $6.50. The ninety-nine pages of text and illustrations present a clear picture not as widely available to the general public in this format before. Extracts from the volume and highlights of its presentation are provided by Edgar Ulsamer, beginning on page 46.

Some points should be noted about the document, aside from its content. First, as Secretary of Defense Caspar W. Weinberger told members of the press when he released it, "Soviet Military Power" resulted from requests by the NATO defense ministers to make this information available. Much of it was presented to them in highly classified form during meetings in the spring. They believed a wider audience—especially including their populations—should have access to the materials, to gain a better appreciation of the dimensions of the Soviet military machine.

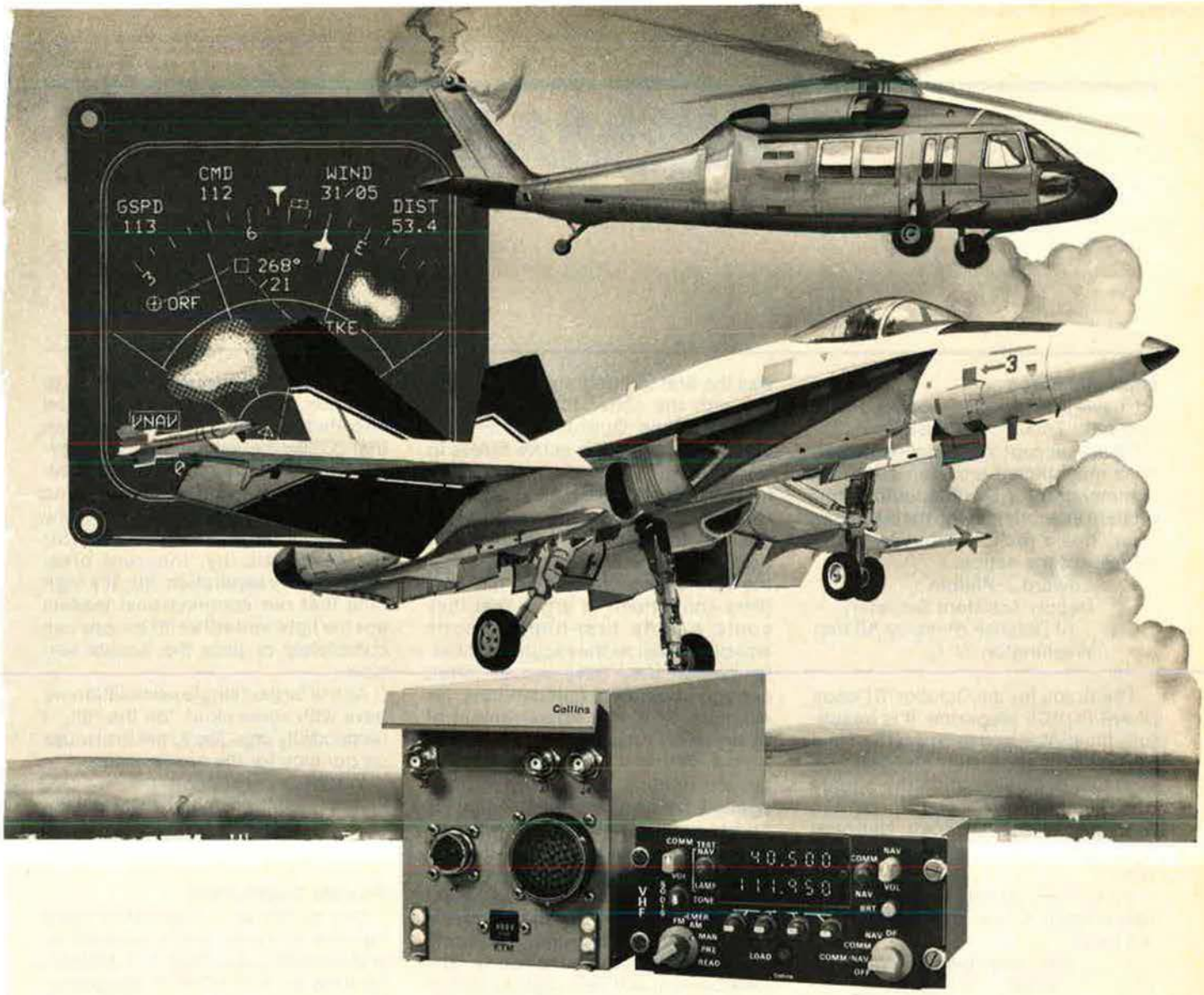
To publish such materials meant declassification, and that resulted in a tug-of-war among the several agencies involved. But enough material was declassified, and presented in a well-organized way, to make a more coherent picture than has been generally available before.

Then the decision was made to publish in other languages also: French, German, Italian, Spanish, and Japanese. This has the obvious advantage of broadening the dissemination.

Specialists who follow such matters—including those who read AIR FORCE Magazine—pointed out that much in the booklet has already appeared in print, including this magazine, *Armed Forces JOURNAL*, *Aviation Week & Space Technology*, *Aerospace Daily*, *Jane's*, and others. But then, several who said that immediately pointed out that most people don't read those publications (much as we'd like them to), and don't get the information in the daily media, so the booklet is very useful.

It comes none too soon, both in the US and in Europe. Over there, the campaign of disinformation, distortion, and deception regarding United States and NATO issues has accelerated. It shows signs of developing a dangerous momentum that could swing enough fuzzy-headed opinions into opposition to much-needed actions by the NATO allies. The need now is for information, not disinformation; but the disinformation side is ahead at the moment.

—F. CLIFTON BERRY, JR., EDITOR IN CHIEF



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AIRMAIL

The Total Force

I have just received copies of the October "Total Force" issue.

Please accept my sincere thanks for a magnificent job. You are to be commended for the conception and brilliant execution of the theme of this issue. It is a real contribution to the security of the nation.

Edward J. Philbin
Deputy Assistant Secretary
of Defense (Reserve Affairs)
Washington, D. C.

Thank you for the October '81 issue of AIR FORCE Magazine. It is beautifully illustrated and portrays the Total Force policy accurately and concisely. It will indeed become the source document for the Total Force! I'm pleased to have the Air National Guard story told in your fine magazine.

Again, my sincere thanks and appreciation to you for this outstanding issue.

Maj. Gen. John B. Conaway,
USAF
Director, Air National Guard
Washington, D. C.

Your tribute to the Air Guard and Air Force Reserve in the October issue was excellent, indeed, and well deserved by the men and women who make up those part-time elements that make the "Total Force" concept a reality.

As a former Chief of Public Affairs for the National Guard Bureau, however, I was disappointed that nowhere was there mention of Maj. Gen. Winston P. Wilson, the first Air Force officer to head the Guard Bureau and a man whose contributions in the development of the Guard and Reserve as active partners of the Air Force outshines, by far, the efforts of any individual in the United States, military or civilian.

The wisdom of this man who came out of the hills of Arkansas to lead first the Air Guard and later the entire Army and Air Guard can be credited with any number of advances made by the Guard first, and later the Reserve. He initiated weekend drills. He was the first to integrate Guard training with the active forces; the first to permit the Guard to enter into competition with the active forces in firing and gunnery meets; he was the first to accept active missions for the Guard, such as air defense; he was the first to exercise "weekend warriors" to overseas areas; and he was the first to have the faith in "his" soldiers and airmen to argue that they could handle first-line weapons equally as well as the regulars, or better (which they have proven often enough in gunnery competitions, for example, or in the establishment of flying safety records).

Had "Wimpy" Wilson not been around fighting for his ideals, often against fierce odds established by higher-ranking officers in the Pentagon who suffered miserably from tunnel vision, the Guard would not be the capable force it is today. Had he not been the champion in the Congress for a stronger, better-equipped backup element for the regulars, the Guard might still be a ragtag outfit of hand-me-downs. So would the Reserve, which copied the book that was written largely by Wimpy.

Both those forces owe a great deal to Wimpy Wilson, as does this nation. It's too bad that, in your effort to pay tribute to these outstanding forces, you overlooked the man who is largely responsible for it all.

Lt. Col. James C. Elliott,
USAF (Ret.)
Fairfax, Va.

The Pay Cap

As a member of AFA, one issue that I feel very adamant about (and I hope you share my concern) is the continuance of the Executive Level V pay cap by the US House of Representatives in current session.

It is shameful that we expect, in fact demand, top-notch executives to manage our defenses and yet pay them at 1972 rates! I fail to understand why the current House pay and entitlements package contained the pay cap for our general officers at $50,112.50, when the US Senate agreed that it must be raised to $57,500.

I realize that I may be preaching to the choir, but it is probably common knowledge that one major reason that our lieutenant generals are retiring early is the pay cap issue. In civilian industry, the American public flaunts the free enterprise philosophy and accompanying compensation for the responsibility, inherent pressures, family separation, etc. It's high time that our congressional leaders see the light and either lift the pay cap completely or pass the Senate version.

As the largest single association we have with some clout "on the Hill," I respectfully urge you to get the House on our side for the next session.

You have my support!

CMSgt. John R. McCauslin,
USAF
APO San Francisco 96328

Flexible Deployment

One of the major reasons I remain a member of the Air Force Association is to be able to read Gen. T. R. Milton's column in AIR FORCE Magazine. While I may not always agree with him, I value his thinking. We are fortunate to have his views expressed publicly, serving as a contribution to the defense analysis process.

His comments on flexible deployment of NATO-based aircraft contained in the October '81 issue *(p. 88)* of AIR FORCE Magazine are particularly germane. Our problem is not whether tactical airpower should be land-based or sea-based. Rather, it is how to get enough of both in the right place at the right time.

The restrictions placed on the deployment of land-based aircraft in Europe apply equally well, or perhaps even more so, to Navy tactical air in the Mediterranean and elsewhere. We have become too enamored with fixed commitments of certain specified numbers of units in designated localities and have forgotten the value of flexibility, one of the greatest arguments for naval airpower (and one used by sailors constantly in their arguments for sea-based air).

When Adm. James Holloway III was the Chief of Naval Operations (and

even before), considerable effort was made to put the Navy on a "flexible deployment" program, varying the number of deployed carriers and other units in the areas of interest throughout the world. But the inability to convince political leaders, at home and abroad, of the value of such flexibility finds the Navy "anchored" in the Mediterranean and elsewhere, minimizing the value of one of our greatest assets.

It is incumbent on us to use land-based and sea-based airpower together, in mutual support, exploiting the flexibility each has, in greater or lesser degree.

Vice Adm. G. E. Miller,
USN (Ret.)
Falls Church, Va.

Gen. T. R. Milton has missed the mark this time *("Flexible Deployment of NATO-Based Aircraft," p. 88, October '81).* Between the strong title and the somewhat redeeming final paragraph, General Milton has let future projections overwhelm current reality.

It is hard to argue with General Milton's characterization of Libya as a source of future trouble and easy to imagine the potential difficulties of maintaining air superiority over the Mediterranean in time of crisis. The proposed solution of moving air units from the "vulnerable forward bases in Germany," however, critically misreads the true situation.

Those "forward-based aircraft rooted to advanced and targeted airfields" are not there through some inexplicable miscalculation or through some dim and unremembered conventions of the past. Air units assigned to NATO's Central Region face the best and largest of the Soviet air armies and further provide the most efficient and capable means to interdict the forward movement of a substantial combined-arms combat ground force. Rebasing these units to counter some perceived Libyan or Libyan-Soviet capability emanating from the north coast of Africa merely means surrendering the potential for air superiority over Central Europe. The remedy for a potential vacuum in the Mediterranean does not lie in the creation of a *de facto* vacuum in Europe.

It is clear that the final remedy for geographic shortfalls is in changes to the force structure but, in advance of that faraway possibility, what is required is the development of plans and the designation of reactor forces that could bolster the Southern Flank in crisis situations. A key necessity in realizing the required flexibility is *tankers*. The present employment plans for NATO tactical airpower are not hampered by lack of imagination. They are hampered by the uncertainty of tanker support and by the tacit recognition that in almost any scenario the SIOP requirement for tanker availability will sooner or later begin to impinge on their use in the NATO theater.

The plans need to be scrubbed hard in light of present realities to determine whether there is any slack in SAC's tanker requirement. More important, however, is the straightforward recognition that tanker support is the key to airpower flexibility. There is a disturbing tendency to link tanker support solely with airlift. This is only one of the payoffs in tanker support. To quote General Milton's redeeming final paragraph, "tactical air, supported by tankers . . . is a resource that has yet to be tapped."

The Soviets have not fielded tankers for their tactical forces and it is this single fact that types them as a continental airpower. We should not play their game by ignoring our own flexibility.

It is critical that we understand the potential impact that our tankers can have in the areas of rapid mobility and sustained operations. It is not too farfetched to think of a dedicated NATO tanker fleet, funded by NATO and controlled in the same manner as the NATO AWACS.

James P. Peak
McLean, Va.

Mothers' Chapter

We of the Air Force Mothers' Chapter would like to congratulate you on the September issue of AIR FORCE Magazine. It was not only very interesting, but also very informative. I had a number of pleasing comments from our members.

I feel we of the Air Force Association are very fortunate that we are so enlightened on most subjects of military happenings—more so than the general public.

Dorothy E. Sadler
President, AFA Mothers' Chapter
Wilkinsburg, Pa.

"The Miracle at Las Vegas"

I read your article in the September '81 issue on the 1959 World Congress of Flight, "The Miracle at Las Vegas" *(p. 59),* with deep nostalgia and a painful awareness of my age.

I was there as a radio repairman with the F-84Fs supporting the Italian, Dutch, and a "Mixed NATO Team." (Just over a year earlier, those same F-84s from Luke AFB, Ariz., were painted blue with red stars for the movie "The Hunters." We were the "bad guys"—MiGs.) As a young airman, I was fascinated with all of the latest technology—the B-58, the F-105, and the missiles. Only one incident marred the show when our Dutch team had a mid-air collision, but thankfully both crew members survived and one brought his plane back with almost half of one wing missing.

Those were good days. The Italian team "The Red Devils" stayed in the US, and I traveled to several bases with them. Their air shows delighted audiences and terrified Air Force personnel. I can't tell you how many hours maintenance people worked on those airplanes for popped rivets, equipment broken loose from mounts, and wrinkled skin. Those were the days before the twelve-hour shift.

I say those were the "good old days" with tongue-in-cheek. I can remember hefting the fifty-pound-plus ARC-33 UHF radio on my lean 125-pound frame and hauling it a quarter of a mile or more down the flight line in baking sun and freezing cold. I thank God for solid-state electronics and vehicles.

What I do miss about the "good old days" was the camaraderie we had, and the 1959 World Congress of Flight was my first exposure to it. I can still remember the "get-together" after the show. (I guess you're not supposed to say "beer bust" anymore!)

Congratulations on your thirty-fifth birthday.

Capt. J. R. Messinger, USAF
Langley AFB, Va.

Chicago Air Fair

The September issue of AIR FORCE Magazine came in this past Saturday, and it was one of the better issues. But I think you perhaps should have done more than just give passing mention to the AFA Air Fair in Chicago in July 1949, as I still consider it one of the very best and biggest this buff has seen in twenty-five-plus years of Air Force service and ten years of airplane chasing before enlistment!

I still have a program, and they really went all out! The B-36s came over in mass formation with the leader only a few hundred feet off the deck, and everyone else stepped up behind him. The vibrations from all those 4360s that low to the ground was as close to an earthquake as one could get without being in one! The static park included an F-80A from the 334th Fighter Squadron, 4th Fighter Group; an F-84C from the 33d Fighter Group; and the star of the static display—a

nice, shiny F-86A of the 27th Fighter Squadron, 1st Fighter Group. The *Enola Gay* was there, and a hangar full of the World War II collection. A C-74 was displayed also.

While it only lasted two days (daze to this fourteen-year-old!), it was the biggest show you people did until the World Congress of Flight.

MSgt. David W. Menard, USAF (Ret.)
Dayton, Ohio

Another Salute

It was a pleasure to read the article by Alfred R. Musi, "A Salute to Jack Gross" *(p. 163),* in the September issue. Just two months earlier I had seen his picture also in your magazine *(July '81, p. 113),* where he was shown presenting an AFA Citation to Maj. Gen. John R. Dolny in Minneapolis. It was not mentioned that both had served with the 86th Fighter-Bomber Group of the Twelfth Air Force in Italy, 1943–44.

It was my pleasure to first meet Jack in Italy while he was the Special Services Officer for the Group. I was a fighter-bomber pilot in the A-36 aircraft, as was John R. Dolny, who later became the CO of the 526th Squadron.

Jack asked me to take a trip one day to Caserta to help him pick out a 16-mm motion picture projector to provide entertainment for the troops in our area. We were based at the time at Pomigliano d'Arco, just north of Mount Vesuvius. Much to my delight, I found that a Victor Animatograph had been consigned to us, the same type that I had first operated as a kid in the YMCA at home and later specialized on as a student in the audiovisual department at the University of New Hampshire. It was also at UNH that I learned to fly in the first Civilian Pilot Training program, another of my lucky breaks in college.

I completed my combat tour in August 1944, and never saw Jack again in person, but I certainly kept track of his activities for the Air Force Association through your magazine. I also salute Jack Gross for being an officer and a gentleman. I hope to see him and John Dolny at the combined reunion of the 525th and 526th Fighter-Bomber Squadrons in St. Louis next June.

Col. John B. Watson, Jr., USAFR (Ret.)
Hanover, N. H.

Memphis Belle

Many thanks for "The Bombardier and His Bombsight," *(September '81, p. 106),* mentioning the *Memphis Belle.* It was well-written, and we greatly appreciate any publicity about her.

Your magazine is one of the most informative I have ever encountered. The articles are well-written and keep your interest all the way through. Keep up the excellent work.

Again, thanks from the *Memphis Belle* Memorial Association for the article.

John W. Emerson
President, *Memphis Belle* Memorial Association
Memphis, Tenn.

AIRMAIL

CLARIFICATION

Lt. Col. W. Boggarts of the Belgian Air Force information and public relations staff recently informed the editors of AIR FORCE Magazine that the article titled "The Melting Pot of Pilot Instruction" in the June 1981 issue of the magazine contained two passages that do not reflect the point of view of the Belgian Air Force.

The first, on p. 42, implied that Belgium participates in the Euro-NATO Joint Jet Pilot Training program (ENJJPT) because "rising costs . . . 'were making separate pilot training programs prohibitively expensive. . . . ' " Colonel Boggarts points out, "The reason why Belgium decided to participate in ENJJPT was not the fact that the training costs became prohibitively expensive, but rather was the need to make partially common the instruction of NATO pilots, thereby improving cohesion between the Allied Air Forces which in turn enhances the solidarity among NATO countries."

Colonel Boggarts also suggested another misunderstanding on the same page, "ENJJPT reflects remarkable commitment and confidence on the part of the Europeans. For Germany, Norway, Belgium, and Denmark, it represents their sole source of fighter pilots. . . ." Colonel Boggarts describes the correct situation, "For various reasons, indeed, the Belgian Air Force maintains its own national pilot training; moreover, due to entirely different flying environments, the pilot instruction in the USA has to be supplemented by specific national training."

Scrambled Generals

As much as I dislike writing letters like this, I imagine you dislike receiving them even more. In this case, however, I feel compelled to write, and even go so far as to ask for a correction.

On p. 87 of your September issue, under the SAC input, the listing for the 47th Air Division is incorrect. The commander of the 47th Air Division at Fairchild AFB, Wash., is Brig. Gen. Regis F. A. Urschler. In addition, the 57th Air Division was left out completely. Brig. Gen. John A. Shaud is commander of the 57th Air Division at Minot AFB, N. D. *(General Shaud was recently transferred to be Deputy Director of Plans, DCS/P&O, in Washington.*—THE EDITORS)

Ward M. Koons
Deputy Director of Public Affairs, Hq. SAC
Offutt AFB, Neb.

B-58 Brouhaha

Concerning letters in two recent issues—June and September 1981—about the potential reactivation of the Convair B-58 Hustler fleet in storage at Davis-Monthan AFB, Ariz.: A recent (October 1981) tour of the boneyard confirmed the fact that there are no B-58s there. They all have apparently been scrapped!

Following retirement of the Hustler in early 1970, the stored aircraft received periodic checks and maintenance. But the last examples of the 116-plane force were scrapped in the mid-1970s. Six Hustlers survive—as museum displays—at the Pima Air Museum in Tucson, Ariz.; the Air Force Museum in Dayton, Ohio; the SAC Museum in Omaha, Neb.; at Chanute AFB, Ill.; at Grissom AFB, Ind.; and one is being refurbished to display condition by the Museum of Aviation group in Dallas, Tex.

Scrapping the fleet of these Mach 2 bombers was possibly a mistake. The B-58 could carry, in addition to the fuselage-mounted combination fuel/weapons pod, four smaller nuclear weapons on underwing stations, giving the delta-wing bomber an extremely potent strike capability.

Also, if any readers are in the Tucson, Ariz., vicinity, the Air Force offers an outstanding tour of the Military Aircraft Storage and Disposition Center (MASDC) at Davis-Monthan AFB, Ariz. Buses depart the main gate at

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When a combat pilot enters hostile territory, he is barraged by electronic signals from hundreds of enemy emitters: he needs to instantly identify all air defense radars, surface-to-air missiles, and airborne interceptors posing lethal threats to his mission.

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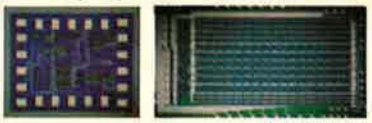

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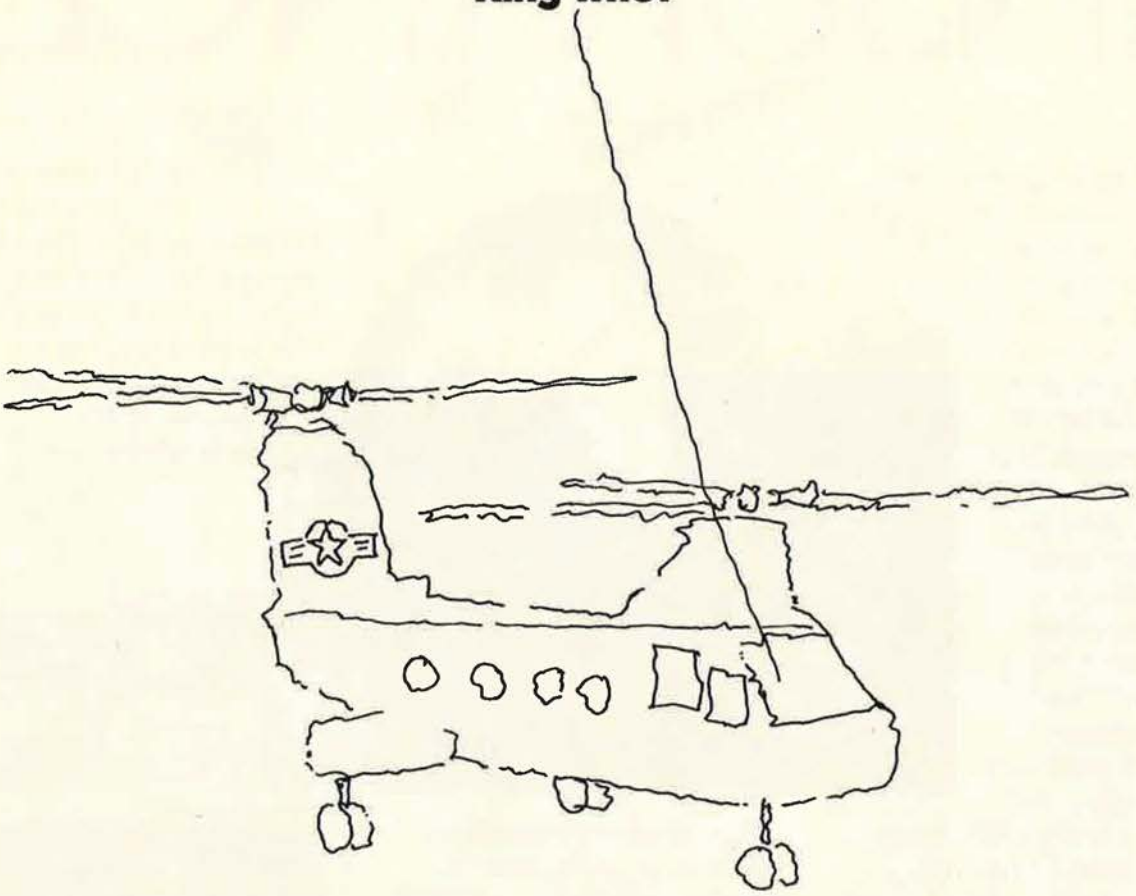
King who?



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You won't have to ask twice.

KING

8:00 a.m. on the second Saturday of each month on a comprehensive tour of the boneyard; the tour lasts until noon. Shorter tours of the base are offered each Monday at 9:00 a.m. and Wednesdays at 1:00 p.m.

The Air Force personnel involved—both military and civilian—are highly motivated and go out of their way to be informative and courteous, making the four hours time well spent.

As an active Reservist, I continue to find your publication informative, and read it from cover to cover. Keep up the outstanding work.

Bob Clarke
Las Vegas, Nev.

I've seen several letters to the editor addressing the question of whether to put the B-58s "stored at Davis-Monthan" back in shape and back in the inventory.

Unfortunately (for B-58 lovers), the B-58s stored at Davis-Monthan (there were just over eighty there at one time) no longer exist. The scrappers got to them several years ago. During my last trip, all of the aircraft had been stripped, gutted, and axed. By now, the majority are almost certainly fond memories in the form of large aluminum ingots.

I might mention that I'm in the middle of completing a book covering the history of the B-58. General Dynamics has furnished us with busloads of development-related information, but we're still in need of operational insight. If any readers wish to contribute to this rather comprehensive effort, it would be greatly appreciated.

Jay Miller
Editor/Publisher
Aerofax, Inc.
P. O. Box 5337
Austin, Tex. 78703

Recent efforts to acquire another manned strategic bomber have provoked some Air Force Association members to propose reactivating the B-58 Hustler (June and September '81 issues).

The question is moot. The Air Force sold the last fifty-seven B-58s for scrap in August 1977, at about the same time the B-1 program expired.

But for those interested, an examination of the B-58's design, operational frailties, and the reason for its retirement is contained in the forthcoming November/December 1981 issue of *Air University Review*.

R. Cargill Hall
Chief, Research Division
Albert F. Simpson Historical Research Center
Maxwell AFB, Ala.

AIRMAIL

The Grim Reapers

Concerning Mr. Carroll R. Anderson's letter in the "Airmail" section *(p. 16)* of the September issue of AIR FORCE Magazine, in which he reports on the "Speedy A-26s" of the 13th Squadron (The Original Grim Reapers), 3d Attack Group: Not that it matters, but the Group had its designation changed from Attack to Bombardment in 1939, although by the old-timers it was always known as the Attack Group.

Although wartime, the 3d Group did play some. For those who are interested, there is an article entitled "The Junglewacs" in the June 2, 1945, issue of the *Saturday Evening Post* that covers this subject very well.

Also, there were some fine officers and leaders who were members of the Grim Reapers. There was especially a young officer who, I believe, by the time he was twenty-four years old had been a squadron and group commander. He was a leader and an example to both officers and airmen—an officer named Richard H. Ellis.

I do not quite agree with Mr. Anderson that the pilot had it all that blind, as I never heard one mention that problem. Also, I believe that Mr. Anderson overlooked the fact that besides the pilot, there was the gunner in the turret who had a 360-degree view and who could, and usually did, catch anything coming in.

CMSgt. John F. Kasper, USAF (Ret.)
Corpus Christi, Tex.

Spider Webb

I am an ex-member of the 18th Fighter-Bomber Wing, which was at a place called Chinhae in Korea. I was a member of No. 2 Squadron, South African Air Force (Flying Cheetahs), and was in Korea from October 1950 to November 1951 and traveled throughout Korea from Chinhae to Pyongyang.

On numerous occasions I was sent on missions with the Gooney Bird (C-47) from home base K10 to advanced landing grounds to recover wounded pilots of all three nations operating with the 18th "Truck Busters." Most of the missions were carried out at night, especially those that were on the other side of the bomb line. I guess there are many old veteran pilots who can remember the cheery little SAAF corporal who comforted them on their flights back to base in the C-47.

I was one of the last to be evacuated out of K13 (Suwon) when the North Koreans and Chinese pushed us down the peninsula in 1951.

You may ask yourself, what is this man getting at? Well, sir, my son, who is also in the South African Air Force serving as a flight engineer on helicopters, phoned me a week ago and told me about a picture of myself in your magazine of June '81.

The magazine was sent to me and on p. 96, advertising the coming events in the September issue, is the photo of an insignificant SAAF corporal preparing his F-51 for an early morning mission. The original picture can be seen in *The Truck Busters: 18th Fighter-Bomber Wing,* the saga of the Korean conflict in the Far East between the period mid-July 1950 to 1952.

The photograph is on the bottom left hand corner of p. 4 of the Flying Cheetahs section of the book and is captioned "servicing by jeeplight."

I am now sixty-two years old and am in my seventh year of service after my first retirement. I hold the position of Logistics Coordinator of an Air Force base in the Northern Transvaal and will finally retire at the end of September 1981.

Wishing you the best for the future of your most interesting and informative magazine.

Maj. L. J. C. "Spider" Webb, SAAF
Pietersburg, South Africa

Expression of Sympathy

Both my wife and I want to express our sympathy to the family of Lt. Col. D. L. Smith, leader of the Air Force's Thunderbirds Demonstration Team, who was killed on takeoff after the Cleveland Air Show on September 8, 1981. I am also sure that his teammates feel this loss as much as the people of Cleveland, who saw the team fly on Sunday, September 7.

Both my wife and I stayed at the same hotel as the Thunderbirds Team, and found the whole team very outgoing and always ready to answer any questions we had.

Once again, our sympathy goes out to his family and team members. Your loss is ours also.

Mr. and Mrs. Fred Harrison
Cheswick, Pa.

Bad Breakout?

I was just looking at the Air Force Almanac in the May '81 issue of AIR FORCE Magazine. In the "USAF Military Personnel by Grade, Race, and

Now there's an entirely new class of bomb, missile and pod Ejector Release Units (ERUs). EDO Government Products Division is building them.

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Sex" chart *(p. 161)*, why is it necessary to make the breakout by race or sex? I thought it was a high-priority goal of this country to integrate all races into society.

Such charts as yours continues to reemphasize the fact that blacks and other minorities are a separate part of society.

R. C. Hardy
Warner Robins, Ga.

Sir Keith Park

I am working on a biography of Air Chief Marshal Sir Keith Park, a New Zealander who made his career in the Royal Air Force, which is to be published by Eyre Methuen during 1983.

Park served with many Americans in both world wars, as a pilot on the Western Front in 1917, and as a senior officer in Malta, Egypt, Ceylon, and Singapore between 1942 and 1946. Some Americans, of course, also served under him in the Battle of Britain.

Among his many decorations, one that I know he prized highly was the American Legion of Merit, awarded in 1946. Park greatly admired American methods of running an air force, and, unlike some British-born officers, he usually got on well with Americans, winning praise from a good many officers (starting with General Eisenhower himself) for his energy, his skill, and his readiness to cooperate.

It therefore occurred to me that there may be members of your Association who recall serving with Park. If so, I would be delighted to hear from them.

G. V. Orange
Senior Lecturer in History
University of Canterbury
Christchurch 1
New Zealand

Former Thunderbirds

The United States Air Force Thunderbirds Alumni Association is trying to locate former members of the aerial demonstration team. The Association is composed of all former members, officer and enlisted.

If you are a former member of this elite group, or know the whereabouts of former members, please contact the address below.

P. K. Fisher
Box 4004
North Las Vegas, Nev. 89030

22d BG in Australia

I am a Senior Lecturer at Deakin University, Victoria, Australia. I am involved in a study of an area in Western Victoria, and my direction of research requires information from members of the US Air Force. The personnel concerned were members of the 22d Bombardment Group who were stationed for a brief time at Nhill, Victoria, in 1942.

I am specifically interested in making contact with members of the above Group. Contact is possible by writing to me at the address below.

John A. Henry
Senior Lecturer, School of Education
Deakin University
Victoria 3216
Australia

AIRMAIL

Lieutenant Goodwin

I had a brother, Lt. William A. Goodwin (#0-706127), who was killed in action during World War II. He was with the 58th Fighter Squadron, 33d Group, stationed in North Africa.

On August 9, 1943, he was shot down over the Strait of Messina between Sicily and Italy. His body was never recovered.

I am interested to know if any readers might have been connected with my brother's outfit. If so, I would appreciate hearing from them regarding his actions and activities between the time he was shipped overseas and his death.

E. Howard Goodwin
200 Executive Dr.
West Orange, N. J. 07052

33d Fighter Squadron

I am trying to contact Joseph D. Shaffer and anyone else who served with the AAF in Iceland during 1942, especially anyone who was with the 33d Fighter Squadron.

I am writing an account of the air combat of October 18, 1942, in which Shaffer destroyed a German reconnaissance plane by accidental ramming.

MSgt. James I. Long,
USAF (Ret.)
449 Whispering Pines Dr.
Ocean Springs, Miss. 39564

Lieutenant Antonucci

I would like to hear from anyone who knew my brother, Lt. Philip Antonucci, who was a P-47 pilot with the 513th Fighter Squadron, 406th Fighter Group, Ninth Air Force.

Phil was flying a mission on October 4, 1944, when he disappeared over France after his squadron was broken up by heavy antiaircraft action by the Germans. He was found buried in Belgium after the war.

I am preparing a book for our family, comprising his letters to us, and would like to know anything I can of his time with his squadron or group from June 1944 to the day he died.

Mrs. J. J. Bevan
P. O. Box 102
Wallingford, Conn. 06492

Airfields in Lincolnshire

For some ten years now I have been researching the history of the airfields in the English county of Lincolnshire, and the preliminary results of this work will be published as a book later this year. My research has, so far, been based upon the official records held at the Public Records Office, the Air Historical Branch of the Ministry of Defence, and the various museums in London.

I am now extending my research toward the units and squadrons of the overseas air forces that served in Lincolnshire. American units first came to Lincolnshire in 1918 and were based at the training stations at Spittlegate, Scampton, South Carlton, and Waddington, and the seaplane station at Killingholme.

During the Second World War, American units were based at Goxhill and Kirton-in-Lindsey (Eighth Air Force), and at Barkston Heath, Folkingham, Fulbeck, and North Witham (9th Troop Carrier Command). Following the Second World War American units have been based at East Kirkby, Hemswell, Scampton, Spilsby, Sturgate, and Waddington.

My purpose in writing is to ask readers who may have served at the stations I have mentioned to make contact with me. In particular I am seeking anecdotes and information concerning the aircraft, the day-to-day routine, and impressions of these Lincolnshire stations. Of great value would be extracts from log books (with details of sorties, aircraft serial numbers, types of mission, etc.), and photographs, which have proved particularly scarce on this side of the Atlantic.

Original material would, of course, be returned promptly after copying.

W. J. Taylor
Officers' Mess
Royal Air Force
High Wycombe
Buckinghamshire
HP14 4UE England

AFROTC Det. 847

AFROTC Detachment 847 is currently attempting to locate all Angelo State AFROTC alumni. If you are a former commissionee of Angelo State

University AFROTC, drop us a note with your name, current address, and date of graduation, and we will contact you.

We are attempting to compile an information booklet to assist former classmates in contacting one another. Your help will be greatly appreciated. Send all correspondence to the address below.

AFROTC Det. 847
P. O. Box 10905 (ASU STA)
San Angelo, Tex. 76909

AFROTC Det. 085

AFROTC Detachment 085, University of California at Berkeley, is interested in locating all prior AFROTC graduates and starting an alumni association of "Old Blues." We plan to publish a newsletter featuring "Who's Who" among Cal alumni.

If you are a past graduate of this detachment (active or retired), let us hear from you. If you can help locate other alumni, that would help, too.

AFROTC Det. 085
University of Calif.rnia, Berkeley
Berkeley, Calif. 947. 0

65th Fighter Wing

Former members of the Headquarters, 65th Fighter Wing, and 52d Fighter Control Squadron, Eighth Air Force, stationed at the Grammar School in Saffron Walden, England, during World War II are invited to contact me for details on the formation of a 65th Fighter Wing Association.

Lt. Col. George M. Epperson, USAF (Ret.)
2369 Oak Crest Dr.
Riverside, Calif. 92506

Lieutenant Trucker

I am looking for information on 1st Lt. Donald Neils Trucker, who was reported missing in action on April 30, 1944, over the Pacific between Makin and Eniwetok in the B-25D *Snuffy Smith.* No trace of the aircraft was ever found.

Lieutenant Trucker served with the Seventh Air Force, 396th Bomber Command. He graduated with the Class of '43 at Luke Field, Ariz.

Could anyone with any information on Lieutenant Trucker please contact me at the address below?

Vickie Trucker Jozefiak
718 Montgomery Pl.
Woodland, Calif. 95695

97th Bomb Wing

Last year our company opened a restaurant in Memphis, Tenn., that we named the "91st Bomb Group." The artifacts in and around the restaurant tell the story of this unit's activities flying out of England during World War II.

We are interested in naming a restaurant at West Palm Beach Airport the "97th Bomb Wing." Any former members of the 409th, 410th, 416th Bomb Groups, or Wing Headquarters, that can help us in obtaining photographs, memorabilia, etc., of the Wing's WW II days, please contact me at the address below.

Ron Weil
Specialty Restaurants Corp.
2977 Redondo Ave.
Long Beach, Calif. 90806
Phone: (213) 426-0451

AIRMAIL

Reunion for WACs?

I wonder why WACs never seem to have a reunion?

I would love to hear from Verna Klevin, Donna Dumas, Dolly Romig, or any other WAC who served with me from July 1, 1943, to December 2, 1945.

Lois C. Solvin
213 Downs Lane
Louisville, Ky. 40214

U-Tapao Vets

An organization of SAC veterans who served in Southeast Asia has been formed in memory of the 118 SAC crewmen killed or missing in action between 1965 and 1972.

The organization, called the U-Tapao Veterans Association, represents all Young Tiger, Arc Light, and Bullet Shot personnel and all others who supported SAC operations in Southeast Asia, according to Brig. Gen. Lyman E. Buzard, U-Tapao President.

The association is currently developing a roster of members and asks that all qualified veterans contact the association and notify their fellow servicemen who served in Southeast Asia. Please contact the addresses below.

Maj. Dennis Ryder
206 Sandi Court
Bellevue, Neb. 68005
or
55th Strategic Reconnaissance Wing
Offutt AFB, Neb. 68113
Phone: (402) 292-6732
(402) 294-3319
AUTOVON: 271-3319

Collectors' Corner

As a result of numerous household moves during the past thirty-five years, my WW II Air Transport Command uniform badges have disappeared.

If any reader is a collector or dealer of military uniform badges and has any Air Transport Command badges available, I would like to purchase two or three. I would like to mount them in a trophy case along with my medals and uniform patches.

Thomas M. Gilbert
9 Bodnar St.
Bernardsville, N. J. 07924

I am looking for new people to trade Air Force items with. I collect and trade patches, photos, slides, and information.

I am most interested in old ADC units and aircraft, but collect most everything. I also have access to a number of US Navy patches and weapon systems patches. Please contact me at the address below.

Randy A. Edens
7232 Twin Oaks Dr.
Indianapolis, Ind. 46226

A friend of mine and I have been enthusiastic collectors of US Air Force patches for the past couple of years.

Our experience has been that it is getting more difficult to obtain unit patches, even from commercial dealers.

We would appreciate any help in obtaining patches from PACAF, SAC, ANG, or AFRES units. We are willing to pay reasonable prices.

Harry Koning
Poolsterstraat 29
7557 XM Hengelo-O
The Netherlands

Ever since I entered the Air Force four years ago, I have been extremely interested in military aircraft and unit patches.

As of now, I'm a junior in AFROTC through the Airman Scholarship and Commissioning program, and my ability to find or purchase patches or photos of aircraft to add to my collection is extremely limited.

I would appreciate any help in obtaining these items.

Eric S. Plura
Box 171, R. D. #1
Duanesburg, N. Y. 12056

I am a member of the Rhode Island Air Guard's 143d TAG, and would like to trade ANG patches with other AFA members.

I have extra 143d TAG patches that I would like to trade for ANG patches from other flying units.

A1C William J. Curry, RIANG
196 Bucklin St.
Pawtucket, R. I. 02861

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IN FOCUS...

By Edgar Ulsamer, SENIOR EDITOR (POLICY & TECHNOLOGY)

Washington, D. C., Oct. 29

The Strategic Force Modernization Package

On October 2, the Administration unveiled with considerable fanfare—but also vagueness and contradiction—a five-pronged strategic force modernization plan known as the "Reagan Strategic Program." The program's most attention-getting feature that stunned Capitol Hill, scooped the media, and shocked the Air Force was the decision to deploy MX initially in fixed, upgraded silos and to cancel the multiple protective shelter basing scheme.

While Administration officials vigorously denied that this move was meant to goad Congress into delivering the *coup de grâce* to the MX program, there are strong indications that various congressional factions plan to do precisely that—and probably stand a better-than-even chance of succeeding. In fairness it must be said that influential Defense Department officials point out privately that the MPS basing mode was not supported by all the Joint Chiefs of Staff, that its political feasibility was uncertain, and that, therefore, the only safe and prudent approach was to go ahead with construction of the missile while continuing the search for a broadly acceptable basing mode. Congress, so this line of reasoning goes, has the right to resurrect MPS and to instruct the Defense Department to continue to pursue MPS design work. Such a development, these officials claim, is about the best solution possible under the circumstances.

While there are good and valid reasons for faulting the Administration's strategic program, there are others that justify praise. Foremost among the latter type is the purpose behind the program: to "end the relative decline of US strategic capabilities and [to] put the United States in a position to reshape the US-Soviet competition in the years ahead." Whether the forecast rests on reality or rhetoric, it is encouraging to hear that "we will, by 1990, roughly double the number of US strategic weapons that could survive a Soviet nuclear attack on our country. We will be able to communicate with these forces during an attack, immediately following an attack, and, if necessary, for extended periods thereafter."

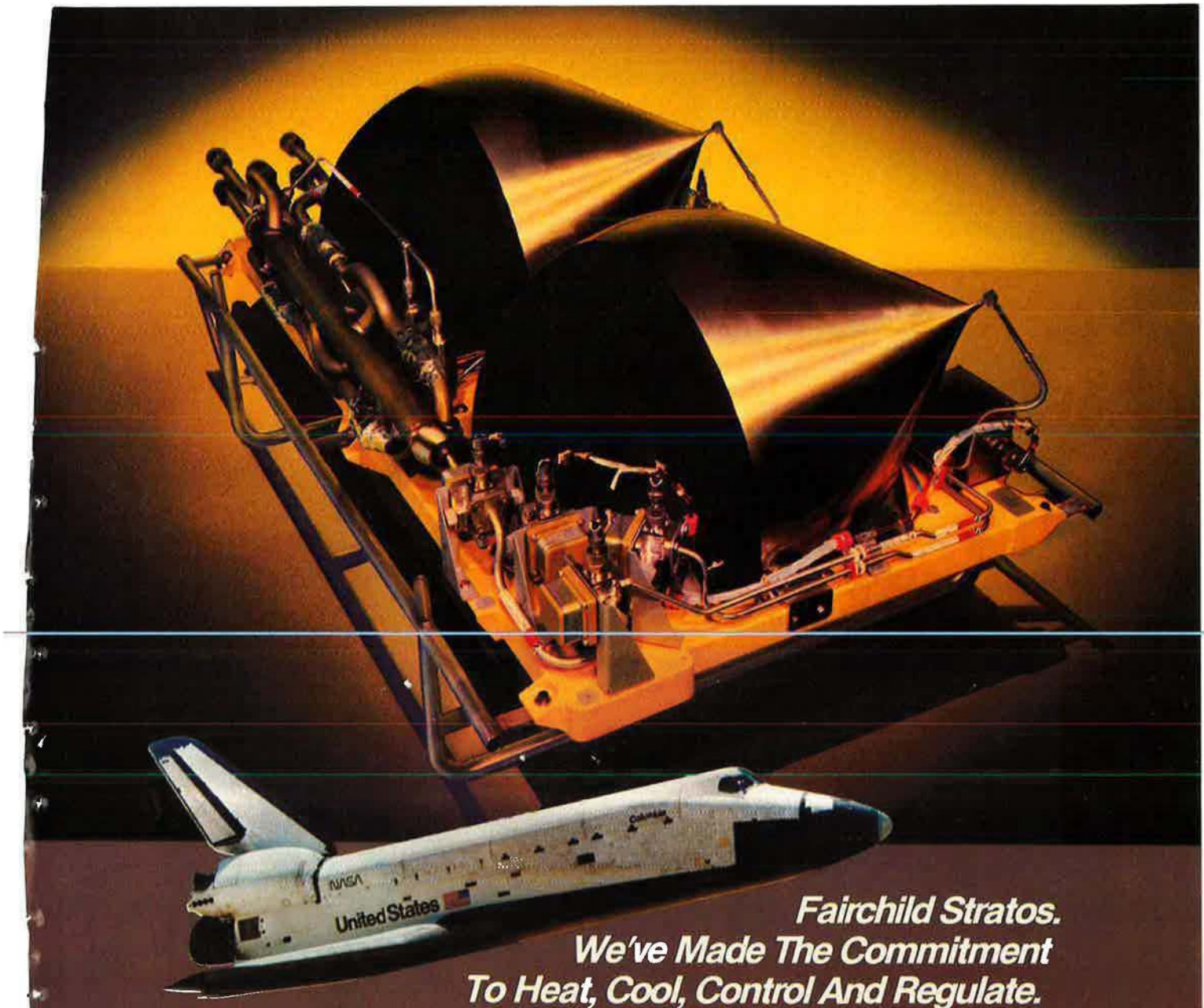
The modernization effort as proposed by the Administration is estimated to cost about $180 billion over the next six years, and should account for no more than fifteen percent of the total defense spending during this period. In order to redress, "within the next four to eight years," the most serious weaknesses in the US strategic posture, the Administration plans to shore up its five essential elements in a mutually reinforcing manner. This will involve improvements in communications and control systems; modernization of strategic bombers; deployment of new submarine-launched missiles; a step-by-step plan to improve the strength and accuracy of new land-based missiles, and to reduce their vulnerability; and improvements in strategic defenses.

Planned improvements in the command control and communications area include the development and deployment of six (three more than previously scheduled) mobile ground terminals to provide survivable ground nodes and data processing for the Defense Support (early warning) satellites, and upgrading of these satellites to increase their survivability. Also, these spacecraft and certain ground-based radars will be modified to give better information about the size and nature of a Soviet missile attack. Two additional—for a total of four—Pave Paws surveillance radars that can detect SLBM launches over great distances will be deployed to improve coverage of the ocean areas to the southeast and southwest of the US.

Probably the brightest aspect of the strategic force modernization program involves air-breathing systems, especially the development and deployment of both a variant of the B-1 bomber and of the advanced technology, or "Stealth" bomber. Officially, the Administration seems committed to build and deploy 100 B-1Bs; unofficially, there are indications that the first production run will be lower, perhaps in the range of about fifty units, and that an upgraded variant, the B-1C, might be brought into the inventory later on. There also appears to be consideration given to buying fewer than 100 B-1Bs if the Stealth bomber's development proceeds smoothly and rapidly.

Three weeks after the Administration's commitment to build a B-1B, the final design of the aircraft is not fully nailed down, especially so far as the question of whether early models need to carry air-launched cruise missiles or not is concerned. It is also not clear whether the Administration will buy only a handful of B-1Bs on a fixed price basis and then shift to multiyear procurement—probably by 1983—or buy incrementally on a fixed price basis. The latter approach would make it easier to cut short the B-1B buy in favor of the Stealth bomber. The possibility of adjusting the acquisition of the two bombers is hinted at broadly by this Administration statement: "Building two bombers will stimulate competition and give the Defense Department the flexibility to adjust bomber procurement in accordance with any changes in estimates of the cost and effectiveness of the two aircraft."

The Administration's "step-by-step" approach to ICBM modernization is premised on the categoric and unexplained assertion that the Air Force's MPS basing of MX has "serious military drawbacks and does not solve the basic problem" of ICBM vulnerability. It would seem a *non sequitur* of historic dimension to argue from this premise that deploying MX in a limited number of upgraded Titan or Minuteman silos, beginning in 1986, *will* provide a degree of temporary survivability. It hardly seems to matter whether these upgraded silos are hardened to withstand up to 3,000 psi (pounds per square inch) of overpressure, as claimed by one senior defense official, or an across-the-board 5,000 psi, as asserted by Sec-



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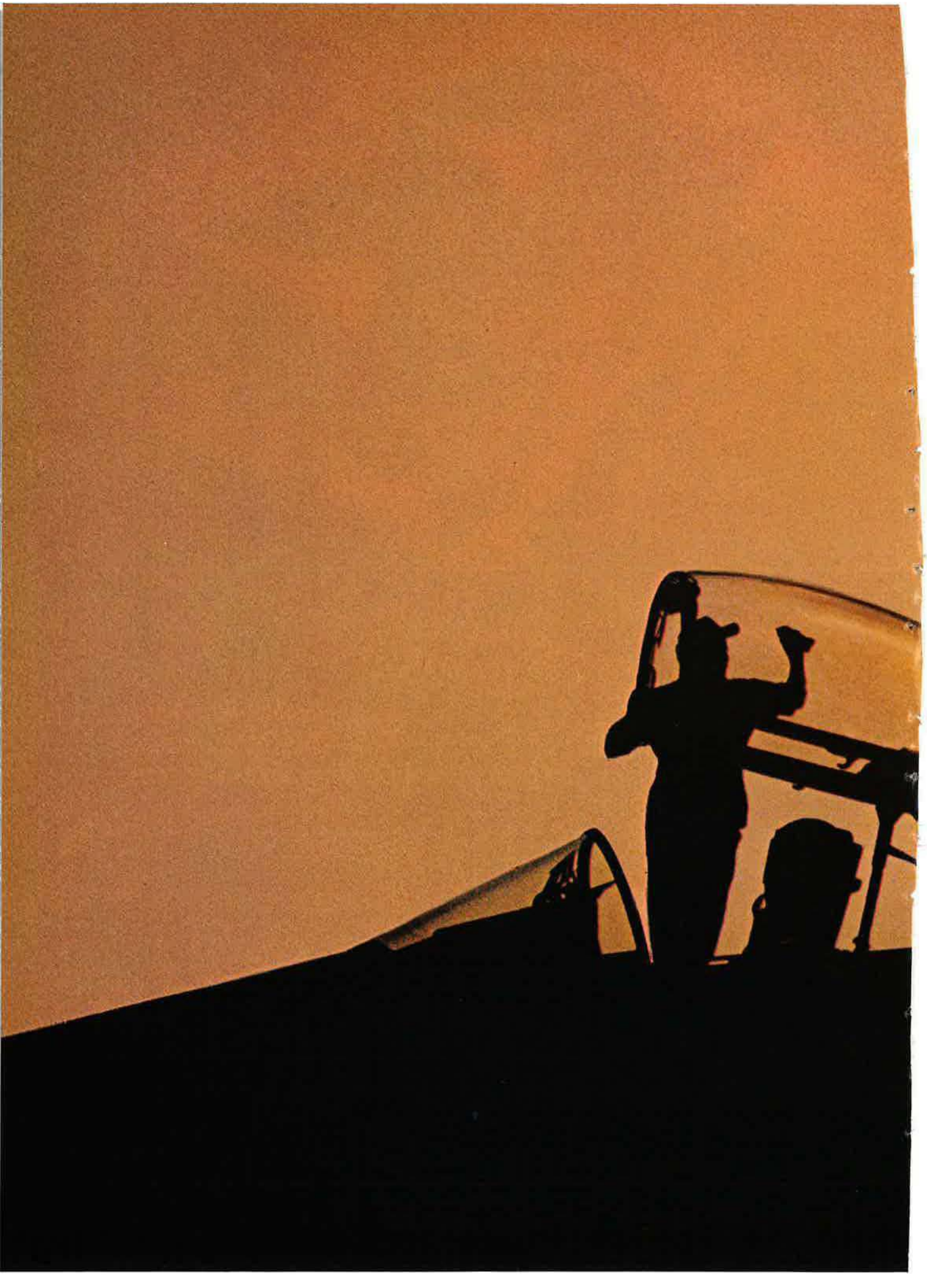

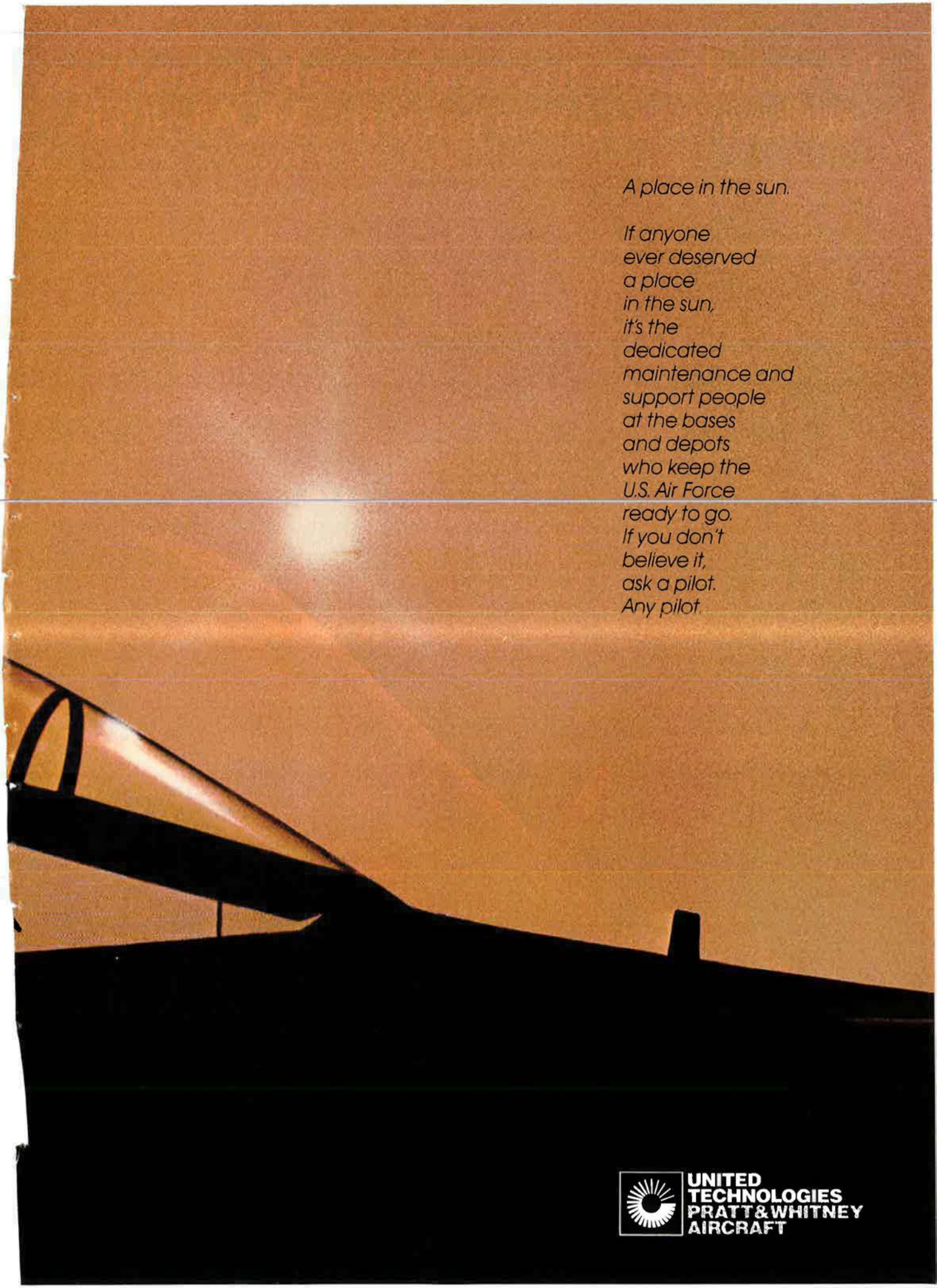
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We found a way to elevate missile technology, yet keep costs down to earth. MQM-107B.

When the MQM-107A was introduced in 1976, it was the most advanced, low-cost, subsonic, recoverable missile target. Since then it's been through a lot of ups and downs—with over 400 units flying at a rate of 20 missions each. It was bound to be a success. Designed for simplicity, production efficiency and utilizing state-of-the-art technology, it's little wonder that the MQM met the target requirements of so many military organizations, so well.

But now there is a new state-of-the-art—the MQM-107B. Like its predecessor, it can be surface launched from a zero-length launcher with rocket booster assistance. It can be operated from remote ground control just like the MQM-107A, and recovered on command with a two-stage parachute system. In fact, the MQM-107B can do everything its predecessor did, but with greatly improved performance characteristics.

The MQM-107B utilizes an increased thrust propulsion system together with more precise digital flight control and improved 3-axis maneuvering autopilot to raise performance characteristics to a new level. Speeds in excess of 535 knots TAS are possible, from sea level to over 40,000 feet. Maneuvers requiring constant g loads up to 6 g's are no problem.

These improvements permit more precise target control and increased mission profile flexibility. For example, low altitude terrain following missions and simultaneous three vehicle flight missions can be flown. And the MQM-107B digital control system has additional computer capacity already built in to accommodate the even more stringent target requirements of the future.

In addition to improved performance, the MQM-107B has an improved payload capability with an internal volume capacity of 4.8 cubic feet. Easy access to augmentation and scoring payload and core electronics are also included in the design. And the new MQM-107B is mobile. Launch, tracking and control units are all self-contained. Relocation of a target operation is a matter of just picking up and moving.

The MQM-107B and all the various elements of its improved design have been thoroughly tested. It more than meets the military's demands for large payload volume and weight, target size, speed, altitude, endurance and precise controllability. All within a down to earth, cost-efficient system. That's technology.

For further details, please write to: Beech Aircraft Corporation, Aerospace Programs, Wichita, Kansas 67201.

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retary of Defense Caspar W. Weinberger, if—as most intelligence estimates of Soviet ICBM accuracies suggest—these aimpoints are within the crater dug up by the enemy warhead. As one congressional expert put it, "the only difference a superhardened silo makes is that MX would lean a little bit less."

In general terms, the Administration pledged to deploy at least 100 MX ICBMs, involving a limited number in fixed silos and the remainder in a "long-term basing" mode that is to be selected by 1984. Three options are to be pursued—a continuous airborne patrol aircraft, active ballistic missile defense of land-based MX ICBMs, and deep underground basing. To date, congressional reaction to these options has been skeptical.

Modernization of sea-based strategic forces involves development and deployment, beginning in 1989, of the D-5, a larger and more accurate SLBM than current systems, that "will allow us to use sea-launched missiles to attack any target in the Soviet Union, including their missile silos." Beginning in 1984, several hundred sea-launched cruise missiles carrying nuclear warheads will be deployed on attack submarines to provide a "strategic reserve force."

The timing of the latter announcement probably was less than fortuitous, coming at the peak of Western European opposition to the stationing of nuclear-armed ground-launched cruise missiles on their soil, beginning in 1983. There is strong sentiment in Western Europe to place cruise missiles aboard submarines rather than on land to avoid becoming a direct target of Soviet counterforce weapons. As Gen. Bernard Rogers, SACEUR, told this writer, the US announcement concerning the deployment of nuclear-armed cruise missiles on submarines will provide "ammunition" for those who already oppose the stationing of US theater nuclear weapons in Europe.

The fifth element of the Administration's strategic plan centers on a much needed upgrading of North American air defenses *(see p. 80, October '81 issue)*, development of an ASAT antisatellite weapon system, accelerated R&D on ballistic missile defense systems, and an expanded civil defense program.

The fate of the strategic package on Capitol Hill might well depend on the Administration's ability to present it with greater consistency and coherence than has been the case so far. It also is probably essential to assuage the concerns of those members who believe that key elements

IN FOCUS...

of the package were arrived at without full consultation with the nation's military leadership.

NATO Deterrent in Jeopardy

"The very credibility of [NATO's] deterrent is in jeopardy," Gen. Bernard Rogers, the American commander of NATO forces (SACEUR), recently told a group of Pentagon reporters. If attacked by the Warsaw Pact, NATO might well be faced with a Hobson's choice of either having to "give up" or resort to the immediate first use of nuclear weapons, thereby running the risk of escalation to strategic nuclear war, he said.

At the root of the problem, General Rogers said, is that while the Allied European Command is getting stronger every year, the gap between NATO and the Warsaw Pact forces, nevertheless, is getting wider, and worse, over time. The balance is deteriorating because of the rapid growth of Soviet military power coupled with the prospect that this growth will continue at an unabated pace for the foreseeable future. The consequence, therefore, is that "NATO's relative ability to counter this threat is declining."

Operating on the assumption that the most plausible scenario for war between the Warsaw Pact powers and NATO would be "spill-over from some place else" that causes escalation to global conflict, he stressed the overriding importance of two separate means for correcting NATO's deficiencies, especially in the general-purpose warfare area.

The first action, he said, revolves around the NATO members' willingness to fulfill commitments made previously to shore up the Alliance's conventional warfare forces. These commitments require that on average each member country increase defense spending at an annual rate of about 4.5 percent, in real terms, in the SACEUR's view. Given the current political and economic climate in Western Europe, such sustained major spending boosts would seem unattainable, at least until "the people themselves send the message to the political leaders" that the Soviet threat must be countered in the manner the American people did in the 1980 elections. Without such a turnaround in attitude and commitment, "our ability to counter the threat will decline year by year."

The second initiative deemed essential by the NATO Commander to forestall or repulse a Warsaw Pact attack on Western Europe centers on the US exploiting existing technologies to detect, acquire, and destroy targets in the Warsaw Pact's second echelon. The importance of interdicting and disrupting the second echelon springs from how, in the light of hard intelligence, the Soviet Union and her satellites would launch a surprise attack: "The Warsaw Pact will attack [under such conditions] with lead armies and will have lead divisions in those armies. And they will have the lead armies' second echelon divisions about 200 km behind [whose role] it is to exploit the situations developed by the lead divisions."

In reality, General Rogers points out, there are two second echelons—as evidenced consistently by how the Pact forces conduct maneuvers—meaning that the Soviets also rely on "follow-on armies" that are kept further back in East Germany, Poland, and Czechoslovakia. The terrain in those areas creates certain bottlenecks "where we will have to interdict them," the NATO Commander suggested.

Blocking the Pact's two second echelons will require use of sophisticated, expensive weapon systems. While well within the technological ken of the US, these weapons are not being developed at the required rate and pace, in General Rogers's view.

Paramount in this context are Assault Breaker, a complex combination of advanced sensor systems, command and control, and standoff weapons; the Pave Mover airborne moving target indicator radar to interdict moving ground targets with precision-guided munitions and submunitions; the Joint Tactical Fusion Center that orchestrates sensors, weapon systems, and C³I (command control communications and intelligence); and blanket suppression of the Pact's air defenses to enable "our air to hit deep targets on a timely basis," he said.

Of equal importance, he added, is greater exploitation of electronic warfare (EW), especially in the field of command control communications countermeasures (C³CM), because "if we can cut off [the Pact's] C³ systems, we can make quick progress on the conventional [warfare] side." There is a problem, however, because in the case of most NATO members "budgets tend to cause the EW money to fall out. Yet the ability to blind [Soviet] radars, to jam their

communications, to cut off centralized direction from their leaders to junior commanders who don't have and aren't expected to have initiative" is essential to blunting the initial thrust of a Warsaw Pact attack.

Washington Observations

★ The Administration's plan to deploy a number of MX ICBMs in modified silos that previously housed Titan or, possibly, Minuteman missiles seems to conflict with a provision of the SALT II agreement that prohibits size increases of such structures in excess of thirty-two percent. Although not ratified by the US Senate, Administration spokesmen assert that the US will abide by the terms of the accord as long as the Soviets do the same.

Initial Pentagon studies suggest that the Administration's intent to boost the hardness of these silos to what various defense officials referred to as overpressure resistance of up to 3,000 psi (pounds per square inch), between 3,000 and 5,000 psi, or 5,000 psi, will require size increases far in excess of the permissible limits, possibly as high as 400 percent in certain dimensional aspects.

This circumstance can be assumed to trigger stiff opposition to a silo-based MX system by members ideologically, or for other reasons, committed to arms control and arms reduction. The high cost of hardening Titan silos to the extent proposed by the Defense Department—estimated to amount to about $30 million per silo—is likely to build up further congressional resistance to such a modification scheme.

★ Dr. Edward Teller, doyen of US defense scientists, strongly favors the development of advanced remotely piloted (unmanned) vehicles to operate in conjunction with, and as an extension of, a modern strategic bomber force.

Remotely piloted platforms controlled via secure data links can extend the range of "vision" of the bomber and increase the manned aircraft's ability to defeat hostile air defenses, in Dr. Teller's view. As a result, the effectiveness and penetrativity of strategic bombers would be assured for the foreseeable future. He likened the importance of such systems to that of a new technology, or "Stealth," bomber.

★ The void created by the Administration's intent to delay a decision on how to base MX over the long term is being filled by some radical but not necessarily sound schemes. Typical

IN FOCUS...

is the notion of a command/arm or disarm warhead. The underlying thought is to change the irretrievable doomsday consequences of a launch under attack (LUA) or launch on warning (LOW) to something less so.

If such a launch is undertaken because of incorrect information and assessment, so the advocates of this approach reason, it would be possible to command the ICBM warheads to disarm—if the scheme involves the launching of armed warheads—or to withhold the command to arm if they were launched in an unarmed state.

In such an eventuality, so the notion goes, the US National Command Authorities would inform their Soviet counterparts on the hot line that the warheads about to rain down on the USSR will not be detonated and that, hence, there is no cause for Moscow to retaliate. Soviet willingness to accept such a US assertion good-naturedly and on faith is probably questionable. Even if the Soviets did so, the US would have lost its ICBM force and thus be excessively vulnerable to political or military reprisals by a justifiably irate Soviet Union.

It is possible, and necessary, to question the jam resistance of such a command link and the soundness of a scheme that clearly instills a high degree of brinksmanship in the decision-making process. Lastly, the effectiveness of a launch policy, either LUA or LOW, that is centered solely on the option of either initially using or forever losing the nation's ICBM force would seem problematical, at best. Since it inexorably leads to a combination of hair trigger and all-out retaliatory strike posture, such a strategy, even when mitigated by a command arm/disarm feature, is certainly destabilizing, probably ineffective, or both.

★ Under Secretary of Defense for Research and Engineering Dr. Richard DeLauer told this column that the Administration plans to invest about $18 billion over the next six years in the development of an integrated strategic command control communications and intelligence system.

Beyond accelerating and expanding C^3 programs in progress, the new package includes MILSTAR, a highly survivable satellite-based command and control system using advanced VHF (very high frequency) technologies that is to take the place of the Strategic Satellite System canceled by Congress. This system, which is in concept formulation, is to provide for survivable two-way communications between forces in the field and the National Command Authorities.

Another important facet of the Administration's integrated strategic C^3 system plan involves the use of a modified MX to launch critical space systems rapidly and in a nuclear war environment. The ability to "reconstitute" satellite systems that did not survive the early phases of nuclear war is essential for protracted strategic operations, in Dr. DeLauer's view. MX, if deployed in a survivable mode, is clearly the launch vehicle best qualified for reconstituting critical systems.

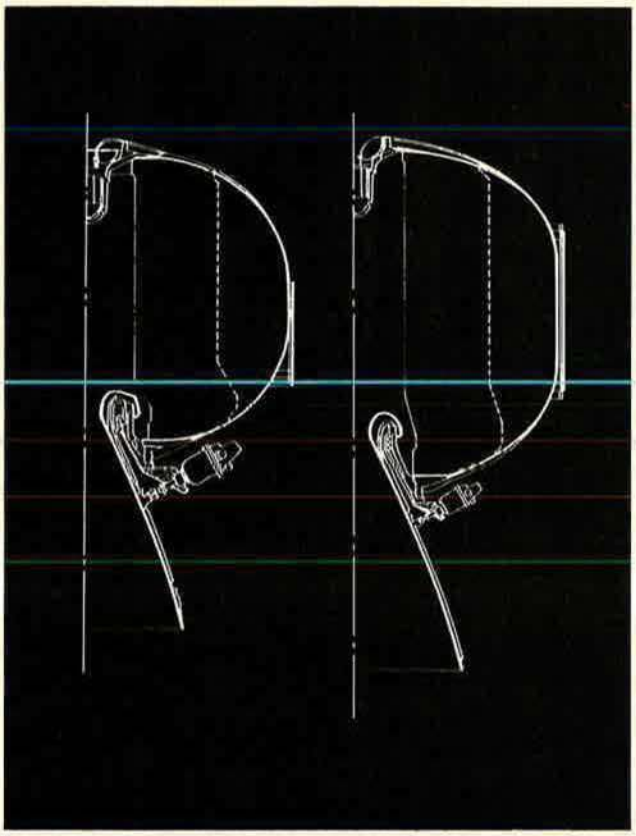
Meanwhile, because of the increasing importance of strategic command and control, the Electronic Systems Division of the Air Force Systems Command announced the formation of a "super SPO" (System Program Office) that will serve as the Defense Department's focal point and manager of all development programs in this field.

★ The US Navy plans to build "at least" twenty Trident SSBNs (strategic SLBM-launching submarines), or at least five more than originally scheduled, if the new D-5 SLBM indeed can be provided with a demonstrable hard-target kill capability. The D-5 missile, expected to first enter the operational inventory in 1989, is to have sufficient yield and accuracy to destroy such hardened structures as ICBM silos and command posts. Navy planners assert that once the SSBNs are required to cover both hardened and soft targets in the USSR, additional SLBMs—and hence additional Trident submarines to launch these missiles—become essential.

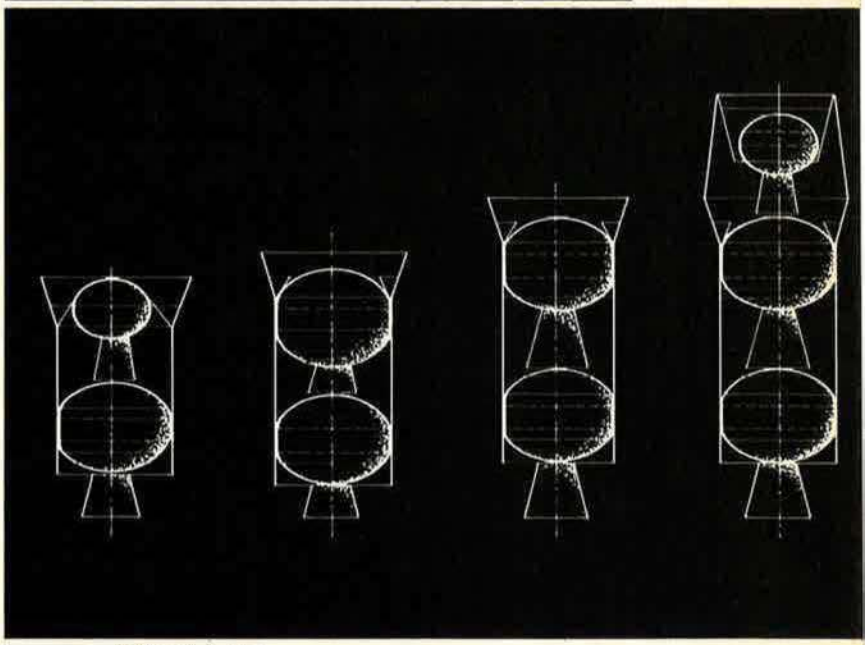
Supporting this argument further is the fact that missiles meant to provide a hard-target kill capability require heavier warheads with a relatively higher yield than those tailored for attack on soft targets. The number of MIRVs carried by a missile assigned to the former task, therefore, is obviously lower than one optimized for the soft-target mission. One of the prerequisites for applying the hard-target kill capability of future SLBMs in an operationally useful manner is improved command and control linkage with submerged submarines. Development of this capability, especially in the sense of rapid information transmission, may lag behind the fielding of SLBMs with hard-target kill capabilities. ■

HERE'S SOMETHING YOU DON'T KNOW.

Chemical Systems' development of the solid propellant propulsion system for the Boeing/Air Force Inertial Upper Stage (IUS), is proving to be one of the most technically successful projects of the U.S. Space Program.



- NO failures in 17 static firings even though the system employs highly advanced subsystems, components and materials.
- Of the 17 tests, 12 involved full-scale motors which operated for durations longer than any others developed for space applications.
- Advanced subsystems and components include the first extendible exit cone destined for flight, Techroll® seal, a new nozzle actuation bearing, integral throat and entrance (ITE) package, and an igniter usable for full or reduced propellant loads.
- Advanced materials include a Kevlar Fiber case, and 3-D carbon/carbon ITE, nozzle and extendible exit cone.
- During the program, all motors were test fired at altitude, some spinning and some with propellant reductions up to 50 percent.
- The IUS propulsion system uses two motors:
  A large motor, 92-inches in diameter with 21,400 pounds of propellant, which provides an average of 42,600 pounds of thrust.
  A smaller motor, 63-inches in diameter with 6,000 pounds of propellant, which produces an average of 17,430 pounds of thrust.
- The first flight motors have already been cast and are undergoing additional processing. Ten Qualification Phase motors have already been cast. Some are being prepared for testing by the Air Force, and others are in the final processing at Chemical Systems.
- With the maiden flight of the IUS aboard a Titan 34-D next year, two whole new families of reliable, fully developed and qualified space motors—which can be tailored to the most exacting requirements—will be available.



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UNITED TECHNOLOGIES CHEMICAL SYSTEMS

AEROSPACE WORLD
News, Views & Comments

By William P. Schiltz, SENIOR EDITOR

Washington, D. C., Nov. 4

★ A Medical Red Flag readiness exercise was conducted at the Malcolm Grow USAF Medical Center, Andrews AFB, Md., in late October.

The objective was to acquaint Air Force medical practitioners with the techniques of battlefield medicine under the most realistic, simulated combat conditions.

The M*A*S*H-type training began with classroom sessions followed by practical experience in the field. Subjects ranged from the threat and probable battlefield environments to wounds that produce vascular, chest, and abdominal injuries; burn management; infectious wartime diseases; and neurological injuries. The seminars were conducted by experts in their field.

Set up at Andrews for the exercise was the air-transportable 1st Tactical Hospital from Langley AFB, Va. The twenty-four-bed facility can be ready for deployment anywhere in the world in twenty-four hours. The hospital is designed to provide routine or emergency care for up to 3,000 patients for thirty days without resupply. It is one of three—of a total of seventeen USAF Medical Service air-transportable hospitals—hardwall, expandable facilities that can treat patients for return to duty or stabilize condition prior to aeromedevac.

In charge of the recent Medical Red Flag at Andrews AFB, Md. (see above) *was Lt. Col. Billy R. Solesbee.*

During the exercise, doctor "students" practiced "triage" (sorting out casualties by degree of injury) and otherwise treated the very realistic simulated wounds of their charges. They also became acquainted with the protective clothing to be worn in a chemical warfare environment. Thus far, some 2,000 Air Force medical people have been trained in battlefield treatment under the Medical Red Flag program.

At Andrews were also such medical evacuation aircraft as the C-130, C-141, and UH-1 helicopter; these were either on display or actually used in the airborne training of the medical people.

Overseeing the Medical Red Flag was the Air Force's Surgeon General, Lt. Gen. (Dr.) Paul W. Myers, a neurosurgeon who conceived the idea of the battlefield medicine training exercises. (*See also "Improved Combat Casualty Medicine" in the August '81 issue, p. 50.*)

★ In another Air Force medical matter, recruiters are seeking some 700 registered nurses for commissioning in the Nurse Corps in the next twelve months.

In addition to a special need for anesthetists, clinical posts to be filled include such specialty areas as mental health, environmental health, operating room nursing, and maternal/child health.

Applicants will be given an initial-base-of-choice option provided vacancies exist and will know where they will be assigned prior to commissioning.

The Air Force medical facilities throughout the world range from small outpatient clinics to such major hospitals as the 1,000-bed Wilford Hall USAF Medical Center in San Antonio, Tex.

★ The third time is the charm. And so it was for two Arizonans who in October successfully completed the first trans-America balloon flight.

The two—John Shoecroft and Fred Gorrell—flew their *Superchicken III* helium balloon from Costa Mesa, Calif., to tiny Blackbeard Island off the coast of Georgia in fifty-five hours twenty-five minutes. The pair spent most of the 2,515-mile (4,047 km) journey on oxygen and endured upper atmosphere temperatures that plunged to forty below.

The two adventurers were undeterred by Shoecroft's two previous failures—he and his crew were forced down by weather near Columbus, Ohio, in September 1980, and a helium leak terminated a second attempt near Liberal, Kan., last December. It was Gorrell's first try.

The first transcontinental balloon flight was completed by noted balloonist Maxie Anderson and his son, Kris, in April 1980. They flew from San Francisco to the eastern tip of Canada. In August 1978, Anderson was one of a trio that completed a transatlantic balloon crossing from the US east coast to France. His first attempt at a circumnavigation of the globe by balloon ended in failure in India last February. As this was written, he planned to try again from Jaipur in India in late November or early December with copilot Don Ida, his teammate on the previous flight.

★ The Air Force Flight Test Center, Edwards AFB, Calif., has awarded Computer Sciences Corp. of Falls Church, Va., an $18.7 million contract to deliver and install a computer system expected to "greatly enhance the Center's ability to process and analyze engineering flight data while aircraft test flights are actually under way."

Called the Integrated Flight Data Processing System (IFDAPS), the computer package will be installed in AFFTC's new Ridley Mission Control Center. It will process and display flight test data in real time or in delayed modes. The system will be able to analyze all or part of a single aircraft test or one or more tests carried out on several aircraft simultaneously.

Acquisition of the system has been

Air Force F-16s have been flying in batches from the factory in the US to their first overseas assignment—with the 8th Tactical Fighter Wing in Korea. The move represents a "dramatic improvement" in the area's defense posture.

one of AFFTC's top priorities. Installation is expected to be completed by late 1985.

The new Ridley Center will eventually house under one roof equipment capable of carrying out complex flight test projects and processing data faster and more accurately, officials said.

Part of the equipment package will be a self-sufficient and air-transportable mobile van for testing aircraft in such remote areas as the Arctic and the tropics.

About $2.3 million of the award came from the Army because its aviation test unit at Edwards will utilize the new capability in its flight-test programs.

★ In a matter related to the Air Force Flight Test Center, its Vice Commander—Col. William "Pete" Knight—has been installed as president of the prestigious Society of Experimental Test Pilots.

The Society is an exclusive club; its 1,400 members are military and civilian test and research pilots from almost all free world countries.

Colonel Knight is eminently qualified to head it, holding as he does the world manned aircraft speed record.

Colonel Knight has been an Air Force pilot since 1951, was a project pilot on the X-15 rocket research program at Edwards AFB in the '50s and '60s, and was awarded astronaut wings for flying the aircraft to 280,000 feet. It was in the X-15 that he set the speed record of 4,520 mph.

At AFFTC, Pete Knight remains active in flight testing new and modified aircraft and has flown or tested eighty-five types.

Long-time AFA member Knight has been active in the organization's local and national affairs.

★ The first Air Force F-16s based outside CONUS have been assigned to the 8th Tactical Fighter Wing's "Wolf Pack" at Kunsan AB, Korea.

The Fighting Falcons are being ferried in groups from the General Dynamics assembly plant in Fort Worth, Tex., via Hickam AFB, Hawaii, Andersen AFB, Guam, and Kadena AB, Okinawa, about an 8,500-nautical-mile (15,752 km) flight with aerial refuelings.

The F-16s are replacing F-4Ds at Kunsan, located on the Yellow Sea in southwestern Korea. All 8th TFW F-16s are identified with a large "WP" on the tail and snarling wolf head insignia.

"The deployment of US Air Force F-16 aircraft to Korea represents a dramatic improvement in our combined defense posture," said US Ambassador Richard L. Walker. "It symbolizes the determination of the United States to make certain that our combined deterrent and defense posture on this peninsula reflects technological advances in weapon systems."

★ A twenty-month study conducted at NASA's Lewis Research Center in Cleveland, Ohio, has determined that fine tuning weather forecasting could save the worldwide commercial airline industry upwards of $1 billion annually in fuel bills.

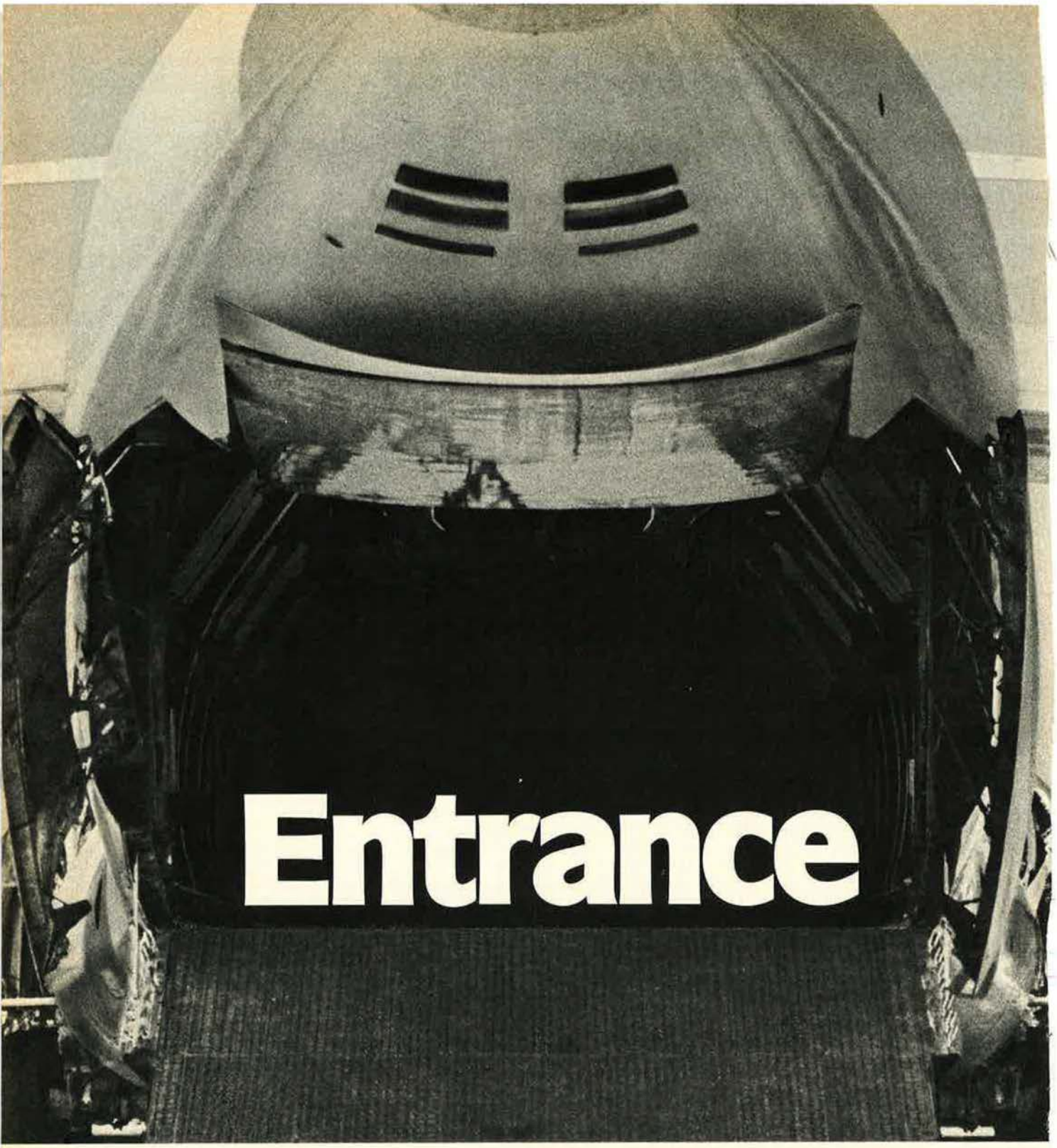
The study was conducted with the cooperation of FAA, the National Oceanic and Atmospheric Administration, the governments of Canada, the UK, and the Netherlands, and such airlines as KLM, TWA, Delta, British Airways, Swissair, SAS, and VIASA.

Particularly helpful would be more timely and detailed reports on winds at altitudes between 15,000 (4,500 m) and 45,000 feet (13,700 m). Savings in the US alone could amount to from $100 million to $200 million a year.

Currently, the airline industry spends between $36 and $40 billion a year for fuel, or more than forty percent of overall operating expenses.

At altitude, multiengine jetliners can save or burn enormous quantities of fuel depending on whether they are helped or hindered by winds.

Airlines now plan their long-dis-



Every new military airlifter

There are times when an airlifter can be loaded and unloaded at a normal pace. And then there are other times—crisis situations—when loading and unloading becomes a critical race, and every second counts.

That's when the drive-on, drive-off, straight-through capability of a great airlifter's cargo compartment pays off.

Once this was theory. Now it's fact, proved in actual operations.

But there's a lot more to a great airlifter's cargo compartment than driving cargo into the rear opening and out the front cargo opening.

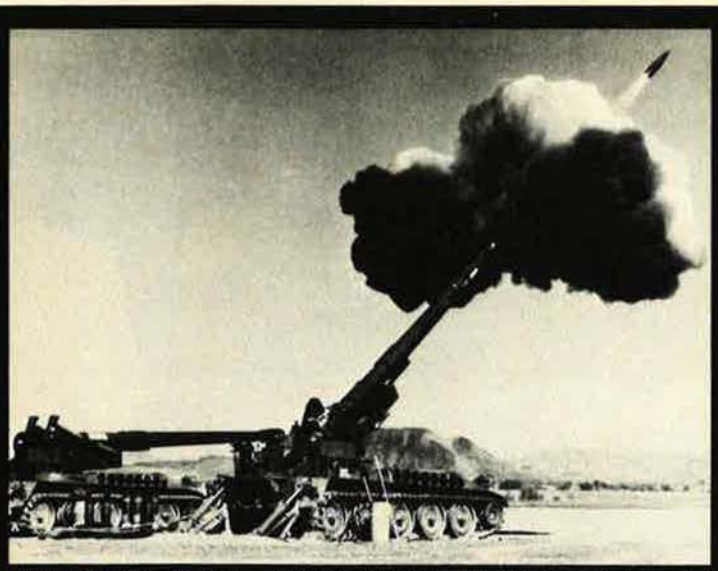
The cargo openings must be low to the ground so that short ramps with low cresting angles can be used. And the openings must be high and wide. High enough to handle

needs fast, easy loading.

bridge launchers and other outsized cargo, wide enough to enable 5-ton trucks or M113 personnel carriers to be parked safely side by side. The dimensions that go with those requirements are: 1) cargo openings low to the ground, roughly five feet, so that the ramp angles are small; 2) cargo openings 13.5 feet high; 3) cargo openings 19 feet wide. The validity of these figures has also been confirmed in actual operations.

A high, wide entrance. A high, wide exit. Each low to the ground. They add up to a great airlifter's business ends—the cargo compartment.

Lockheed-Georgia



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tance flights based on eighteen- to twenty-four-hour forecasts, while the weather—especially over the oceans—can change dramatically in a six- to twelve-hour period, officials said. Also, jet engines are generally more efficient in colder air.

According to program manager Robert Steinberg at the Lewis Center: "By adapting man-computer interactive display techniques a new era in flight planning may be possible. Interactive technology offers the opportunity to combine a trained mind to evaluate weather information presented by a fast computer which performs the millions of repetitive calculations and instantly displays the results for evaluation. Such systems, designed to provide tuned upper air forecasts and including manpower for twenty-four-hour operations, would cost about $600,000 per year after a one-time capital investment for equipment of about $1 million. After that, an international carrier, with a present annual fuel bill of $1 billion, could expect to save at least $20 million on fuel per year."

★ About 150 Air Force personnel are being assigned to the NATO E-3A program, the majority from the 552d Airborne Warning and Control Wing, Tinker AFB, Okla.

Among the first crew and support people for the NATO program, they will also make up the Alliance's first training cadre and staff. The thirty-three slated to be reassigned to Geilenkirchen AB in Germany in January will be among the first operational crews to fly the NATO early warning aircraft. Instructor-qualified, they'll help operate the NATO Training Center there.

In a related matter, the 552d is also creating a training program for the NATO E-3A, based on a complete revision of current materials. This task involves developing instruction procedures for each of the thirteen crew member stations in the aircraft.

The personnel of the 552d Wing are further burdened by the chore of conducting E-3A training operations in the US while at the same time bringing replacement instructors for those reassigned up to par.

"The NATO program marks a change in training methods," commented Lt. Col. Charles Wilson of the 552d staff. "While the current training relies heavily on classroom instruction, the NATO version will be self-paced individualized study. This means that we need to look at current NATO task requirements and spell out every detail of the criterion objective."

AEROSPACE WORLD

The instruction is being written for the US/NATO standard version of the aircraft, ten of which are due to be delivered to the 552d Wing to help in the transition.

★ USAF has awarded Piper Aircraft Corp. a contract for the "design, development, and testing of two prototypes of a lightweight, turboprop close-support aircraft called the Enforcer," it was announced.

The Enforcer is based on the airframe of the P-51, the famed World War II fighter. Piper has made changes "to the original Enforcer design, including aerodynamic improvements in the horizontal stabilizer and in the aileron control system. The small, rugged airplane will have modern-day weaponry and three weapon stations on each wing," Piper said.

The aircraft's maximum gross weight will be about 14,000 pounds (6,350 kg) and fuel capacity 424 gallons, including tip tanks. Maximum speed is to be 350 knots.

First flight of the Enforcer is scheduled for December 1982, with an operational demonstration slated for late summer 1983. The total program is expected to cost $12 million.

★ The first operational flight trainer (OFT) for the A-10 Thunderbolt II has been delivered to TAC at Davis-Monthan AFB, Ariz., site of combat crew training for the aircraft.

The OFT will allow A-10 crews to practice emergency procedures and thus reserve their actual flying time for combat training.

TAC, ANG, and AFRES A-10 units will have access to the new OFTs.

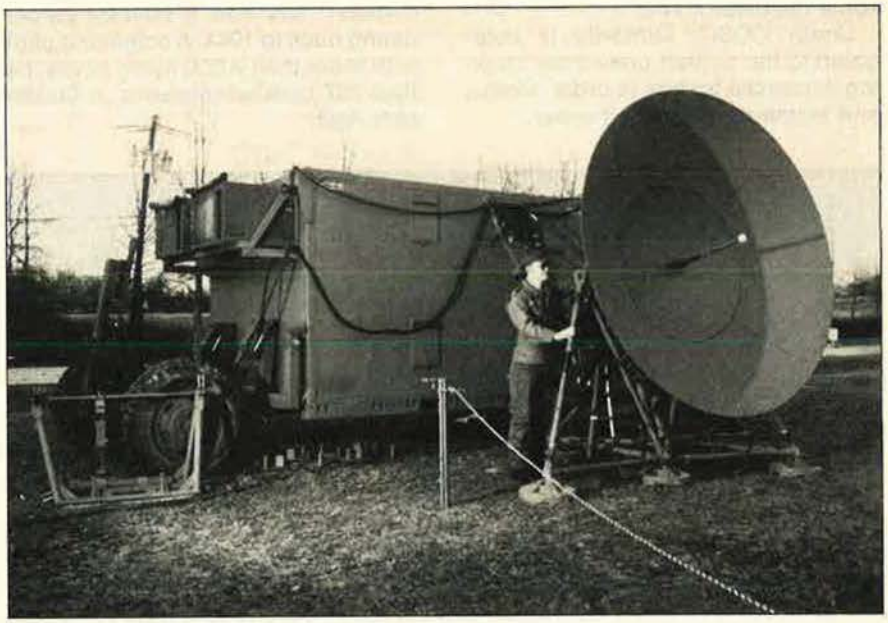
Aeronautical Systems Division, Wright-Patterson AFB, Ohio, in 1976 awarded a contract to Reflectone, Inc., Tampa, Fla., to produce two OFTs, with an option for an additional four. ASD officials now peg mission requirements for the simulators at fourteen, at a cost of about $72 million.

The OFTs are designed to simulate all types of emergencies, as well as provide student pilots with a realistic environment for performing such aircraft procedures as weapons delivery and scoring, normal aircraft maneuvers, electronic warfare, and ground-handling.

★ By summer's end, some 486 USAF air traffic controllers had been dispatched to FAA control towers and radar-approach facilities around the nation.

This followed in the wake of the August 3 walkout by 12,000 members of the Professional Air Traffic Controllers Organization.

As reported by Air Force Communications Command, which manages air traffic control for the Air Force, a number of the deployed controllers



The antenna of the US Army's new AN/TSC-86 terminal is aimed at a communications satellite in a test program at RCA facilities in Cherry Hill, N. J. The strategic and transportable ground system is the first of six designed to provide instant communications among Army commanders located in close proximity or half-way around the globe.

had already completed training and were handling traffic under FAA supervisors.

By deploying controllers from some sixty-four Air Force installations, the impact on Air Force operations has been minimized, officials said.

What's more, planners at Hq. AFCC, Scott AFB, Ill., were looking toward possible additional deployments and such important long-term effects as training, normal military reassignments, annual leave, and controllers working extended duty hours at their home stations.

★ A new supply operation designed to speed up aircraft maintenance is currently under test at Langley AFB, Va.

The Combat Oriented Supply Organization (COSO) was officially opened for business recently by TAC Commander Gen. W. L. Creech. He put the system through a test run to observe how it worked. COSO is designed to provide closer coordination between flight-line maintenance personnel and supply warehouses.

The system, in effect, is a small supply store organized to simplify the supply process by making parts available easier and quicker—and closer to where the actual work is being done on the aircraft.

"In an actual wartime environment, we need simple, straightforward methods to get needed parts in order to fly," said Lt. Col. R. M. Hodson, chief of TAC's supply systems management division. "COSO makes this goal achievable because it erases some needless steps."

Under COSO, authority is delegated to the aircraft crew chief, making it possible for him to order, locate, and install parts in short order.

COSO is receiving a six-month test at Myrtle Beach AFB, S. C., and Mountain Home AFB, Idaho, as well as at Langley. If successful, it could be implemented throughout the Tactical Air Command.

AEROSPACE WORLD

★ Among the 1981 "Sands of Time" Kitty Hawk award recipients this year are the two Space Shuttle astronauts, an aerospace industry executive, a three-star Air Force general, and an eighteen-year-old youth.

John W. Young and **Capt. Robert L. Crippen,** USAF, of course, were cited for April's first orbital flight of the Space Shuttle, among other things. Young, a veteran astronaut with five spaceflights, went to the moon during Apollo-16. Crippen, a veteran aerospace research pilot with more than 4,700 hours logged in jets, made his first spaceflight in the Shuttle.

David S. Lewis, Jr., head of General Dynamics Corp., has had a lifetime career in the aerospace industry and was cited for his many contributions. He was awarded the Collier Trophy in 1976 for his leadership in developing the F-16 fighter.

Lt. Gen. Richard C. Henry, currently Commander of AFSC's Space Division, has had a military career dating back to 1944. A command pilot with more than 4,000 flying hours, he flew 207 combat missions in Southeast Asia.

Chance Harrison is the youngest jet-rated pilot in the US and possibly the world. He learned to fly at fourteen, received his commercial pilot's license on his eighteenth birthday, and has already logged more than 500 hours.

The awards will be presented in December at the annual Wright Brothers Banquet, also sponsored by the Los Angeles Area Chamber of Commerce. For the first time, net proceeds from the event will fund scholarships for graduate engineers in aerospace or related disciplines, the Chamber announced.

★ Rome Air Development Center's Solid State Sciences Division, Hanscom AFB, Mass., has designed and built an infrared sensor system that detects intrusions into military installations.

USAF alone maintains 100 strategic and tactical installations that use intruder detection/assessment devices, most of which require high-powered lights. The infrared sensor—which detects heat rather than light—is a promising candidate for replacing or augmenting sensors at these and other DoD facilities. Their operation could save substantial money and energy.

According to program manager Dick Taylor, the new sensor was first tested at Griffiss AFB in New York during ordinary and snowy weather with excellent results at detection. Further tests are under way at Hanscom.

RCA's Advanced Technology Lab, Camden, N. J., has begun delivery of five units containing all system elements in a television-size package. These will be tested singly and linked together as an extended system at a field site at Eglin AFB, Fla.

A decision on engineering development is expected by the end of next year.

In another security matter, at three TAC bases flight-line "constables" replete with distinctive headgear have been making the rounds. Their main concern is to raise the security awareness level by their mere presence as "security ambassadors" in the flight-line area but they also answer questions, brief newcomers, and the like.

The constables are at Bergstrom AFB, Tex.; Homestead AFB, Fla.; and Davis-Monthan AFB, Ariz.

★ In late September, Air Force officials dedicated a new, $50 million weapon system training facility at Castle AFB, Calif.

The "Linebacker II Training Cen-

A duo of Air Force A-10 Thunderbolt IIs lands at Aviano AB in Italy during a recent major NATO exercise. The "Autumn Forge" series is conducted annually from northern Norway to eastern Turkey and involves air, land, and sea forces of the Alliance members in NATO's Southern Region. Among objectives is the development of uniform doctrine and standardized procedures.

ter"—named for those who participated in the famed aerial attacks on North Vietnam in the latter stages of the war in Southeast Asia—will house B-52 and KC-135 Weapon Systems Trainers (WST), USAF's latest flight simulators.

Castle AFB and the 93d Bombardment Wing there were selected as the test-bed for the program because of the Wing's dual role of SAC mission support and training B-52 and tanker crews.

SAC plans to take delivery of sixteen production versions of the B-52 trainer simulator between May 1982 and December 1985 for operation at twelve bases.

The trainers will be used for initial qualification at the combat crew training squadron and for continuation training at the unit level, officials said. The trainers will be concerned with all facets of the B-52 mission and will duplicate exactly the characteristics of B-52G and H aircraft, even to the offensive avionics currently being installed.

The production phase of the KC-135 WST was canceled in 1977, so Castle will be the only base to have such a tanker simulator.

Eventually, the 85,000-square-foot facility at Castle will operate three B-52 WSTs, the single KC-135 WST, and the previously acquired Boom Operator Part Task Trainer.

The first phase for the new simulators will be instructor training at the pilot-production (later to be upgraded) WST at Castle. Initial crew training is scheduled to begin in February 1982. The production simulators are being built at Singer Co.'s Link Division, Binghamton, N. Y., at a cost of $35 million each.

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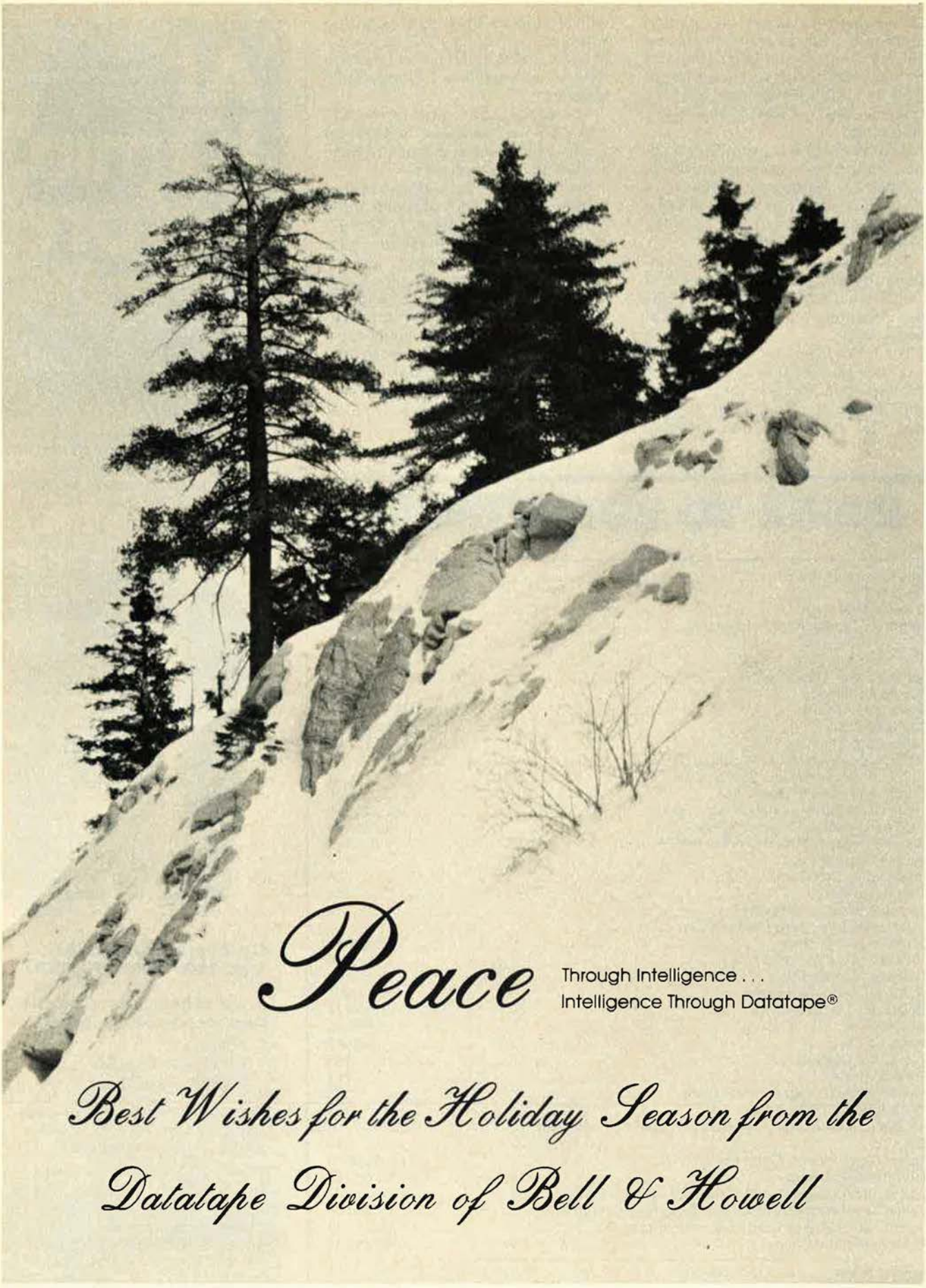


300 Sierra Madre Villa, Pasadena, Ca 91109

AEROSPACE WORLD

The B-52 WST has four stations: a flight deck or cockpit mounted on a six-degree freedom-of-motion base, an offensive station with limited motion, a defensive station without motion, and an instructor station with consoles.

The flight deck's visual subsystem will provide computer-generated imagery for night and day takeoff, approach, landing, and air refueling. The imagery includes terrain-avoidance presentations.

The offensive station for the navigator and radar navigator will also realistically display low-level-flight characteristics and will simulate all bomb/navigation systems.

The defensive station will provide electronic warfare officers and gunners with "threats" to counter. If successfully dealt with, the threats will "go off the air." If not, the aircraft will receive simulated damage.

It will be possible to integrate all stations, to train an entire crew in performing a complete mission—or operate them independently, SAC officials said.

★ A long-noted phenomenon has been the reason for the death of victims in pancake-like crashes of light aircraft:

While the bodies are intact—held snug by seat belts—the hard impact had crushed the victims' spines.

As a segment of the joint NASA/FAA research program aimed at aircraft safety, aircraft subflooring strong enough to bear the stresses of flight yet capable of being collapsed to a predetermined level when subjected to crash impact loads may be the answer.

It's no minor matter. According to a recent report by the National Transportation Safety Board, in 1980 alone 1,375 Americans lost their lives in general aviation accidents with a substantial proportion dying from splintered spines.

Besides a redesigned interior floor, researchers hope to improve the energy-absorption characteristics of aircraft seats and restraint systems.

Initial tests of crushable floors have proven the merit of such research, and two designs are to undergo full-scale plane crashes at NASA's Impact Dynamics Research Center, Hampton. Va.

AEROSPACE WORLD

The planes will be swung by cables, pendulum style, from the top of an outdoor gantry on to a concrete pad some 200 feet (sixty m) below at impact speeds of from seventy-five to eighty mph (120–128 km/hr).

Various seat concepts are being studied at Langley and at the FAA's Civil Air Medical Institute in Oklahoma City.

The research on crash dynamics is being expanded to jet transports and will complement current NASA/FAA work aimed at enhancing occupant survivability in post-crash fires, officials said.

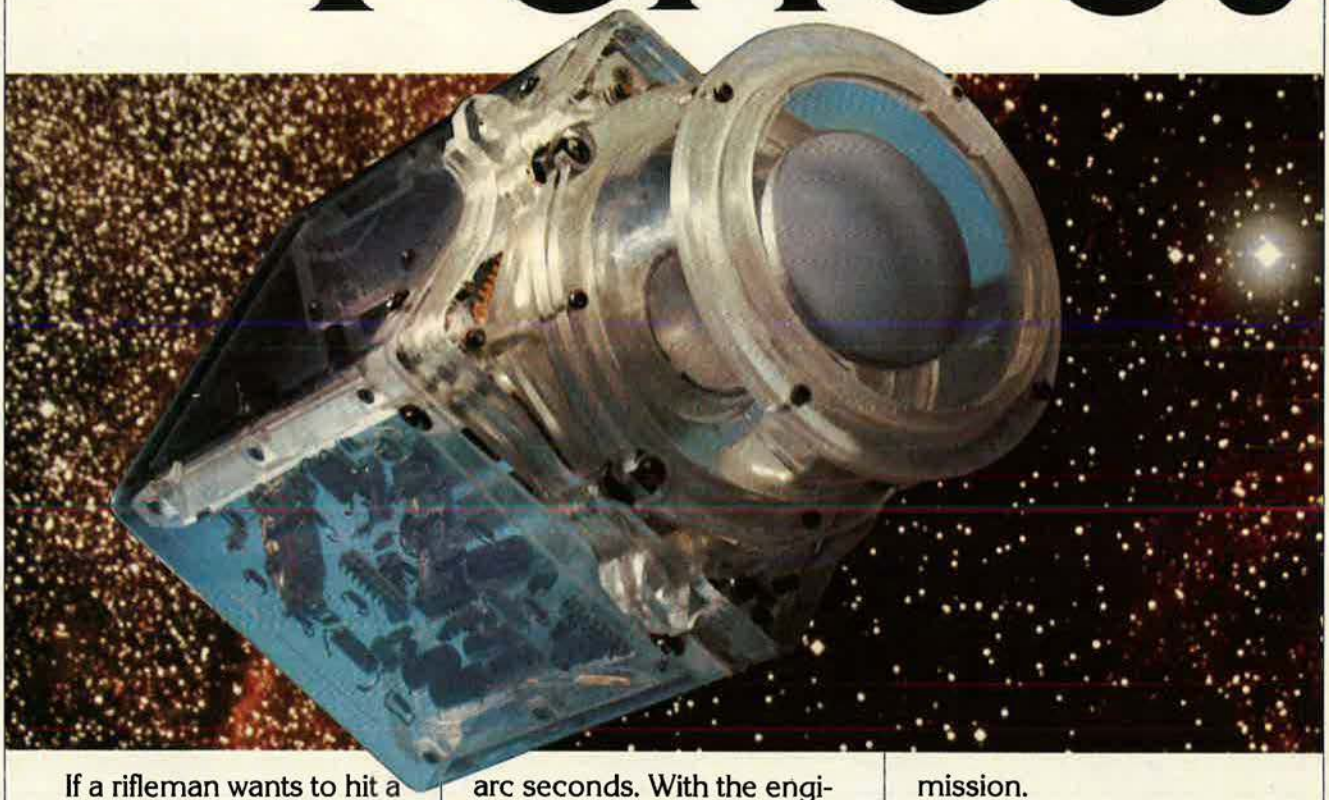
★ **NEWS NOTES—Maj. Norman L. Lowry III** has been named **Commander of the Air Force Thunderbirds** aerial demonstration team following the death of **Lt. Col. D. L. Smith** in a crash in September. Major Lowry served with the 414th Fighter Weapons Squadron, Nellis AFB, Nev., before joining the Thunderbirds earlier this year. He's a veteran of 264 combat missions in SEA.

In October, the **USO celebrated its fortieth anniversary** with a big bash in Washington, D. C., that was at once a tribute to Bob Hope and the opening of a campaign to raise $10 million for expanded activities and facilities. The star-studded event **included President Reagan** and former Presidents and First Ladies. USAF's Airmen of Note helped entertain. Tax-deductible contributions can be sent to USO–Bob Hope, P. O. Box 1981, Washington, D. C. 20013.

Maj. Gen. James A. Abrahamson, former DCS/Systems, Hq. AFSC, Andrews AFB, Md., has been named **Associate Administrator for NASA's Office of Space Transportation Systems.** The General has had a long career in Air Force space activities, including the Manned Orbiting Lab program. He flew forty-nine combat missions in SEA.

Australia plans the acquisition of **seventy-five McDonnell Douglas F-18A Hornets** over the next ten years at a cost of more than $3 billion. The Hornets, thirty percent of which will be built in Australia, are to replace **RAAF's seventeen-year-old French-built Mirage.** The action is the major expenditure in the country's biggest new-equipment purchase in history: $5.75 billion. ■

AIMING FOR Perfect



If a rifleman wants to hit a standard, 10″ bullseye at a hundred yards, his aim must be accurate to within about 9 arc minutes (less than 1/6 of a degree).

The best currently available star sensors, which position a spacecraft relative to its targets (which may range from celestial sources of X and gamma-rays to other spacecraft) is accurate to within about 10 arc seconds.

Using a highly reliable imaging charge-coupled device, sensor specialists at TRW have now developed a sensor five times more precise; it's accurate to ±2 arc seconds. With the engineering model soon to undergo final tests, a space-qualified unit is within easy and economical reach.

But why strive for perfection when good enough is available? Well, one reason is military: Satellites carrying laser, or other directed-energy weapons for defense against satellite killers (and perhaps ballistic missiles), will require exquisite accuracy.

Another reason is scientific: Astronomers need extremely accurate pointing for spaceborne telescopes that are adding new scope to man's knowledge with every mission.

A third is technical: Laser Communications, an area of vital interest to TRW, also require pointing as close to perfect as possible.

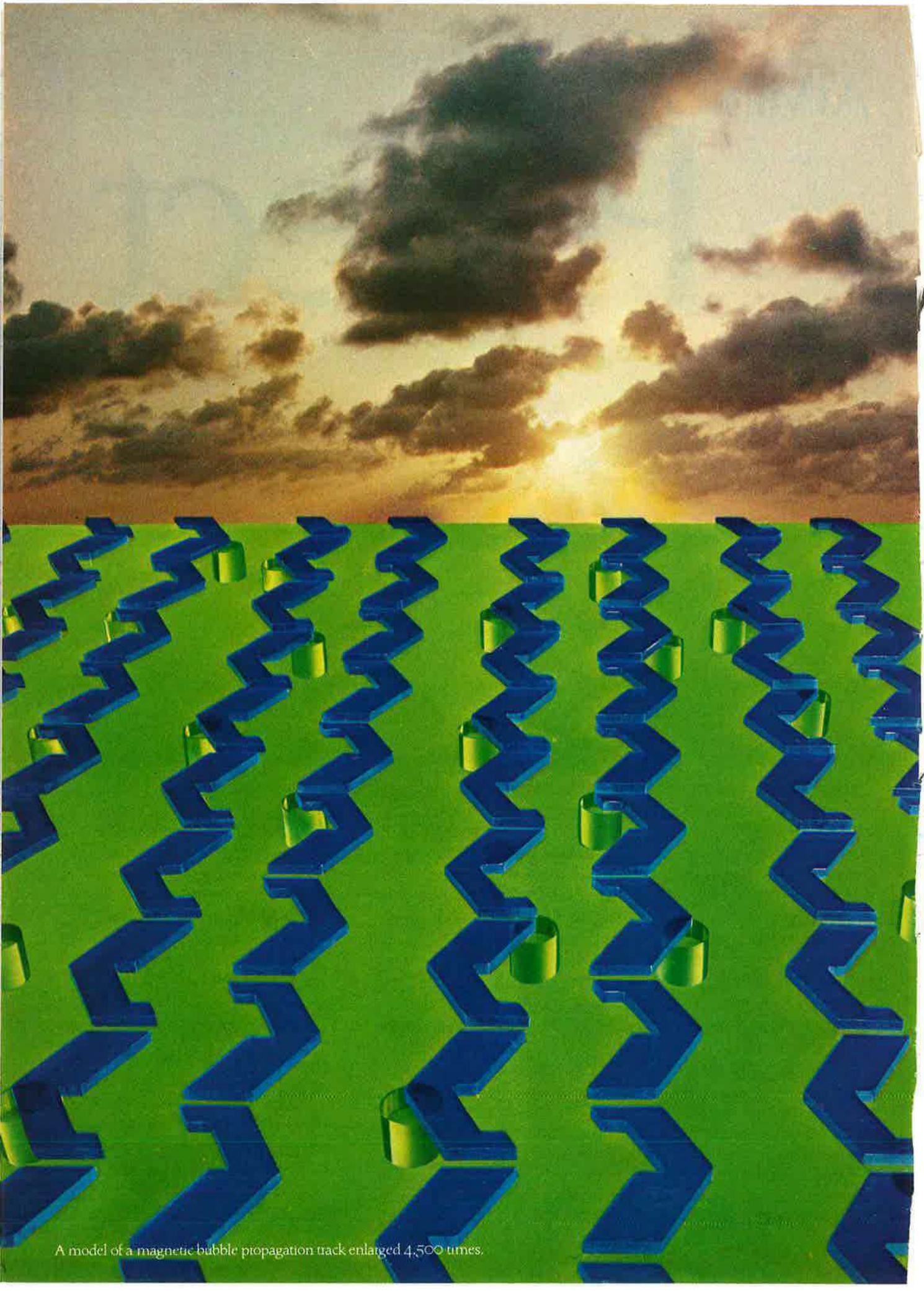
Finally, there's what you might call the technological imperative: Our scientists and engineers hate to settle for anything less than the best they can do.

SPACEBORNE SENSORS

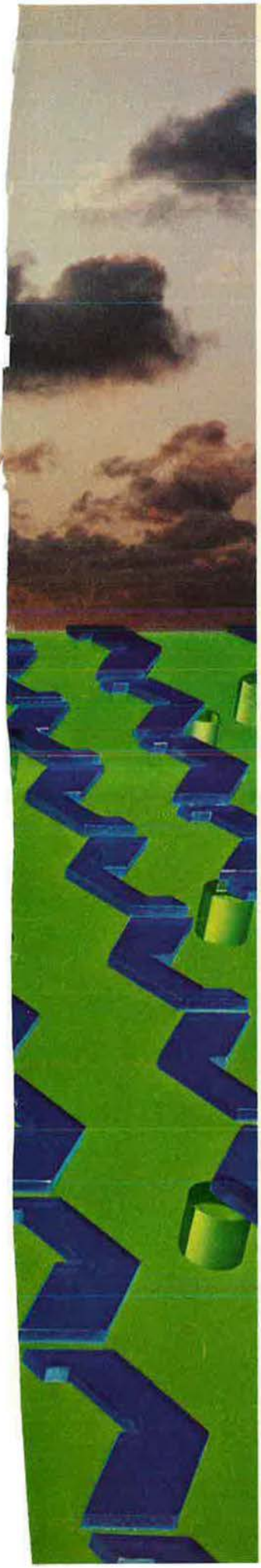
from

A COMPANY CALLED TRW

DEFENSE AND SPACE SYSTEMS GROUP



A model of a magnetic bubble propagation track enlarged 4,500 times.



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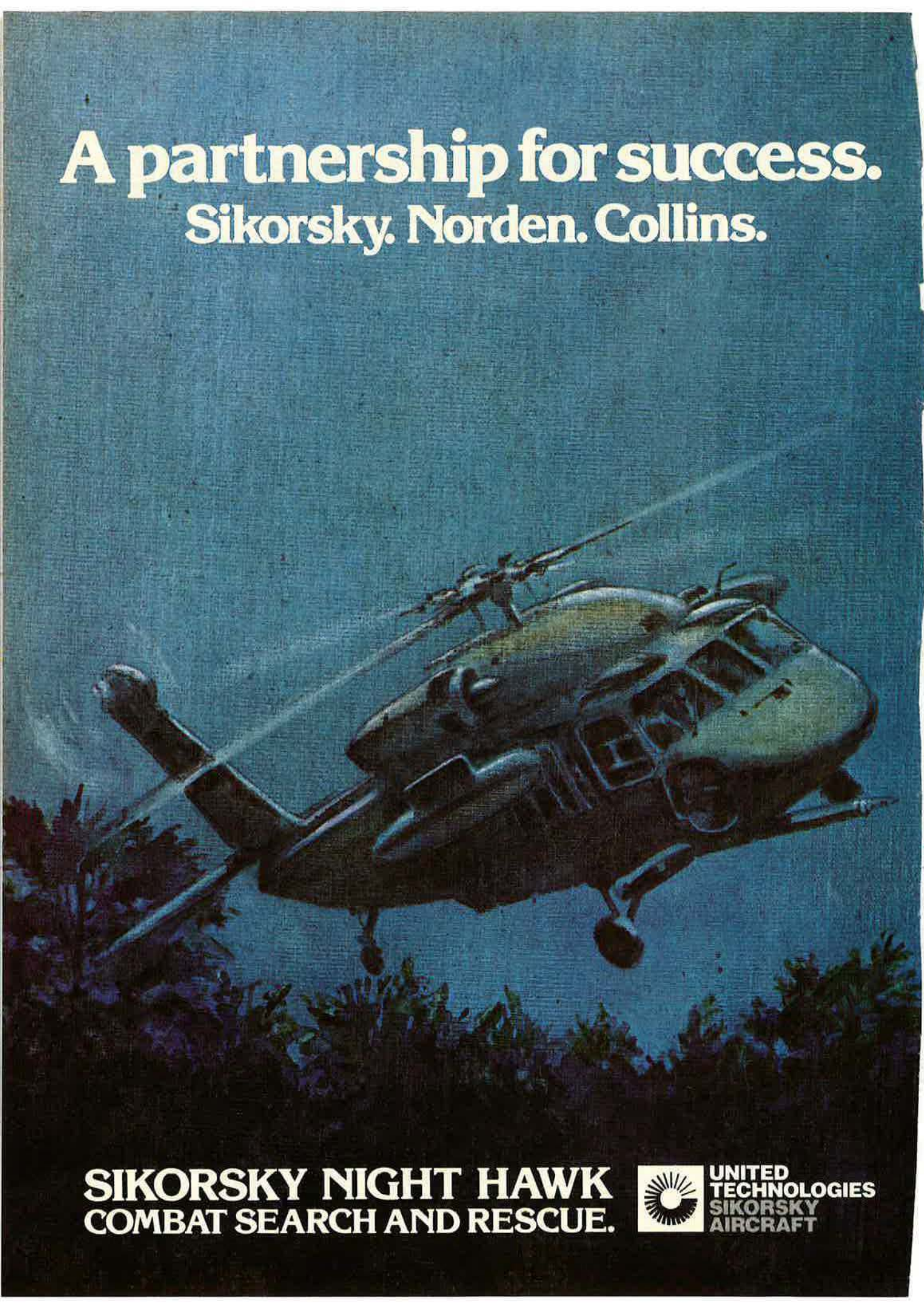

SIKORSKY NIGHT HAWK
COMBAT SEARCH AND RESCUE.

UNITED TECHNOLOGIES
SIKORSKY AIRCRAFT

CAPITOL HILL

By Kathleen G. McAuliffe, AFA DIRECTOR OF LEGISLATIVE RESEARCH

Washington, D. C., Oct. 22

MX Future

The future of the MX will continue to rest on shaky ground until Congress reviews the Air Force position on deploying the missile in super-hardened Titan and/or Minuteman silos. The Air Force is deciding what approach it will use in defending silo-stuffing before a skeptical Congress and what program refinements it will recommend in order that MX be deployed at effective, advantageous sites.

The Air Force was allegedly caught by surprise by the MX decision since up to two days prior to the announcement, the Air Force had firm indications that the President would go ahead with a scaled-down version of the multiple protective shelter (MPS) system.

The Administration's effort to "buy time" with silos as an interim solution to the ICBM vulnerability problem is not sitting well with Congress, which has never been receptive to MX in silos.

Strong MPS congressional supporters state flatly that MX in silos would be totally vulnerable while some members of Congress feel a silo-based MX becomes a far more attractive target for a Soviet first strike.

However, Sens. Jake Garn (R-Utah), Paul Laxalt (R-Nev.), and Harrison Schmitt (R-N. M.), advocates of "silo-stuffing," will be a big help in getting the Senate to fund the new basing scheme. All three Senators are members of the Appropriations Committee. Sen. John Tower (R-Tex.) and Rep. Melvin Price (D-Ill.), chairmen of the Armed Services Committees, expressed grave concern over the MX decision and directed that intensive hearings be conducted. However, as one DoD official predicted, they probably will not buck the President.

Therefore, passage of resolutions disapproving the basing decision is, at this writing, unlikely, and funds to continue R&D on the missile, including continuation of research on a "permanent" basing mode, will probably be okayed by Congress. No funds for silo hardening are needed this fiscal year, and moves have already been taken to drop previously allocated construction money for the basing mode.

Eventual congressional approval of funds for silo hardening is questionable since Congress may well look at the accuracy and throw-weight of the Soviet SS-18 ICBM and conclude that hardening beyond 2,000 pounds per square inch would be of marginal utility and not affordable at up to $300 million per Titan silo.

Big Bird Funding Favorite

Three relatively junior members of the House Armed Services Committee have accused DoD of "stacking the deck" in favor of the air-launched or "Big Bird" scheme for the permanent solution to the MX basing question. Reps. David Emery (R-Me.), Robert Badham (R-Calif.), and Ken Kramer (R-Colo.) made the accusation after new DoD figures showed that in the FY '82–'87 time period R&D on the three basing options to be considered, *i.e.*, deep silo basing, air-launched, and some form of Ballistic Missile Defense (BMD), will not be given equal consideration. BMD is slated for $2.8 billion, deep silo basing for $220 million, and Big Bird for $8.5 billion.

The Congressmen told President Reagan that such a "drastic funding disparity makes it apparent that there will not be an equal and objective evaluation of each of the three likely MX" basing modes. They urged the President to take immediate steps to correct the funding disparities. Earlier this year, all three members wrote to the President urging him to disregard air-launching as a viable basing solution for MX.

B-1 Approval Anticipated

The President's decision to deploy tentatively 100 B-1 bombers while R&D continues on an Advanced Technology Bomber (ATB) is in step with the House Armed Services Committee position. USAF leadership's hard work in lining up members of the House Appropriations Defense subcommittee, critical to B-1's future, is paying off, with seven members now expected to vote funding of the program.

Chairman Joseph Addabbo remains strongly anti-B-1. Assuming that the B-1's Initial Operating Capability (IOC) will slip, the Congressman stated that he is against allocating another $2.4 billion to its development because "it will deprive the United States of the timely introduction of a new technology Stealth bomber. There is simply not enough money to do both."

Secretary Weinberger stated flatly that DoD's budget can and will accommodate both programs and the ATB will in no way be slowed. A number of congressional B-1 opponents have exceedingly high expectations on ATB's schedule and capability. Some may be persuaded to support the B-1 upon receipt of a commitment from DoD to bring ATB on line expeditiously.

A major problem foreseen by some Air Force officials for the B-1 is any delaying tactic for passage of a FY '82 appropriations bill. The longer B-1 R&D starts are stalled, the further back its IOC slips and the nearer ATB's IOC comes.

Funding Timetables

The Second Budget Resolution is now expected in mid-November with a $4 billion cut in the national defense ceiling almost certain. The only question is how the reductions will be made—further program cuts as the Senate prefers or program slippages as the House wants.

Meanwhile the defense appropriations bill is stalled because the House defense panel is awaiting the authorization conference report. The authorization is delayed because of a lack of firm figures on the strategic programs. Absence of a final appropriations bill by November 20, expiration date for the continuing resolution authority now in effect, will necessitate passage of a second stopgap measure. The newer version will probably be based on FY '82 figures included in the House version of the bill. This could be good news for new program starts. ■

Add a couple of you may not need the

Needless to say, the purchase of different aircraft to meet different mission requirements is, to some extent, inevitable.

A jet fighter will never double as a cargo plane.

But the number of aircraft types you need to buy in order to perform such missions as priority personnel transport, cargo transport, air ambulance service, flight inspection/calibration, pilot and systems training, remote surveillance, search and rescue and reconnaissance and mapping can, in fact, be reduced dramatically.

To one.

For example, a Canadair Challenger outfitted for cargo transport can quickly be converted into a 28-passenger people-hauler. Or a 14-passenger people-hauler with a large cargo area.

A Canadair Challenger outfitted for priority transport of V.I.P. personnel can, with the addition of two partitioned operators' consoles, easily double as a surveillance or flight inspection/calibration aircraft.

A Challenger outfitted for remote sensing and surveillance can quickly be refitted for reconnaissance and mapping.

A Challenger outfitted as an air ambulance or MED/EVAC aircraft can, with relative ease, switch to a flight inspection/calibration interior. Or an advanced pilot and systems trainer interior. Or a maritime surveillance/search and rescue interior.

All told, the variations of equipment you can move into and out of a Challenger are far too numerous to mention.

What's just as important, the Challenger gives you more AC power to run it on than any other aircraft in its class.

In fact, it's the only all-AC electrical system you'll find on any jet short of the latest commercial airliner. Unlike DC systems, AC gives you the benefits of extreme light weight in relation to power produced and far less chance of electrical failure due to low current, constant frequency and the obvious fact that there's no need for cumbersome inverters.

As for those of you who just want to get from point A to point B, you'll find the Challenger will fly you more economically and in greater comfort than any comparable jet in the world.

Overall, the Canadair Challenger averages a 22% lower rate of fuel consumption per mile than a Gulfstream III, virtually the same rate of fuel consumption per mile as the far smaller Falcon 50 and, hard as it may be to believe, a 24% lower rate of fuel consumption per mile than the small, short-range T-39.

Yet the Challenger is actually bigger than all of them in the one dimension crucial to passenger comfort and a realistic working environment: width.

Measured at the floor line, the Canadair Challenger is roughly 30% wider than the Gulfstream III, and 48% wider than the Falcon 50.

And speaking of range.

With the Challenger's big fuel tanks and extremely low rate of fuel burn, you can cross the Pacific with one stop, fly from New York to the Middle East with one stop or fly from Washington to London non-stop.

Or, getting back to multiple missions, fly a thousand miles out for, say, remote surveillance and still remain on station for four to five hours before flying back.

To find out more about the aircraft that can perform the roles of two or three or four aircraft, just call Mr. James B. Taylor, President of Canadair Inc., at 203-226-1581. Or write Canadair Inc., 274 Riverside Avenue, Westport, CT 06880.

canadair challenger

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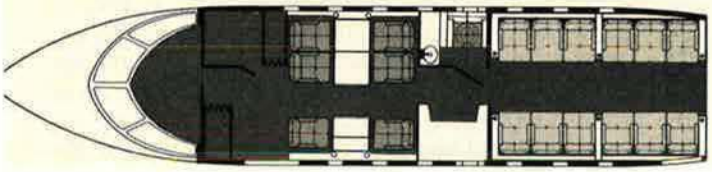
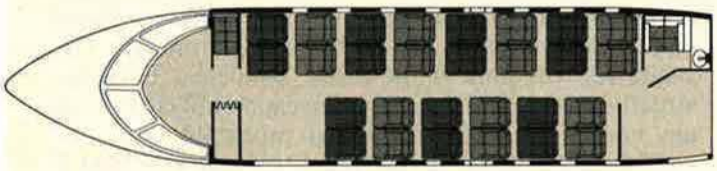
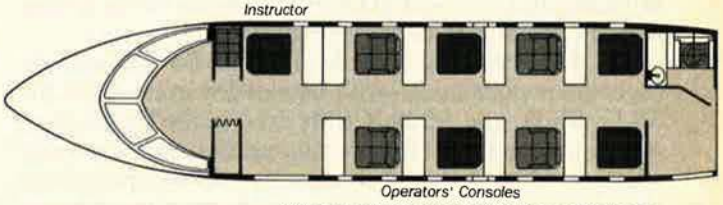


VIP Interior

Flight Inspection/Calibration



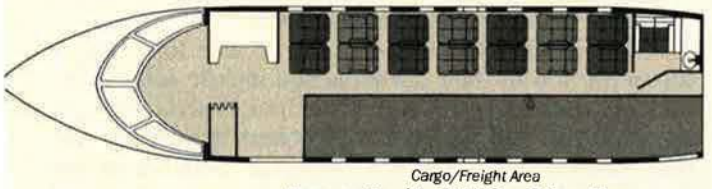
28-Passenger Interior



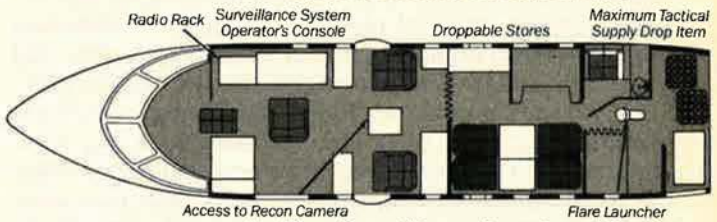
Advanced Pilot and Systems Trainer

Cargo Configuration

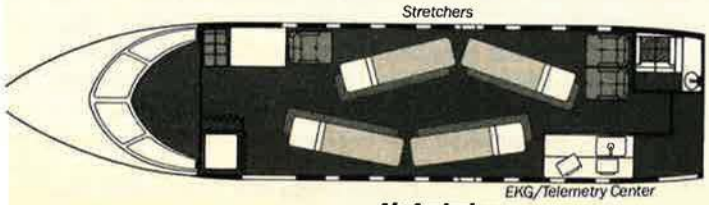
Remote Sensing and Surveillance



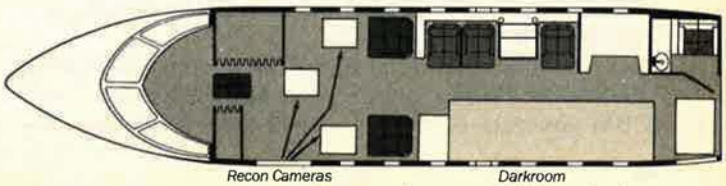
Passenger/Freight Configuration



Maritime Surveillance/Search and Rescue



Air Ambulance



Reconnaissance and Mapping

The Soviet arms buildup and associated massive efforts to strengthen Soviet Russia's technological and defense industrial base continue at a stupendous pace, yet largely ignored or shrugged off by Western public opinion. A recently released document which spells out the details of the USSR's awesome armament drive is titled fittingly . . .

SOVIET MILITARY POWER

BY EDGAR ULSAMER, SENIOR EDITOR (POLICY & TECHNOLOGY)

FOLLOWING months of painstaking declassification of intelligence information that heretofore was not available to the public, the Defense Department, in concert with the intelligence community, released an unprecedentedly comprehensive and revealing assessment of the growing Soviet threat.

Released simultaneously in the US and overseas, the document, entitled "Soviet Military Power," represents a distillation of briefings provided to the NATO Ministers of Defense and limns the totality of the Soviet military buildup in considerable detail.

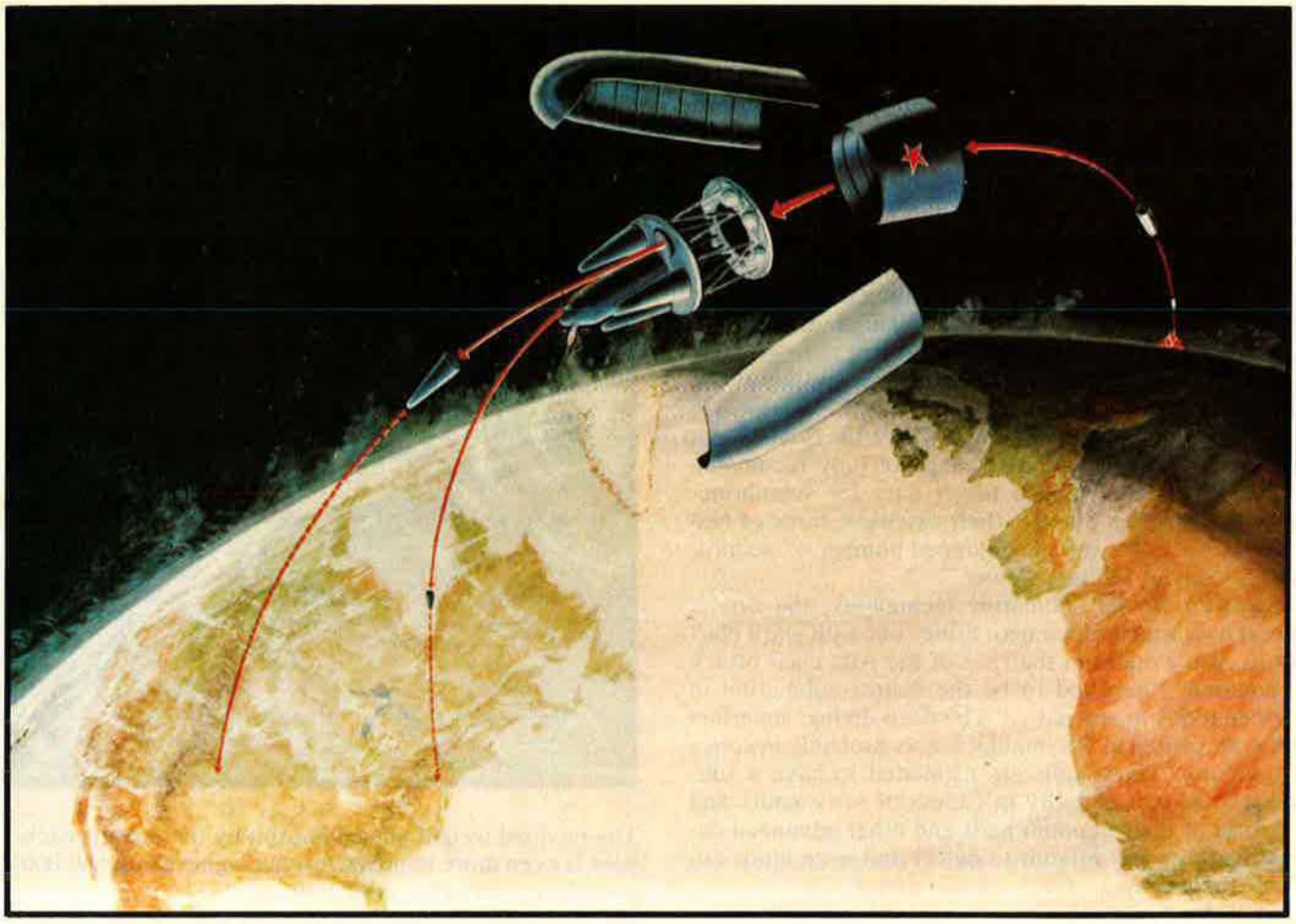
The document's section dealing with Soviet strategic capabilities points out—with unintended irony—that the SS-17, SS-18, and SS-19 ICBMs are "in the forefront of ICBM technology"; that certain versions of these missiles are "among the most accurate ICBMs operational anywhere"; and that these "systems have the capability to destroy a large percentage of the more than 1,000 US ICBM launchers, using only part of their total numbers." Release of this information coincided with the Administration's decision to begin deployment of MX in refurbished and improved Titan or Minuteman silos in 1986.

Reconfirmation of the fact that Soviet missile accuracies threaten the survivability of silo-based US ICBMs *now* would not seem to strengthen the case for deploying a small number of new missiles in silos, beginning in 1986—when obviously Soviet ICBM accuracies (and hence lethality) will be even greater. As "Soviet Military Power" points out, four major Soviet design bureaus supported by a strong manufacturing base specialize in the development of new ballistic missiles as well as the modification of existing systems to achieve yet "greater capabilities against such hardened military structures as ICBM silos. . . . Future missiles are expected to include upgraded versions of the present systems as well as new missiles."

At this time the Soviet ICBM force consists of some 750 SS-17s, SS-18s, and SS-19s, known as the fourth ICBM generation, as well as 640 older SS-11s and SS-13s. The older types, however, are expected to be replaced by a like number of fourth-generation ICBMs in the "early 1980s," according to the new threat analysis. The current Soviet ICBM inventory includes 308 SS-18s, the world's largest ICBM, about twice the size of the proposed US MX missile. Single RV (reentry vehicle) and MIRVed versions—the latter carrying either eight or ten RVs—have been tested. Each warhead of the ten RV variant, according to the new document, "has a better than fifty percent chance of destroying a Minuteman silo. When used in pairs against a single target, the warheads are even more destructive. The single RV versions of the SS-18, with their large destructive power and accuracy, are capable of destroying any known fixed target with high probability."

Of the 1,398 Soviet ICBMs permitted under the SALT II accord, more than half are now housed in rebuilt, "vastly more survivable, hardened silos," according to US intelligence. This silo-upgrading program apparently is in step with the replacement of third-generation ICBMs by fourth-generation weapons. The potency of the Soviet ICBM force could be enhanced further by "contingency plans for reloading and refiring missiles from ICBM launchers which already have fired an initial round. The cold-launch technique [which delays engine ignition to minimize launch damage to the silo] employed by the SS-17 and SS-18 lends itself to such a capability in a protracted nuclear war.

"Additionally, the Soviets may be able to reconstitute a portion of their hot-launched missile force—SS-11, SS-13, and SS-19—as well. The Soviets probably cannot refurbish and reload silo launchers in a period less than several days—thereby avoiding violation of the SALT II Agreement which precludes a rapid reload capability for ICBM launchers," according to "Soviet Military Power." In this context, the intelligence document points out that the trend is toward replacement or augmentation of existing liquid-propellant designs by solid-propellant systems to "give the Soviets additional flexibility in handling and basing their missile force."



This artist's concept of how a Soviet ICBM post-boost stage releases individual warheads against specific targets demonstrates the sophistication of the USSR's fourth generation of ballistic missiles that threaten the survivability of our ICBMs.

The Growing Soviet SLBM Force

Some of the most revealing disclosures of the document involve developments affecting the Soviet strategic submarines (SSBNs) and their missiles (SLBMs). That force consists now of sixty-two submarines carrying 950 modern SLBMs. In the aggregate, these missiles accommodate about 2,000 warheads at present. Even though the Soviets outnumber the US Navy's current inventory of thirty-six SSBNs, which in turn carry 575 SLBMs, this country is still ahead in the number of warheads carried by its subs. The reason, for the moment, is that the US force is more heavily MIRVed. This condition promises to be short-lived. The SS-N-18, a new Soviet SLBM that is rapidly coming in the inventory, can deploy seven RVs, according to "Soviet Military Power." The SS-NX-20, the latest Soviet SLBM that is still in a test phase, can carry twelve RVs. This missile, by far the world's largest SLBM, is about the size of the Air Force's proposed MX. By way of a benchmark, the US Navy's latest SLBM, the C-4 (or Trident I), can carry up to eight RVs. Range of the twelve-MIRV SS-NX-20 is 8,300 km, or about 1,800 km more than that of the seven-MIRV SS-N-18.

The SS-NX-20 will be carried by the Typhoon SSBN, a leviathan of the sea that is as long as the Washington Monument is tall (555 feet) and, submerged, displaces some 25,000 tons. According to the intelligence report, the Typhoon/SS-NX-20 weapon system will reach operational status in the mid-1980s, or several years before the D-5 (Trident II), the largest planned US SLBM, could reach the inventory. The D-5, which is one of five elements of this country's strategic force modernization package announced by the President on October 2, 1981, is still in a preliminary design phase and there is no firm schedule for when the system will complete final design formulation. The size of the Trident SSBN's launch tubes confine the D-5 SLBM to a size significantly smaller than that of the SS-NX-20. The US SLBM, therefore, won't be able to carry anywhere near as many warheads over a given range as its Soviet counterpart.

The consequence of the almost frenzied pace of the Soviet SSBN/SLBM development and deployment program is twofold: For one, the Soviet SSBNs will be able to cover targets in the US without having to leave port; and, secondly, the new generation of Soviet SLBMs—the SS-N-18 and SS-NX-20—provides by dint of vast boosts in throw-weight for a massive proliferation in Soviet warheads. What's more, as "Soviet Military Power" points out, these RVs will be more accurate, and hence more lethal, than the current systems.

The Typhoon is being produced at the Severodvinsk Naval Yard, one of five facilities where Soviet submarines are being built. Coincidentally, the same yard also builds the world's largest and possibly fastest sub-

marines. These behemoths, considerably larger than the Typhoon, are the Oscar-class guided missile nuclear-powered subs that can fire twenty-four long-range antiship cruise missiles while remaining submerged, according to the intelligence report.

The Oscar's cruise missiles, "Soviet Military Power" suggests, are a variant of a new antiship cruise missile of the nuclear-powered guided cruiser *Kirov*, which began sea trials last year. These missiles, according to US intelligence, have a range of about 450 km. These Soviet cruise missile subs—along with a large number of other modern, nuclear-powered attack submarines and missile-launching bomber forces—represent the "greatest threat to Allied naval surface forces operating at the high seas. This is especially so when [the forces are] within range of Soviet air bases where the Soviets can launch coordinated attacks using not only reconnaissance aircraft to provide target data for submarine-launched missiles but also their extensive force of Naval and Air Force missile-equipped bombers," according to "Soviet Military Power."

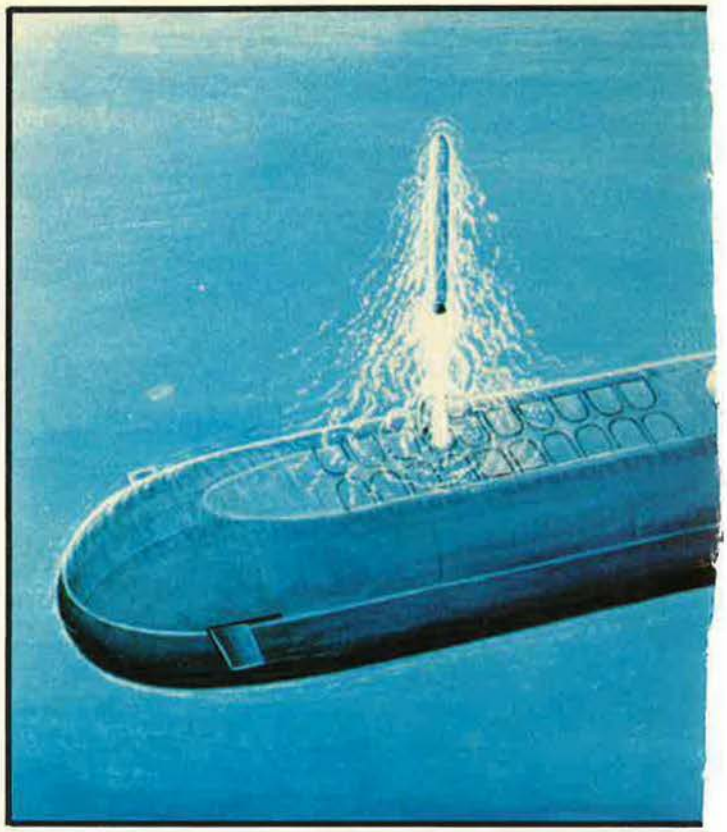
Superior Soviet submarine technology, the Soviet threat assessment document brings out with stark clarity, is also evident in the case of the Alfa-class attack submarine, "believed to be the fastest submarine in service today in any navy." The deep-diving, superfast Alfa, according to US intelligence, is probably in series production. These subs are estimated to have a submerged speed capability in excess of forty knots and because of their titanium hulls and other advanced design features are difficult to detect and even more difficult to destroy.

Soviet Militarization of Space

Some of the most intriguing disclosures of "Soviet Military Power" are in the area of Soviet military space programs, revolving around this assertion: "A very large space booster similar in performance to the Apollo Program's Saturn V is under development and will have the capability to launch very heavy payloads into orbit, including even larger and more capable laser weapons." It might be tempting to ask, "Larger and more capable than what?" but the answer probably boils down to no more than speculation, according to intelligence experts contacted by this writer. They point out there has been no evidence that any Soviet—or for that matter any other, including American—laser weapons have yet been put in space.

But this vagueness in language does not extend to the document's subsequent statement that the new Soviet space booster "is estimated to have six to seven times the launch weight capability of the US Space Shuttle [and] will be capable of putting very large permanently manned space stations in orbit." The intelligence document goes on to say that "the Soviet goal of having continuously manned space stations may support both defensive and offensive weapons in space, with man in the space station for target selection, repairs, and adjustments and positive command and control."

In statistical terms, the just-released intelligence report asserts that in the past ten years the Soviets have been launching spacecraft at a rate four or five times that of the US, or an average of seventy-five per year.

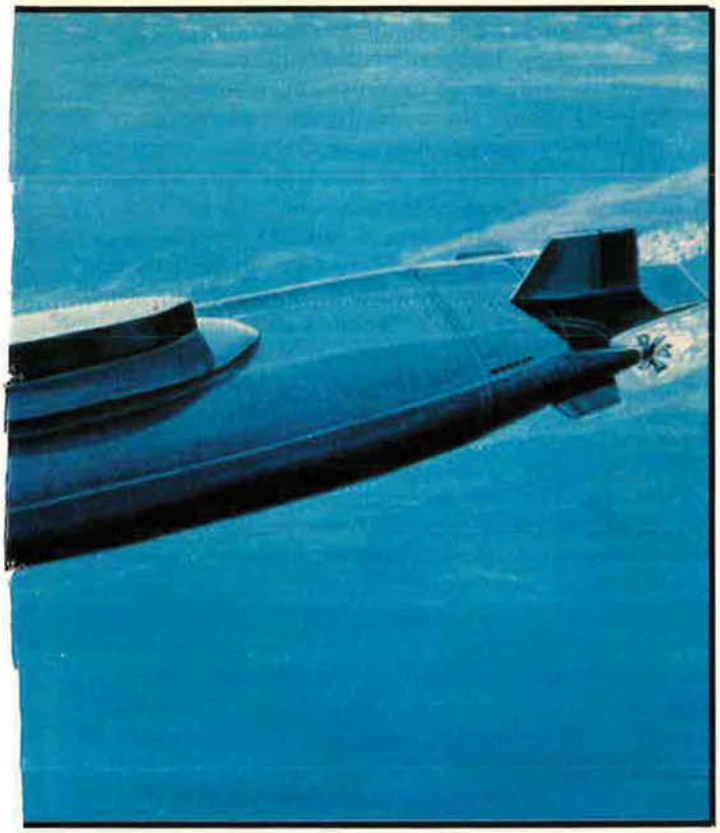


The payload weight placed in orbit by the Soviets each year is even more impressive—averaging about 660,000 pounds, or ten times the US payload. The dynamics of the Soviet space program obviously don't come cheap, but Moscow seems willing to crank out space hardware at a rate that spirals upward at an annual growth of eight percent per year, measured in constant dollars.

The key reason for this relentless growth of Soviet space investments, the US intelligence document suggests, is that more than seventy percent of all Russian space systems seem to serve a purely military role; that another fifteen percent perform dual military and civil roles; and that only fifteen percent have no national security overtones. Russian military spacecraft, the US intelligence document asserts, "perform a wide variety of reconnaissance and collection missions. Military research and development experiments are performed on board Soviet manned space stations, and the Soviets continue to develop and test an ASAT antisatellite coorbital interceptor."

The document hints that the Soviets also may be developing an "improved ASAT," presumably a weapon capable of threatening US military spacecraft at altitudes higher than those the current generation of Soviet ASATs can reach. It is in the context of the latter that development of the Saturn V-like Soviet space booster takes on especially ominous meaning. A vehicle of this size and payload capability is a prerequisite for a direct-ascent ASAT, meaning a weapon that can be launched from the ground to reach the high orbital altitudes where many critical US spacecraft operate, without the need of one or more transfer stages.

The latter approach obviously takes more time and is far more observable—and vulnerable to countermeasures—than a single stage to orbit weapon. Both in



The ultra-modern Typhoon SSBN accommodates twenty of the world's largest SLBMs, each of which can deliver twelve warheads over a distance of 8,300 km with great accuracy.

terms of design and location, the new large Soviet space booster differs completely from trouble-plagued earlier designs, at least one of which blew up on the launch site with catastrophic results, this writer has learned.

A Cornucopia of Talent, Money, and Machines

The Soviet defense industrial base—unlike that of the US—is in a state of robust health, and growing. It is "by far the world's largest in the number of facilities and physical size." In the matter-of-fact language of the just-released US intelligence document, "the Soviet Union alone produces more weapon systems in greater quantities than any other country." As Secretary of Defense Caspar W. Weinberger points out in the document's foreword: "The growth of the Soviet Armed Forces is made possible by the USSR's military production base, which continues to grow at the expense of all other components of the Soviet economy. There are 135 major military industrial plants now operating in the Soviet Union with over 40,000,000 square meters in floor space, a thirty-four percent increase since 1970. In 1980, these plants produced more than 150 types of weapon systems for the Soviet forces and for export to client states and developing countries."

One of the giants of the Soviet military-industrial complex is the Nizhniy Tagil tank plant, a facility occupying 827,000 square meters of floor space that last year pumped out 2,500 T-72 tanks. Superimposed on a map of Washington, D. C., Nizhniy Tagil extends from the Lincoln Memorial to the US Capitol building in one direction and from the Tidal Basin to beyond the White House in the other.

By lavishing on the defense sector a steady twelve to fourteen percent of its gross national product, the USSR has kept up the unprecedented growth of its military industrial base for about a quarter of a century. While rapid growth and pampering—in terms of financial and human resources—of the Soviet military industry induce unabashed envy on the part of Western defense industry managers, the rock-steady flow of the Soviet weapons pipeline is probably even more impressive.

By Wall Street standards, the prospects of the Soviet armament industry would have to be rated as a gilt-edged AAA. By direct Kremlin ukase, production plants are never permitted to idle. There are no boom or bust cycles. As old weapon programs are phased out, new ones are begun, leaving no downtime or long periods of layoffs or inactivity. As "Soviet Military Power" points out, the imperturbability of the process, "the continuing facility growth, and the high rates of production keep the arms industry in a high state of readiness to meet any contingency and any demand for new weapons."

The result of Soviet cossetting of its military industry is awesome. Last year, US intelligence estimates, the Soviet military-industrial complex spewed out some 3,000 tanks, 5,500 infantry fighting vehicles, 550 artillery and rocket launcher units, and about 400,000 other infantry weapons.

During the same year, the Soviets produced 2,765 military aircraft and about 53,000 missiles, ranging from 200 ICBMs to 50,000 surface-to-air missiles. In the naval sector, Soviet shipyards kept an equally fast pace, producing eighty-seven combatants, including, as noted, the world's largest submarine.

Toward Scientific and Technological Superiority

The fecundity of the Soviet arms industry proceeds in step with broad expansion of the technology base and across-the-board quality advances of new Soviet weaponry, according to "Soviet Military Power." The motor driving the growing sophistication of Soviet armament is a vast pool of scientifically and technically trained manpower. Last year, US intelligence finds, about 900,000 scientists and engineers worked in the field of research and development. "This is the world's largest aggregation of scientists and engineers and is compared to about 600,000 for the US. While the number of scientists and engineers specifically engaged in Soviet military R&D is unknown, it is clearly a large percentage of their total effort," according to the new intelligence document.

Payoffs from these investments abound. In the field of directed energy weapons, the document suggests that "in the latter half of this decade, it is possible that the Soviets could demonstrate laser weapons in a wide variety of ground, ship, and aerospace applications." Even earlier, by the mid-1980s, the Soviets may be able to field short-range laser weapons for tactical air defense and in antipersonnel roles, according to "Soviet Military Power."

The Soviet directed-energy weapons program—in the main high-energy laser designs—got under way in the mid-1960s and proceeds now at "three to five times the

US level of effort," according to the intelligence estimate. Unlike the US program—which is exploratory—the Soviet effort is tailored to the development of specific weapons and exploits a variety of technological approaches, according to "Soviet Military Power."

Another area of Soviet R&D that bears watching centers on fuel-air explosives, according to US intelligence. These nonnuclear munitions, involving, basically, ignition of a highly explosive gas cloud to distribute lethal overpressures over a relatively wide area, are highly effective against troops and such soft targets as radar vans and aircraft on the ground.

Advanced Manufacturing Capabilities

Obviously, all products of the armament industry depend heavily on the quality and quantity of the materials that beget them. The USSR has the largest raw materials base in the world. Complementing this advantage are bold Soviet moves to keep their arms industry on the cutting edge of manufacturing technology. To wit, as the operator of the world's largest forging and extrusion presses, the Soviet aircraft industry can fabricate aircraft structural components in sizes and with efficiencies that are unsurpassed. US intelligence credits the Soviet armament industry with similar prowess in the field of the so-called superalloys, materials that exhibit unparalleled performance in terms of high strength, low weight, and heat and oxidation resistance.

There is clearcut evidence, according to "Soviet Military Power," that the USSR is replicating the US effort to develop and manufacture advanced composite materials such as carbon and boron-fiber reinforced structures. These materials are the key to the low observables or "Stealth" technology in aircraft. The new intelligence report points out that "the large Soviet commitment to physical and manpower resources to the development of a variety of high-modulus fiber-reinforced metals, organic, and inorganic matrix composites should enable them to gain ground quickly in this field."

Overall, the US intelligence document finds, the consequences of the Soviet military research and development program are stark: "During the 1970s the Soviets have dramatically reduced the US lead in virtually every basic technology. The United States is losing its lead in key technologies, including electro-optical sensors, guidance and navigation, hydroacoustics, optics, and propulsion."

The Soviet Command Structure

The new intelligence report provides important information concerning the USSR's organizational arrangements that would be instituted in case of war. At the apex of the Soviet war machine is the State Defense Committee, or GKO, that encompasses the nation's highest military and civilian leadership and provides centralized control of the total war effort. Under the guidance of the Defense Committee, a Supreme High Command (VGK) would serve as the highest organization of strategic military leadership. According to "Soviet Military Power," this Supreme High Command apparently includes the CPSU (Communist Party) General Secretary, the Minister of Defense, the first Deputy Ministers of Defense, the Chief of the Main Political Directorate, and the Commanders in Chief of each of the five services. The contributions of the Soviet General Staff, serving as an executive agent for the VGK, would be to ensure the development and execution of unified military strategy for the operational commands.

In order to simplify the planning for war, according to the new document, "the Soviets have divided the world into thirteen Theaters of Military Operations, or TVDs. The Theater of Military Operations is a geographical concept used to denote an area within which their armed forces would function in wartime. There appear to be possibly five continental TVDs, four maritime or naval TVDs, and four intercontinental TVDs."

In order to blend centralized strategic planning with decentralized battle management the Soviets have created intermediate-level high commands, or Fronts.

Thus, the Theaters of Military Operations not only include the terrain upon which the Fronts would conduct their operations, but also incorporate those Military Districts that would support such operations, according to "Soviet Military Power." Even if battle operations stray from a Military District, the latter's structure would be retained to serve as a principal wartime administrative entity. This structure is clearly designed to provide the USSR with continuity of government in case of strategic nuclear war as well as to furnish the means to fight on a protracted basis, *and* survive.

As the intelligence document points out, "Central to this system is the establishment of the means to ensure the survival of state control. The Soviets have, for years, been building an infrastructure of facilities and procedures which is geared to the survival of the means of control for the Communist Party of the Soviet Union during even the worst of conflict situations—a nuclear war. Alternative locations have been established for virtually the entire structure of the Soviet leadership—political, military, security, and industrial—from the highest to the lowest levels." Supporting this organizational system is an elaborate and efficient command control and communications (C^3) network that emphasizes centralized control, survivability, redundancy, and flexibility.

Combined Arms Warfare

At the heart of the Soviet combat doctrine is an ironclad commitment to integrate all forces without room for interservice rivalry. This concept of combined arms operations is much broader and more profound than its Western counterpart which only aims at the joint and cooperative employment of ground, air, and naval forces. To the Soviets, the intelligence report points out, the combined arms battle is a battle "fought by a combined arms formation or unit, together with attached formations or units of other service branches and aviation; and in the maritime sectors, with naval forces as well. The use of nuclear weapons and the participation of the various service branches or forces, in conjunction with great mobility of the troops, impart an especially decisive and maneuver-oriented character to combined arms battle."

The authority of the Combined Arms Commander within the area under his purview appears to be total and ensures streamlined battle management. The com-

Artist's concept of Soviet surface-to-air laser weapons could become operational reality in the second half of this decade. The USSR's high-energy laser program is three to five times the US level of effort.

bined military power of all weapon systems, thus, is applied in a fully integrated plan embracing ground, air, missile, air defense, and naval formations.

In a practical sense, "Soviet Military Power" explains, the largest field formation to reflect this integrated combined arms concept is the earlier alluded to Front, typically composed of three to five combined arms armies, plus aviation, air assault, diversionary, artillery, missile, air defense, engineer, signal, intelligence, reconnaissance, and rear service units. As few as one Front and as many as five may exist in a Theater of Military Operations, according to US intelligence.

Augmenting the combined arms structure is a more traditional arrangement that arrays the five services (ground, naval, air, strategic rocket, and air defense forces) under the General Staff. The principal function of the services is to provide for the training, formulate tactics, and manage weapons acquisition, with heavy emphasis of the mutual support that they are expected to provide each other. The overriding concern reflected in this arrangement is a unified command structure that can apply the totality of Soviet military power in a cohesive and synergistic manner.

Unconventional Warfare and Expansionism

Coercion and subversion are as much the underpinnings of Soviet global power projection as is sheer military might. What the just-released intelligence report terms Moscow's "infrastructure of influence" is a lethal melange of unconventional warfare forces, diplomats, traditional state-to-state activities, military advisors and aid, treaties and legal ties, support for terrorists and pro-Soviet guerrilla groups, economic aid, cultural, media, and educational diplomacy, and the use of what the Soviets call active measures, such as propaganda, blackmail, and forgery. These are the tools for penetrating areas that may be beyond the immediate reach of Soviet military forces.

Unconventional warfare activities, "Soviet Military Power" explains, are managed at the highest level of government: "The Committee for State Security (KGB) and the Main Intelligence Directorate (GRU) of the General Staff can be assumed to plan and execute Soviet unconventional warfare operations. These activities are protected by stringent security measures."

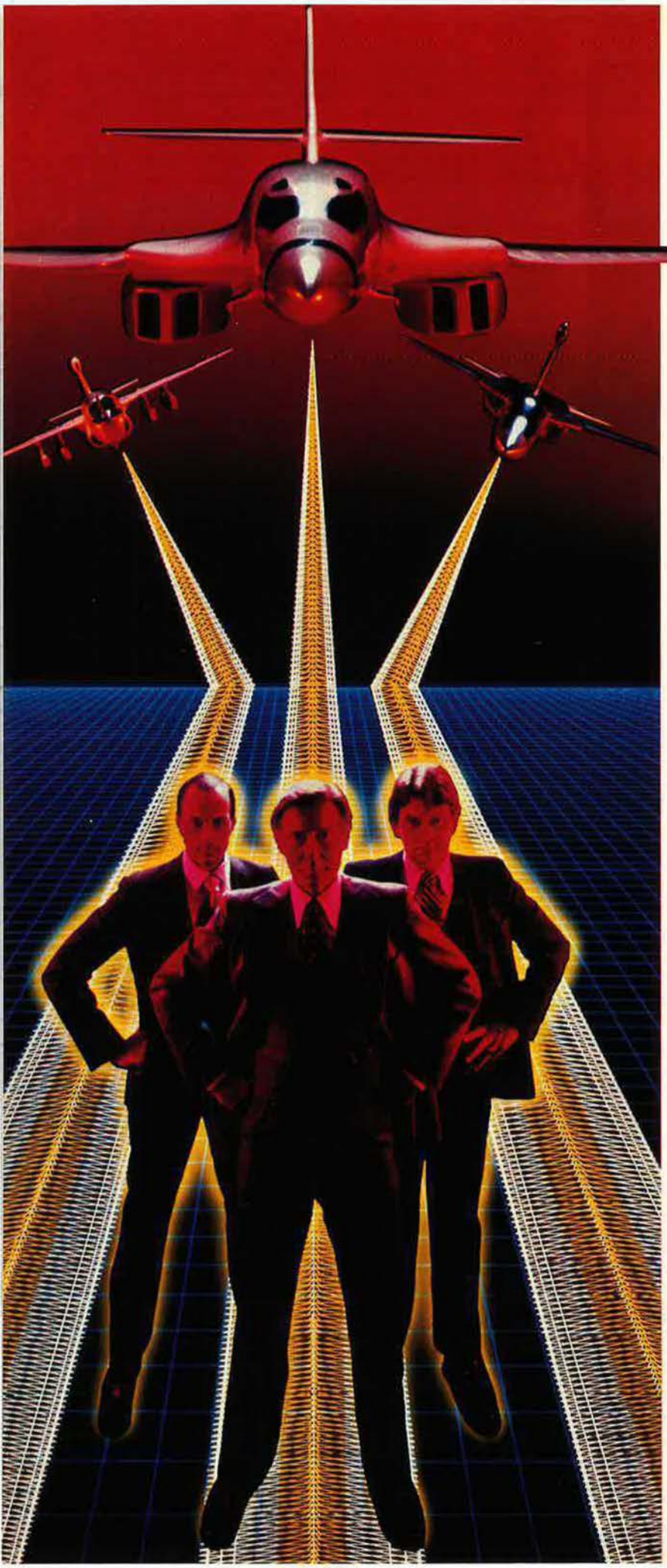
The elite forces for conducting unconventional warfare missions, according to US intelligence, include "special units of the KGB, GRU, Airborne, and Ground and Naval Forces. The KGB special purpose units have a sabotage mission, and are thought to be targeted primarily against the civilian sector. Their tasks would be to create general panic among the civilian population, to disrupt civil government and public utilities, and to damage or destroy key production facilities." Some of the airborne units of the regular armed forces are designated as "special purpose" troops and trained to operate in small groups against key political, military, command and control, transportation, and industrial targets in the enemy's rear areas. Each of these teams has an officer in charge who speaks the language of the country fluently as well as a range of specialists in various aspects of clandestine warfare and sabotage. The US intelligence document points out that "use of unconventional warfare is a basic element of Soviet doctrine, and Soviet capabilities in this respect constitute a formidable threat."

Arms sales represent another instrument of Soviet expansionism. Over the past twenty-five years the Soviets have granted more than $50 billion in military assistance to fifty-four non-Communist nations, especially in the Middle East and along the Indian Ocean littoral. Other members of the Warsaw Pact sold an additional $4.3 billion in arms to Third World nations during that period, according to US intelligence.

In tandem with arms sales is the dispatching of Soviet military advisors, some 20,000 of whom were stationed last year in twenty-eight countries where "they play a central role in organizing, training, and penetrating client armed forces." In the same vein, large numbers of military personnel from the less-developed countries are being trained in the USSR and Eastern Europe. Lastly, the Soviets have turned to use of proxy forces of such satraps as Cuba and East Germany into a fine art for promoting anti-Western causes and extending the USSR's influence. Currently there are some 35,000 Cuban military personnel stationed in twenty countries, according to US intelligence.

Overall, "Soviet Military Power" makes—as US Defense Secretary Caspar Weinberger puts it—a cogent and strong case for the proposition that "there is nothing hypothetical about the Soviet military machine. Its expansion, modernization, and contribution to projection of power beyond Soviet boundaries are obvious." If the document can be faulted, it is in the absence of overhead photography. As Gen. Bernard Rogers, SACEUR, told this writer, "I think this will be disappointing. I personally believe . . . that the intelligence community must give just a little bit . . . in order to lend credibility to the assessments that we make." Yet in spite of remonstrations by him and other military leaders, the intelligence community declined to release any satellite photography on grounds of security concerns.

This factor notwithstanding, there is reason to hope that "Soviet Military Power" will have impact where it is needed most, in pacifism-wracked Western Europe. ■



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THE MILITARY BALANCE 1981/82

As Compiled by The International Institute for Strategic Studies, London

AIR FORCE Magazine takes pleasure in presenting to its readers "The Military Balance, 1981/82," compiled annually by The International Institute for Strategic Studies in London. This exclusive US presentation of "The Military Balance" has appeared in AIR FORCE Magazine each year since 1971. It provides the magazine's readers access to an international standard reference compiled by the recognized leading international authority in the field.

Just a few days after IISS released this volume, President Reagan announced his decisions on strategic systems. They included decisions to:

- Construct and deploy 100 B-1 bombers, while continuing to deploy cruise missiles on existing bombers, and develop an advanced bomber with "Stealth" characteristics.
- Continue construction of Trident submarines, develop a "larger and more accurate sea-based ballistic missile," and deploy nuclear cruise missiles in some existing submarines.
- Complete development of the MX missile, and deploy "a limited number . . . in existing silos as soon as possible," while studying long-term basing operations.
- Strengthen and rebuild the communications and control system.
- Improve North American air surveillance and defense, in cooperation with Canada, and "devote greater resources to improving our civil defense."

The several elements of President Reagan's plan continue to be debated and examined in Congress and elsewhere in the US and abroad.

"The Military Balance" is such a handy reference because it is so comprehensive, and provides the most detailed, unclassified yet authoritative, quantitative assessment of military power and defense expenditures by the nations of the world. It is not a comprehensive assessment of the balance of power, either globally or regionally. It does not take into account the realities of geography, efficiency, vulnerability, or politics, except as mentioned in the balance sections.

Nations are grouped geographically, but there is special reference to the principal regional defense pacts and alignments, such as NATO and the Warsaw Pact. A separate section treats the United States and USSR separately, subdividing the comparisons into sections on strategic forces and general-purpose forces.

As in the past, we have excluded some tabular materials because of space limitations. These exclusions are minor. Readers wishing the entire volume may obtain it direct from The International Institute for Strategic Studies, 23 Tavistock St., London WC2E 7NQ, England. The cost is $14.00, postpaid.

Some notes on terminology. We have retained IISS's system of abbreviating military weapons and units, and its British spelling and usage (as in "programme"). A list of abbreviations used in the text appears on p. 54

Where a $ sign is used, it refers to US dollars, unless otherwise stated. Figures for defense expenditures are expressed in US dollars, showing current and past expenditures as reported or compiled by IISS. Defense expenditures for the USSR and China are estimates, with explanatory notes at the end of the sections on those countries.

IISS is responsible for the facts and judgments in the document. AIR FORCE Magazine has added photos and captions, and we are responsible for them.

ABBREVIATIONS

⟨	under 100 tons
–	indicates part of establishment is detached
AA	anti-aircraft
AAM	air-to-air missile(s)
AB	airborne
ABM	anti-ballistic missile(s)
ac	aircraft
AD	air defence
AEW	airborne early warning
AFV	armoured fighting vehicle(s)
ALBM	air-launched ballistic missile(s)
ALCM	air-launched cruise missile(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
AWACS	airborne warning and control system
AWX	all-weather fighter(s)
bbr	bomber
bde	brigade
bn	battalion *or* billion(s)
Br	British
bty	battery
Can	Canadian
cav	cavalry
cdo	commando
Ch	Chinese (PRC)
cmd	command
COIN	counter-insurgency
comms	communications
coy	company
CW	chemical warfare
det	detachment
div	division
ECM	electronic counter-measures
ELINT	electronic intelligence
engr	engineer
eqpt	equipment
EW	early warning
FAC(G)	fast attack craft (gun)
FAC(M)	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
Fr	French
FRG	Federal Republic of Germany
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 *or* 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), helicopter
LSD	landing ship(s), dock
LSM	landing ship(s), medium
LST	landing ship(s), tank
lt	light
m	million(s)
MARV	manoeuvrable re-entry vehicle(s)
MCM	mine counter-measures
mech	mechanized
med	medium
MICV	mechanized infantry combat vehicle(s)
MIRV	multiple independently-targetable re-entry vehicle(s)
mod	modified *or* modification
mor	mortar(s)
mot	motorized
MR	maritime reconnaissance
MRBM	medium-range ballistic missile(s)
MRCA	multi-role combat aircraft
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
nm	nautical miles
OCU	operational conversion unit(s)
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)
SSBN	ballistic-missile submarine(s), nuclear
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
USGW	underwater-to-surface guided weapon
veh	vehicle(s)
V(/S)TOL	vertical (/short) take-off and landing
Yug	Yugoslav

The United States and the Soviet Union

AMERICAN STRATEGIC FORCES

The second Strategic Arms Limitation Talks Agreement (SALT II), signed in June 1979, remains unratified. Modernization of strategic weapons continues within the context and limits imposed by SALT I and stipulated in the Vladivostok accord of 1974. Neither side appears to have taken any steps to breach irreversibly the provisions of SALT II, and both sides have reduced the numbers of SLBM in service, although this is probably temporary only, while new submarine types are phased into service.

Modernization of the US ICBM force with Mk 12A warheads retrofitted to the 550 *Minuteman* III missiles is virtually complete. Damage to two *Titan* II silos has resulted in a reduction in that force of two missiles, one of which is expected to be back in service in 1982. The new Administration is reviewing the MX ICBM basing mode, with decisions expected shortly, and development of the missile continues.

The retrofitting of the *Trident* C-4 SLBM (range 4,000 nm, 8 × 100KT MIRV) into *Poseidon* SSBN continues with 4 boats now in service and 6 more scheduled for refitting shortly. Five *Allen*-class *Polaris* boats have now been retired. The net effect of these changes has reduced the number of SLBM launchers by 100, warheads by 272, and yield by 43.2MT. The first of the new *Ohio*-class SSBN (24 *Trident* C-4) is undergoing sea trials. The programme (totalling 11 boats) has suffered from production delays, but 8 boats are now building. Early development of *Trident* D-5 SLBM (range 6,000 nm, up to 14 × 150KT MIRV or, possibly, MARV) continues.

Within the strategic bomber force the older B-52F models have now been placed in reserve. Upgrading of the D, G, and H models has begun. This will give the B-52D greater bombing accuracy and enable the G and H models to carry ALCM. Conversion of the B-52G to carry ALCM is in hand, with the first squadron of 16 aircraft due to enter service in December 1981. The Administration's decision on whether to reinstate the B-1, to stretch the F-111, or to embark on an entirely new strategic bomber is expected shortly. The total number of US deliverable strategic warheads is now about 9,000, when ICBM and SLBM warheads and air-delivered weapons are counted (the figure of 7,301 in last year's *Military Balance* referred to missile-carried warheads only). Bomber force loadings are difficult to establish with precision.

Defence against strategic attack is under review, with renewed emphasis being placed on the research and development of ABM systems. This programme looks at pursuing short-term, endo- and exo-atmospheric detection and interception of re-entry vehicles. A previous LOADS (Low-Altitude Defensive Systems) concept is being re-examined, with full system tests expected during this fiscal year. Improvements in early warning systems against manned bombers, strategic command control communications and intelligence (C^3I), and increases in the CONUS interceptor forces are taking place.

SOVIET STRATEGIC SYSTEMS

The Soviet Union's ICBM deployment total remained unchanged over the year, although there have been reports of modifications to warheads to provide greater targeting flexibility in terms of yields and accuracy. There are now some 308 SS-18 in service, mostly with 8 × 2MT warheads, but a few are reported with 1 × 10–50MT warhead. Also in service are 150 SS-17, 300 SS-19, and 580 of the older SS-11, some 60 of which, in SS-19 silos, may be being uprated to SS-19 standard. A number of new types of ICBM are believed to be under development.

The modernization of the I/MRBM force continues, with some 230 of the new SS-20 (3 × 150KT MIRV) in service. Phasing out of the older single-warhead SS-4 and SS-5 (1 × 1MT RV) continues at a rather slower pace, resulting in a net increase of perhaps 10 launchers over the year. Before the SS-20 was introduced in 1977 there were some 600 SS-4 and -5 with single warheads. Today there are some 380 SS-4/-5 1MT and 690 SS-20 150KT warheads; an increase in the total number of available warheads of some 56%, albeit with a decline in the deliverable megatonnage of some 19%.

There has been an overall decline in the number of SLBM from 1,003 in 1980 to 989 in 1981. The total number of D-class submarines remains the same, but a reassessment has raised the total of D-II boats to 11, with a corresponding drop in D-I boats, and results in an increase of four missiles in the gross total. The Y-class and H-II class totals are each down one. The G-class (not included under SALT) remain as they were last

year, with perhaps 3 in reserve. The older G-I class, withdrawn last year, have apparently been scrapped. The first of the new *Typhoon*-class, with 20 missiles, is now fitting out and more of this class are under construction. The missile is also believed to be new, the SS-NX-20 with MIRV.

The Long Range Air Force continues to operate its aging force of Tu-95, Mya-4, Tu-16, Tu-22, and its newer Tu-22M/Tu-26 *Backfire*. There is some variation in numbers of *Backfire* when compared with last year. It is possible that the earlier *Backfire* A has been taken out of service for modification.

Excluding the I/MRBM forces, the total number of nuclear delivery vehicles is 2,537, and the number of deliverable warheads has risen in the year from 6,000 to over 7,000, primarily as a result of introducing MIRVed launchers to replace single-warhead launchers.

There is no evidence that the Soviet Union is according a lower priority to strategic defence. Although the number of *Galosh* ABM around Moscow has been reduced from 64 to 32, it now appears that this is a prelude to some upgrading consistent with the ABM Treaty of 1972. New ABM-associated and intermediate-range radars are reported in service or under construction, and a new low-level SA-10 SAM is entering service, with other SAM reported under development. Civil Defence remains a higher priority in the USSR than in the US, particularly in terms of providing protection for the leadership.

AMERICAN GENERAL-PURPOSE FORCES

Significant in the first Reagan budget was the emphasis given to the general preparedness of the US conventional forces, in clear recognition not only of their utility but also the neglect of previous years in terms of force levels and readiness. Clearly, it is still too early to identify all programme changes, but the shipbuilding programme deserves specific emphasis, as does the attention now being directed to the logistic support levels of all types of conventional forces.

All services continue to procure additional items of existing equipment. The Army is slowly introducing the new M-1 *Abrams* tank and has begun to introduce its new M-2 infantry and M-3 cavalry combat vehicles. It has virtually phased out the 175mm gun, standardizing on the 155mm and 203mm howitzers. New weapons include the Multiple Launch Rocket System (MLRS), similar to multi-rail unguided artillery rocket systems in general use throughout the Warsaw Pact. It is intended to provide high rates of fire against area targets. The Divisional Air Defense gun *(DIVAD)*, a 40mm self-propelled anti-aircraft weapon intended to augment existing AA artillery protection within the field forces, is also being introduced. A new SAM, the *Patriot*, is on order. The Navy is ordering two aircraft carriers, four cruisers, three destroyers, and 31 frigates, with plans for others for future fiscal years. The reactivation and modernization of two, perhaps four, battleships from the reserve is being considered. The Marine Corps will receive additional amphibious personnel carriers and CH-53E *Super Stallion* helicopters. The Air Force continues to phase in the F-16, replacing its F-4 *Phantoms*.

Concern continues to be expressed over the increasing problems concerning the serviceability and maintenance of complex military equipment. Reports suggest that many modern weapons fail in service through inadequate maintenance, or some minor components showing faults when tested, sometimes as a result of a malfunction in the test equipment.

SOVIET GENERAL-PURPOSE FORCES

The steady improvement of Soviet divisions in terms of firepower, mobility, and logistic support continues, although no new types of major equipment have been identified during the past year. The T-80 medium tank has not yet appeared, while the familiar PT-76 light tank continues to be phased out in favour of the BMD light tank and perhaps the BMP infantry combat vehicle, which uses the same turret as the PT-76 with a 73mm gun. The old BTR-50 and -60 personnel carriers are being replaced by the BTR-70 and by the BMP.

The Soviet Navy is acquiring some impressive new equipment. A new cruise missile submarine, the O-class with 20 SS-N-19, has been developed. New surface combatants include the *Kirov*-class nuclear-powered missile cruiser, carrying a mix of surface-to-surface, surface-to-air, and anti-submarine missiles, and two new classes of missile-equipped destroyers, *Sovremenny* and *Udaloy*. Construction continues on known types in all categories.

No new types have been noted in either the Naval Air Force or Frontal Aviation, with the possible exception of a new Sukhoi ground-attack aircraft. Older types are being replaced with new.

Russian equipment continues to be characterized by its sturdiness and, in many cases, by its simplicity. Over the years, however, there has been a trend toward more sophistication both in construction and operation.

THE UNITED STATES

Population: 225,300,000.
Military service: voluntary.
Total armed forces: 2,049,100 (167,760 women).
Estimated GDP 1980: $2,920 bn.
Defence expenditure 1981–2: $180 bn (national definition),[1] $171 bn (NATO definition).

Strategic Nuclear Forces:[2]
OFFENSIVE:
(a) *Navy* (21,000): 576 SLBM in 36 SSBN.
31 *Lafayette* SSBN: 4 with 16 *Trident* I C-4 (64 msls); 27 with *Poseidon* C-3 (432 msls), (8 to be retrofitted with C-4).
5 *Washington*, each with 16 *Polaris* A-3 (80 msls); (3 decommissioned *Allen* could be reactivated).
(8 *Ohio* SSBN, each with 24 *Trident*, building; 1 is on trials.)
(On order: 320 *Trident* I C-4 msls.)
(b) *Strategic Air Command* (SAC) (120,000):
ICBM: 1,052 in 26 strategic msl sqns.
9 sqns with 450 *Minuteman* II, 11 with 550 *Minuteman* III (300 to refit with Mk 12A warhead).
6 sqns with 52 *Titan* II.
(Some 100 ICBM in storage.)
(On order: 200 MX.)
Aircraft: Some 430 combat aircraft.
Long-range bombers: 316.
16 sqns (2 trg) with 151 B-52G, 90 B-52H.
5 sqns (1 trg) with 75 B-52D.
Medium-range bombers: 60.
5 sqns (1 trg) with 60 FB-111A.
Active reserve: a further 5 FB-111A, 31 B-52 (perhaps 3 D, 22 G, 6 H).
Storage: 223 B-52 (all series).
ASM: perhaps 1,250 SRAM.
Strategic recce and comd:
1 sqn with 9 SR-71A.
1 sqn with 8 U-2R.
1 sqn with 4 E-4A/B (3 E-4A to convert to -4B).
3 sqns with 16 RC-135, 7 EC-135N, 14 EC-135C, EC-135S/U/V.
Tankers: 49 sqns (1 trg) with 615 KC-135A

[1] See pp. 60-61 for all footnotes.

(incl 13 Air National Guard with 107 ac, 3 Air Force Reserve with 21 ac).
(On order: 2 E-4B comd, 10 TR-1A recce, 12 KC-10A tanker ac; 920 ALCM.)

DEFENSIVE:

North American Aerospace Defense Command (NORAD/ADCOM) a joint US–Canadian organization with HQ at Colorado Springs, includes:

Aircraft (excluding Canadian and tac units):

Interceptors: 312.

(i) Regular: 6 sqns with 108 F-106A (F-15 to replace).

(Assigned from Tactical Air Force: 1 sqn with 18 F-15, 1 with 21 F-4.)

(ii) Air National Guard (ANG): 10 sqns (2 with 36 F-101B, 3 with 54 F-4D, 5 with 75 F-106A).

AAM: *Genie, Falcon, Super Falcon.*

Warning Systems:

1. ICBM, SLBM, satellites:

(a) Satellites: TRW Block 647: 1 over Indian Ocean: infra-red surveillance and warning system. Control stations at Guam, Pine Gap, and Nurrunger (Australia).

(b) Space Detection and Tracking System (SPADATS):

(i) *Cobra Dane* phased-array radar system at Shemya, Aleutians. Augments BMEWS in Alaska. (*Cobra Judy* ship-borne phased-array tracking system being built; will support research programmes, and also SPADATS.)

(ii) USAF 496L *Spacetrack*. FPS-17 detection, FPS-79 tracking radars at Diyarbakir (Turkey); FPS-10 tracking radar at Ko Kita (Thailand); optical tracking system in California, at San Vito (Italy), Sand Island (Pacific), Mount Johns (New Zealand).

(iii) USN Space Surveillance System (SPASUR): 9 field stations in US (3 transmitting, 6 receiving sites and civilian agencies).

(c) Ballistic Missile Early Warning System (BMEWS). USAF 474L system: 3 stations: Clear, Alaska; Thule, Greenland (AN/FPS-50 + -49); Fylingdales, England (AN/FPS-49 + other). 13 radars detect and track ICBM and IRBM, but not MIRVs or satellites. 3,000-mile range.

(d) Perimeter Acquisition Radar Attack Characterization System (PARCS). 1 north-facing phased-array, 130° arc, 1,800-mile range system at Grand Forks, North Dakota (identifies and tracks individual re-entry vehicles).

(e) Space Defense Operations Center (SPADOC). NORAD/ADCOM Combat Operation HQ, Wyoming (tracking, identification and cataloguing). Command control and communications to all space-associated commands and agencies.

2. SLBM:

(a) Pave Paws 474L system. 1 phased-array station each on US East and West coasts; 3,000 nm range.

(b) 1 FPS-85 and 1 AN/FSS-7 station in Florida. Alternate Space Defense Center. Linked to *Spacetrack* and SPASUR through NORAD HQ. Also to identify and track fractional-orbit bombardment systems (FOBS).

3. Anti-Air (aircraft, cruise missile):

(a) Over-The-Horizon-Back-Scatter (OTH-B). 414L at 2 sites in Maine (2 transmitters, 5 receivers), 1 in Washington state planned.

(b) Distant Early Warning (DEW) Line. 31 stations roughly along the 70°N parallel detecting aircraft and cruise missiles to 40,000 feet at 200-mile range.

(c) Pinetree Line: 24 stations in Southern Canada.

(d) Semi-Automatic Ground Environment (SAGE). 416L air weapons control and warning system at 6 locations (2 in Canada); combined with BUIC and Manual Control Center (MCC) in Alaska.

(e) Back-up Interceptor Control (BUIC). All stations but 1 semi-active (AD command and control to support Joint Surveillance System (JSS) in tactical control of interceptor forces). (SAGE, BUIC, and MCC are all being replaced in 1982–3 by USAF/Federal Aviation Administration JSS, with 7 Region Operations Control Centers (ROCC): 4 in US, 1 in Alaska, 2 in Canada; will control 46 radars in US, plus Alaska and Canada, for co-ordination/control of military and civil air traffic; surveillance and tracking of objects in high- and medium-altitude transpolar flight.)

4. Intermittent programmed photographic recce satellites:

(a) USAF: *Titan* 3D launcher, 50-80 day life span.

(b) CIA: KH-11; longer life.

Army: 775,000.

5 corps HQ (1 AB)(1 forming).
4 armd divs (5–6 tk, 4 mech inf bns).
6 mech divs (4 tk, 5 mech inf, 3–4 arty, 1 hel, 1 SAM bns, 1 armd cav sqn, spt units).[3]
4 inf divs.[3]
1 airmobile div.
1 AB div: 3 bdes (each 3 para bns, 1 arty bn), 1 armd bn, 1 armd hel bn.
5 corps arty gps (each 2 bdes: 2 bns of *Lance* SSM; 2 bns of 8-in (203mm), 2 of 155mm how).
5 corps AA arty gps (2 bdes: 1 bn of *Nike Hercules*, 3 of *Hawk*, 1 of *Chaparral/Vulcan*).
1 armd bde.
4 inf bdes.
3 armd cav regts.
4 *Pershing*, 8 *Lance* SSM bns (10 in corps arty).
3 Special Forces Groups: 2 Ranger bns.
Army Aviation: 1 air cav combat bde; indep bns and dets, assigned to HQ for tac, tpt, and medical duties.
Tanks: some 11,400, incl 1,825 M-48A5, 1,555 M-60, 5,775 M-60A1, 540 M-60A2 with *Shillelagh* ATGW, 1,500 M-60A3, 150 M-1 *Abrams;* 400 M-551 *Sheridan* lt tks with *Shillelagh* (330 trg).
AFV: some 20,000 M-577, M-901 *TOW*, M-113 (some with *TOW*) APC, M-2, M-3 MICV.
Arty and Msls: about 2,500 105mm, 155mm towed guns/how; 4,000 105mm, 155mm, and 203mm SP how; 3,500 81mm, 2,000 107mm mor; 2,000 90mm and 106mm RCL; 6,200 *TOW*, 10,400 *Dragon* ATGW launchers; 144 *Pershing* and *Lance* SSM.
AA Arty and SAM: some 600 20mm and 40mm towed and SP AA guns; some 2,600 *Vulcan* towed and SP 20mm AA guns: *Redeye*, FIM-92A *Stinger* SAM; 600 *Chaparral* SAM systems; *Nike Hercules* and *Improved HAWK* SAM (to be replaced by *Patriot*).
Aircraft/Hel: about 580 ac, incl 200 OV-1/-10, 200 RU-21, 80 C-12; some 8,000 hel, incl 1,000 AH-1G/Q/S, 4,000 UH-1/-19, 145 UH-60A, 500 CH-47/-54, 2,500 OH-6A/-58A.
AAM: MIM-92A *Stinger*.
Trainers incl about 100 T-41/-42 ac; 250 TH-55A hel.
(On order: 340 M-60A1, 981 M-60A3, 210 M-1 tks; 1,100 M-901 *Improved TOW* AFV, 72 M-2 inf, 25 M-3 cav MICV; 450 M-198 155mm towed, 232 M-109A2/A3 155mm, M-110A2 203mm SP how; 300 81mm mor; 44 MLRS MRL; *Pershing* II SSM; 12,000 *TOW* ATGW; *Viper* RL; 276 *DIVAD* 40mm SP AA; *Stinger*, 32 *Rapier*, 38 *Roland* launchers, 795 *Improved HAWK*, 5 *Patriot* launchers (155 msls) SAM; 12 C-12A ac; 324 AH-1S, 8 AH-64, 192 UH-60A hel; 1,075 *Hell Fire* ATGW (ASM).

DEPLOYMENT:

Continental United States (incl Alaska, Hawaii, and Canal Zone):

Strategic Reserve, incl Rapid Deployment Force (RDF):

(i) 1 mech, 1 AB divs; 1 armd, 1 air cav bdes.

(ii) To reinforce 7th Army in Europe, 2 armd, 3 mech, 2 inf, 1 airmobile divs, 1 inf bde, 1 armd cav regt.[4]

(iii) Alaska, 1 inf bde.

(iv) Panama, 1 inf bde.

(v) Hawaii, 1 inf div less 1 bde.

(See also *Forces Abroad* below.)

RESERVES: 605,400.

(i) Army National Guard: 385,800. 3,285 units; capable after mobilization of manning 2 armd, 1 mech, 5 inf divs, 22 indep bdes (4 armd, 8 mech, 10 inf; 4 of them in regular army divs), 4 armd cav regts; plus HQ, reinforcements, and spt units to fill regular formations. Indep bns: 6 tk, 2 mech, 50 arty, 4 *TOW;* 8 AD; 1 inf (recce) gp, 6 bns; 2 Special Forces Gps, 6 bns; 105 air units, 150 sections; 2,568 ac.

(ii) Army Reserves: 219,600; 49,000 a year do short active duty. 3,410 units: 12 trg divs, 3 indep combat bdes: 1 mech, 2 inf; 67 indep bns incl 1 tk, 2 inf, 15 indep arty bns; 2 Special Forces Gps: 7 bns; 130 indep air units with 566 aircraft.

Navy: 528,000; 201 major combat surface ships, 84 attack submarines. Four Fleets.

Submarines, Attack:

79 nuclear: 15 *Los Angeles* with *Harpoon* SSM and *SUBROC;* 2 *Allen* (converting from SSBN 1981); 52 with *SUBROC* (1 *Lipscomb*, 1 *Narwhal*, 37 *Sturgeon*, 13 *Thresher*); 5 *Skipjack*, 4 *Skate*, 1 *Tullibee*.

5 diesel: 3 *Barbel*, 1 *Grayback*, 1 *Darter*.

Aircraft carriers: 14 (1 trg; 1 more building).

3 nuclear: 2 *Nimitz* (91,400 tons), 1 *Enterprise* (89,600 tons).

11 conventional: 3 *Kitty Hawk* (78/80,000 tons), 1 *Kennedy* (82,000 tons), 4 *Forrestal* (76/79,000 tons), 2 *Midway* (62,200 tons, 1 has no regular air wing), 1 *Intrepid* (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 each) or 24 F-4J, 3 attack (2 lt with 24 A-7E, 1 med with 10 A-6E), 2 ASW (1 with 10 S-3A ac, 1 with 6 SH-3A/D/G/H hel), 1 ECM with 4 EA-6B, 1 AEW with 4 E-2B/C, 4 KA-6D tankers and other specialist ac.

Other surface ships:

9 nuclear-powered GW cruisers with *Standard* SAM, *ASROC:* 4 *Virginia* (2 SH-2F hel), 2 *California*, 1 *Truxtun* (1 SH-2F hel), 1 *Long Beach*, 1 *Bainbridge* with *Harpoon* SSM.

18 GW cruisers with SAM, *ASROC*, some with *Harpoon:* 9 *Leahy*, 9 *Belknap* with 1 SH-2F hel.

39 GW destroyers with SAM, *ASROC*, some with *Harpoon:* 2 *Kidd*, 10 *Coontz*, 4 *Sherman/Hull*, 23 *Adams*.

43 gun/ASW destroyers, most with SAM or *ASROC:* 30 *Spruance* (most with *Harpoon*), 13 *Sherman/Hull*.

20 GW frigates with SAM, *ASROC*, hel: 14 *Perry with Standard/Harpoon*, 6 *Brooke* with 1 SH-2F hel.

58 gun frigates with *ASROC:* 46 *Knox* (some with *Harpoon*), 10 *Garcia* (all with 1 SH-2F hel), 2 *Bronstein*.

2 *Asheville* large patrol craft.

2 *Pegasus* GW hydrofoil with 8 *Harpoon* SSM.

3 *Aggressive* ocean minesweepers.

67 amph warfare ships: 1 *La Salle*, 2 *Blue Ridge* comd; 5 *Tarawa* LHA (mix of AV-8A ac or 12 CH-46, 4 CH-53, 3 UH-1N, 4 AH-1T hel; 4 LCU); 7 *Iwo Jima* LPH (mix of 6 AV-8A, 4 OV-10 ac or 2 HH-46, 10 CH-53, 1 UH-1N); 12 *Austin*, 2 *Raleigh* LPD; 5 *Anchorage*, 8 *Thomaston* LSD; 20 *Newport* LST; 5 *Charleston* amph cargo ships.

91 LCU: 60 Type 1610, 31 Type 1466.

51 replenishment and 27 depot and repair ships.

Anti-sub msls: *ASROC*.

SSM: *Standard* (SM-1), *Harpoon, Tomahawk* (trials).

SAM: *Standard* (SA-1), *Aegis* (SM-2), *Talos, Sea Sparrow, Tartar, Terrier*.

Ships in active reserve and storage:

3 *Allen* nuclear subs, 6 aircraft carriers, 4 battleships, 4 cruisers, 8 destroyers, 5 amph, 46 log spt, 41 troop, 3 LST, 2 LPC, 22 ocean

minesweepers. 162 cargo vessels in National Defense Reserve Fleet; (579 govt-owned cargo ships and tankers could be used for auxiliary sea-lift).
(On order and funded (5 years): 8 SSBN, 12 SSN, 2 nuclear carriers, 4 *Ticonderoga* GW cruisers, 3 GW destroyers, 31 GW frigates, 5 GW hydrofoils, 1 amph ship, 15 auxiliaries, 240 *Harpoon* SSM/ASM.)

Aircraft: 12 attack carrier air wings; some 1,450 combat ac, some 170 armed hel.
26 fighter sqns: 14 with 374 F-14A, 12 with 144 F-4 (4 converting to F-14).
24 attack sqns: 12 med with 116 A-6E, 12 lt with 164 A-7E.
3 recce sqns with 12 RF-8, 12 EA-3, 12 EP-3.
24 land-based MR sqns with 260 P-3B/C.
11 ASW sqns with 110 S-3A.
9 electronic warfare sqns with 35 EA-6B *Prowler*.
13 AEW sqns with 48 E-2B/C *Hawkeye*.
18 ASW hel sqns: 11 with 72 SH-3A/D/G/H, 7 lt with 75 SH-2F.
2 MCM hel sqns with 23 RH-53D.
17 misc spt sqns with 14 C-130F/LC-130/EC-130Q, 7 C-118, 2 C-9B, 16 CT-39, 13 C-131, 6 C-117, 20 C-1, 10 C-2, 44 UC-12B; 36 KA-6D, 1 Convair 880 tanker ac; CH-46, SH-3, SH-2B/C hel.
1 aggressor trg sqn with 13 F-5E/F.
21 OCU:
6 fighter trg sqns: F-14/TA-4J/F.
6 attack sqns: 60 TA-7C, A-6 ac.
1 recce sqn: EA-3/EA-4.
3 AEW sqns: E-2B.
3 ASW sqns: S-3A, P-3B ac, SH-2F hel.
2 hel sqns: TH-12, TH-57A.
1 test sqn with 11 F-18 (1 combat sqn to form 1981).
15 trg sqns with T-1A, T-2B/C, T-28/-29B/-34/-38/-44, TS-2A, TE-2 ac; UH-1D hel.
AAM: *Sparrow, Phoenix, Sidewinder.*
ASM: *Standard, Bullpup, Shrike* (anti-radiation), *Walleye, Harpoon, Maverick.*
(On order 181 F-18 fighters, 12 A-6E attack, 12 P-3C MR, UC-12B, 3 EC-130Q, 6 EA-6B ECM ac, 16 CH-53E *Super Stallion* hel.)

DEPLOYMENT AND BASES (average strengths of major combat ships).
Second Fleet (Atlantic): 31 SSBN, 41 attack subs, 4–5 carriers, 76 surface combatants, 27 amph. Norfolk (HQ), Mayport, Roosevelt Roads (Puerto Rico), Charleston, Jacksonville, Brunswick, New London, Newport, Boston, New Orleans, Bangor, Kings Bay.
Third Fleet (Eastern Pacific): 5 SSBN, 30 attack subs, 3 carriers, 44 surface combatants. Pearl Harbor (HQ), San Francisco, Whidbey Island, San Diego, Long Beach, Adak (Alaska).
(See also *Forces Abroad,* below.)

RESERVES: 85,400.
Ships in commission with the Reserve including 16 destroyers, 4 amph warfare ships, 22 ocean minesweepers, 4 log spt ships.
2 carrier wings: 6 attack sqns with 60 A-7B, 4 fighter with 48 F-4N, 2 recce with RF-8G, 2 AEW with 8 E-2B, 2 ECM with EA-6A, EKA-3B, 2 tanker sqns with KA-3.
2 MR wings: 13 sqns with P-3A/B.
1 hel wing: 7 sqns; (4 ASW with 26 SH-3D, 2 lt attack with 16 HH-1K, 1 SAR with HH-3).
1 tac spt wing: 2 composite sqns with TA-4J; 8 spt sqns with C-9, C-118, C-130.
Naval Construction Bde: 9 regts, 17 bns; specialist and spt units.

Marine Corps: 188,100.
3 divs, each of 9 inf, 1 recce, 1 tk, 1 engr, 1 amph bns, 1 arty regt.
575 M-60A1 med tks; 985 LVTP-7 APC; 175mm SP guns; 150 105mm, M-198 155mm towed, 155mm, 203mm SP how; 230 81mm mor; 106mm RCL; *TOW, Dragon* ATGW; *Redeye, Stinger* SAM.
3 Air Wings: 35,600; some 440 combat aircraft, 72 armed hel.
10 fighter sqns with 144 F-4N/S.
16 FGA sqns: 5 lt with 61 AV-8A/C *Harrier* V/STOL; 5 lt with 80 A-4M; 6 med with 60 A-6A/E.
1 recce sqn with 10 RF-4B.
1 ECM sqn with 15 EA-6B.
3 observation sqns with 24 OV-10A.
2 utility sqns with 24 C-117D/CT-31G.
3 assault tpt/tanker sqns with 36 KC-130F.
20 hel sqns: 2 hy with 38 CH-53D; 9 med with 162 CH-46F; 6 lt with 96 UH-1E/N; 3 attack with 72 AH-1J/T.
6 OCU: 3 with some 40 A-4M, A-6/E, 1 with F-4N ac; 2 with CH-46F, CH-53D hel.
7 trg sqns with TA-4F, TAV-8A.
2 SAM bns with *Improved HAWK.*
AAM: *Sparrow, Sidewinder.*
ASM: *Maverick.*
(On order: 329 LVTP-7 amph APC, 12 AV-8B ac, 33 CH-53E hel, *Stinger* SAM.)

RESERVES: 34,800.
1 Marine div: 3 regts, 21 combat and spt bns: 6 air gps (4 combat, 1 service, 1 air control).
1 air wing: 2 fighter sqns with 24 F-4N; 6 attack sqns with 72 A-4E. 1 observation sqn with 16 OV-10A/E; 1 tpt/tanker sqn with 12 KC-130F, 10 hel sqns (1 attack with 18 AH-1J, 3 heavy with 18 CH-53A/D, 2 medium with 36 CH-46, 4 light with 21 UH-1N); 1 SAM bn with *HAWK;* 32 spt units.

DEPLOYMENT:
Hawaii: 1 bde (from Japan-based div).

Air Force: 558,000; some 3,200 combat aircraft.[5]
26 combat wings, comprising 83 sqns: 32 with 774 F-4 (55 to be replaced with F-16); 16 with 358 F-15; 7 with 150 F-16; 5 *Wild Weasel* (1 with 24 F-105G, 4 with 84 F-4G); 11 with 252 F-111A/D/E/F; 12 with 276 A-10A.
6 tac recce sqns with 108 RF-4C.
3 AWACS sqns with 22 E-3A.
11 tac air control sqns; 6 with 88 OV-10 and O-2A; 1 with 7 EC-130E; 1 with 11 EC-135K ac; 3 with 27 CH-3 hel.
5 special operations sqns; 3 with 19 MC-130 ac; 1 with AC-130 ac, CH-3, UH-1N hel; 1 with HH-53H hel.
4 aggressor trg sqns with 55 F-5E, T-38.
17 OCU: 1 with 13 F-16; 7 with F-4; 1 with F-5; 2 with F-15; 2 with F-101/-106; 3 with 60 A-10; 1 with RF-4C.
14 tac airlift sqns with 218 C-130.
17 hy (strategic) tpt sqns: 4 with 70 C-5A; 13 with 134 C-141A, 100 C-141B (being modified from A; to be 270 by mid-1982, incl 36 from reserve).
8 SAR sqns incl 1 msl spt sqn (SAC): 11 C-135, 28 HC-130 ac, 42 HH-3/-53, 68 T/H/UH-1 hel.
3 medical tpt sqns with 19 C-9.
3 weather recce sqns with 13 WC-130, 5 WC-135B.
30 trg sqns: 8 F-16B, 120 T-33A, 662 T-37B, 690 T-38, 113 T-39, 100 T-41A/C, 13 T-43A, 4 C-5A, 28 C-130, 16 C-141A, 5 HC-130, 2 UV-18A (DHC-6) ac; 8 HH-53, 8 C/HH-3, 10 H/U/TH-1 hel.
Hel incl 73 UH-1N, 21 HH-3E, 162 HH-53.
AAM: *Sidewinder, Sparrow.*
ASM: *Maverick, Standard; Shrike* (anti-radiation).
(On order: 162 F-16, 315 F-15 fighters, 261 A-10 FGA, 13 E-3A, 15 EF-111A, 30 A-7K, 7 C-130H, 3EC-130E.)

DEPLOYMENT:
Continental United States (incl Alaska);
(i) *Tactical Air Command:* 98,000: 2 Air Forces; 11 air divs; 28 wings; 30 fighter sqns, 3 tac recce sqns, 3 tac air spt sqns.
(ii) *Alaskan Air Command:* 7,300: incl 1 fighter wing (2 sqns), 1 control (warning) gp, 1 tac air spt sqn, 2 combat spt gps.
(iii) *Military Airlift Command:* 71,000: 2 Air Forces; 3 air divs; 9 wings; 11 tac, 17 strategic airlift sqns, weather, SAR sqns.
(iv) Support elements: 171,500. Comms, logs, systems trg, electronic security Comds.
(See also *Forces Abroad* below.)

RESERVES: 153,800. 41 wing equivalents.
(i) Air National Guard: 97,100; 24 wings, 73 gps, 94 sqns; 741 combat aircraft.
10 interceptor sqns (NORAD-assigned); 33 fighter/FGA sqns (3 with 60 F-105B/D, 11 (1 OCU) with 160 F-4C, 14 with 312 A-7D, 5 with 90 A-10); 8 recce sqns with 107 RF-4C; 1 ECM sqn with 12 F-4G *Wild Weasel;* 6 tac air spt sqns (4 with 50 OA-37B, 2 with 75 O-2A); 19 tac tpt sqns with 168 C-130A/B/E/H; 13 tanker sqns with 107 KC-135 (NORAD-assigned); 2 special electronics sqns (1 with 18 EB-57B/C, 5 T-33, 1 with 20 EC-130E): 2 SAR sqns with 8 HC-130 ac, and 12 HH-3E hel. Trg ac incl 40 T-33, 6 T-43A.
(ii) Air Force Reserve: 56,700; 19 wings, 52 sqns: about 165 combat aircraft, 5 armed hel.
8 fighter sqns (2 with 69 F-105D, 1 with 24 A-37B, 3 with 20 F-4C; 2 with 42 A-10); 16 tac tpt sqns (11 (1 OCU) with 112 C-130A/B, 3 with 48 C-123K, 2 with C-7A); 3 tanker sqns with 21 KC-135 (NORAD-assigned); 2 special operations sqns (1 with 10 AC-130 ac, 1 with 5 S/HH-3 hel); 1 weather recce sqn with 7 WC-130; 4 SAR sqns with 16 HC-130 ac, 9 C/HH-3E, 10 H/UH-1 hel.
18 Reserve Associate Military Airlift sqns (personnel only): 4 for C-5A, 13 for C-141, 1 aero medical for C-9A (1 for KC-10A forming).
(iii) Civil Reserve Air Fleet (numbers fluctuate): 334 long-range commercial ac: 224 passenger (Boeing 707/747, L-1011, DC-8/-10); 110 cargo/convertible (Boeing 707/747, DC-8/-10).

Para-Military Forces: Coast Guard: 45,000; 42 destroyer-size vessels, 7 icebreakers, 79 patrol craft, 118 other vessels; 47 ac and 93 hel, incl 22 HC-130B/E/H, 17 HC-131, 1 VC-4A, 1 VC-11A, 6 HU-16E ac, 24 HH-3F, 69 HH-52A hel.
(On order: 9 cutters, 41 HU-25A ac, 90 HH-65 hel.)
Coast Guard Reserve: 11,600 (a further 9,700 have some Reserve obligation); 1 cutter, 167 Port Security units in 40 ports, 59 spt units, 63 reserve gps, 150 small vessels.

Forces Abroad:
ARMY:
Europe: 219,729.
(i) Germany: 208,000. 1 Army HQ: 2 corps (incl 2 armd, 2 mech divs, 1 armd, 2 mech bdes plus 2 armd cav regts), 4 AD sqns with *HAWK*; 3,000 med tks.[6]
(ii) West Berlin: 4,400. HQ elements and 1 inf bde.
(iii) Greece: 569.
(iv) Italy: 3,760.
(v) Netherlands: 1,000.
(vi) Turkey: 1,200.
(vii) Other: 800.
Pacific (see also *Deployment*, above):
(i) South Korea: 30,000. 1 inf div (13,900), 1 AD bde with 8 *Improved HAWK* btys.
(ii) Japan: 2,500; base and spt personnel.

NAVY:
Second Fleet (Atlantic) (see also 'Deployment and Bases') Guantánamo Bay (Cuba), Bermuda, Keflavik (Iceland), Holy Loch (Britain).
Sixth Fleet (Mediterranean); 5 subs, 2 carriers, 14 surface combatants. Gaeta (HQ), Naples, Sigonella, La Maddalena (Italy), Rota (Spain).
Seventh Fleet (Western Pacific): 8 subs, 2 carriers, 21 surface combatants. Yokosuka (Japan, HQ), Subic Bay (Philippines), Agana, Apra Harbor (Guam), Midway.
Dets serve in the Indian Ocean: 1–2 carrier task forces (some 12 surface combatants), 7 chartered stores ships. Middle East Force

(Persian Gulf): 1 cmd ship, 4 surface combatants.

MARINES:
Caribbean:
Cuba (Guantánamo) 420. 1 reinforced marine coy.
Pacific:
Japan: 1 MAF (1 div (-), 1 air wing), 1 Marine Amphibious Unit (MAU), 1 bn landing team.[7]
Indian Ocean: 1,800: 1 MAU deployed intermittently.

AIR FORCE:
Europe: US Air Force, Europe (USAFE): 54,000.
Britain (20,500): 1 Air Force HQ; 4 combat wings; 4 sqns with 90 F-111E/F, 4 sqns with 84 A-10, 2 sqns with 36 RF-4C, 1 sqn with F-5E, spt sqns, 1 tac tpt sqn with 16 C-130 (MAC); 29 KC-135, 4 EC-135. *Spain:* 1 Air Force HQ: strategic recce unit, 1 tac wing, 3 sqns F-4, A-10, F-15 (1 trg wing); units in Italy, Greece, and Turkey. *Germany:* 1 Air Force HQ: 5 combat wings: 3 sqns with 66 F-111, 2 sqns with 42 A-10, 8 sqns with 144 F-4, 3 sqns with 54 F-15. *Netherlands:* 1 sqn with F-15. *Iceland:* 1 AD sqn with F-4E. Total 29 fighter sqns, plus 5 in US on call (7 with 147 A-10, 10 with 180 F-4C/D/E, 5 with 90 F-15, 7 with 156 F-111E/F), 2 tac recce sqns, plus 3 in US on call, with 36 RF-4C; 1 ECM sqn with 24 F-4G *Wild Weasel*.
Pacific: Pacific Air Forces (PACAF): 30,000.
Japan: 1 Air Force HQ: 1 div: 1 wing with F-15, RF-4C, T-39, UH-1E. *Korea:* 1 div: 2 wings: 5 sqns, 4 with 72 F-4D/E (2 to get 48 F-16), 1 with 18 OV-10. *Philippines:* 1 Air Force HQ: 1 wing with F-4E/G, F-5E; 9 fighter sqns (6 with F-4, 3 with F-15); 1 tac recce sqn with RF-4; 1 tac spt sqn with 18 OV-10; 1 special operations sqn with MC-130; 2 tac airlift sqns, 32 C-130 (MAC); det with 2 E-3A AWACS; 1 combat trg sqn with F-5E (other ac incl T-33, T-39).
Middle East (all services):
Egypt: 323.
Saudi Arabia: 861.
Africa (all services): 120.

THE SOVIET UNION

Population: 265,500,000.
Military service: Army and Air Force 2 years, Navy and Border Guards 2–3 years.
Total armed forces: 3,673,000.[8]
Estimated GNP 1979: 422.5 bn roubles.[9]
Estimated defence expenditure: see p. 61.

Strategic Nuclear Forces:

OFFENSIVE:
(a) *Navy:* 989 SLBM in 84 subs (950 SLBM within SALT Agreement, 39 outside it).
(*Typhoon*-class, 20 SS-NX-20, fitting out; more building).
11 D-III SSBN, each with 16 SS-N-18 (1 more may enter service in 1981; more building): (176 msls).
4 D-II SSBN, each with 16 SS-N-8: (64 msls).
18 D-I SSBN, each with 12 SS-N-8: (216 msls).
1 Y-II SSBN with 12 SS-NX-17 (trials): (12 msls).
28 Y-I SSBN, each with 16 SS-N-6 *Sawfly* (5 more believed converting to attack subs): (448 msls). (Perhaps 18 carry mod 3 (6-MRV warhead), 10 with mod 1.)
1 H-III SSBN with 6 SS-N-8: (6 msls).
6 H-II SSBN, each with 3 SS-N-5 *Serb:* (18 msls).
15 diesels: 1 G-III (5 SS-N-8), 1 G-IV (5 SS-N-6): (10 msls); 13 G-II each with 3 SS-N-5 (39 missiles: non-SALT).
(b) *Strategic Rocket Forces* (SRF): 385,000 (50,000 civilians).[10] 6 operational rocket armies, organized in divs, regts, bns, and btys; probably 1 msl per bty; 300 launch control HQ; 3 msl test centres.
ICBM: Some 1,398.[11]
580 SS-11 *Sego* (some 60 in SS-19 silos; may be being modified to SS-19).[12]
60 SS-13 *Savage*.
150 SS-17 (mostly mod 1, 4 MIRV).
308 SS-18 (mostly mod 2, 8–10 MIRV; modification to mod 4 may have begun).
300 SS-19 (mostly mod 3, 6 MIRV).
IRBM and MRBM: some 610 deployed (perhaps 500 in Western USSR, rest east of Urals).
40 SS-5 *Skean* IRBM.
230 SS-20 IRBM (mobile launchers capable of being reloaded).[13]
340 SS-4 *Sandal* MRBM.
Reserves: 520,000 personnel; a proportion of the msls withdrawn from service.
(c) *Long-Range Air Force* (LRAF): 45,000; some 774 combat aircraft. 3 Air Armies: 2 (North West and South West bomber corps) opposite NATO, in Europe, 1 (Far East Bomber Corps) 9 regts. Eastern USSR.[14]
Long-range bombers: 150.
105 Tu-95 *Bear* A/B, 45 Mya-4 *Bison* (some 70 *Bear* have AS-3 *Kangaroo* ASM).
Medium-range bombers: 500 (365 in Western USSR).
310 Tu-16 *Badger*, 125 Tu-22 *Blinder*, 65 Tu-22M *Backfire* B (AS-4 *Kitchen* ASM).
Recce: 34.
4 Tu-95 *Bear* E, 15 Tu-16 *Badger* D/E/F/K, 15 Tu-22 *Blinder* C.
ECM: 90 Tu-16 *Badger* H/J.
Tankers: 45.
35 Mya-4 *Bison* A, 10 Tu-16 *Badger*.
ASM: AS-3 *Kangaroo*, AS-4 *Kitchen*, AS-5 *Kelt*, AS-6 *Kingfish*.

DEFENSIVE:
Air Defence Force *(PVO-Strany):* 550,000;[10] 10 Air Defence Districts, numerous AD regiments. 14 specialist schools. It includes:
ABM: 32 ABM-1 *Galosh* (32 former sites non-operational); range over 320 km, warheads nuclear, presumably MT range. 1 regt (4 bns) at 4 sites around Moscow.
Aircraft: about 2,500; in regts and sqns.
Interceptors: some 750 MiG-23 *Flogger* B/G, 330 MiG-25 *Foxbat* A, some 200 Su-9 *Fishpot* B, Su-11 *Fishpot* C, 800 Su-15 *Flagon* D/E/F, 120 Tu-28P *Fiddler*, 300 Yak-28P *Firebar*. AAM: AA-3 *Anab*, AA-5 *Ash*, AA-6 *Acrid*, AA-7 *Apex*, AA-8 *Aphid*.
Airborne Warning and Control Aircraft: 10 modified Tu-126 *Moss*.
Trg ac incl 40 Su-11, 120 Su-15, 20 MiG-15, 60 MiG-17, 50 MiG-23, 50 MiG-25, 10 Yak-28.
SAM: About 10,000 launchers in some 1,200 fixed sites: some 12,000 SA-1 *Guild*, SA-2 *Guideline*, SA-3 *Goa* (launcher capacity being doubled), SA-5 *Gammon;* SA-10 now entering service.
AA artillery: 23mm, 57mm, 85mm, 100mm, 130mm guns.
Warning Systems: Some 7,000, incl satellites and EW and ground control intercept radars.
(i) *Satellites:* 1 geostationary over the Atlantic (anti-SLBM). 2 *Molniya*-type with elliptical orbits (anti-ICBM).
(ii) *Over-the-Horizon (Backscatter)* radars: 3 (possibly 4), near Minsk, near Nikolayev (Caucasus), and in the Far East; targeted on the US and polar areas.
(iii) *Long-range early-warning radars:* At least 5 reported sites. Mostly *Hen*-series (*e.g. Hen House*), range 6,000 km, covering approaches from the west, north-east, south-east and, possibly, south.
(iv) *Intermediate-range radars: Dog House* and *Cat House*, associated with the Moscow ABM complex, range 3,000 km (new system reported building).
(v) *ABM-associated control radars: Try Add* (with *Galosh*), a new 10-site system, 2,800 km range, believed in service.
(vi) *High-altitude, aircraft-associated radars: Tall King*, 600 km range.
(vii) *Missile-associated short-range radars: Yo-Yo* (with SA-1); *Fan Song, Spoon Rest* (SA-2); *Flat Race, Squat Eye, Low Blow* (SA-3).
(viii) *Gun-associated radars: Fire Can, Flap Wheel*.
Civil Defence: 2 widespread shelter programmes down to city level include some 75 cmd posts within 120 km of Moscow, and accommodation for at least 110,000 officials.

Army: 1,825,000 (perhaps 1,400,000 conscripts).
46 tk divs.
119 motor rifle divs.
8 AB divs (each 3 para regts, arty regt, AA bn).
Front and Army tps:
14 arty divs.
Indep tk regts, arty, SSM, ATK, engr bdes, CW regts, bns, spt services.
Tanks: 45,000 IS-2/-3, T-10, T-10M hy, T-54/-55/-62, 10,000 T-64/-72 med (most fitted for deep wading) and PT-76 lt.
AFV: 62,000 BRDM scout cars: BMP and BMD MICV, BTR-50/-60/-70/-152, OT-64, MT-LB APC. (BTR-50/-60 being replaced by -70 and BMP.)
Artillery: Some 20,000 100mm, 122mm, 130mm, 152mm, and 180mm towed guns/how and 122mm and 152mm SP guns; 7,200 82 mm, 120mm, 160mm, and 240mm mor; 2,700 122mm, 140mm, and 240mm MRL.
ATK: 40mm RPG-7, 73mm RPG-16 RL; SPG-9 73mm RCL; 10,800 76mm, 85mm, 100mm towed and ASU-75/-85 SP ATK guns; AT-2 *Swatter*, AT-3 *Sagger*, AT-4 *Spigot*, AT-5 *Spandrel*, AT-6 *Spiral* ATGW.
AA artillery: 8,000 23mm, 57mm towed, ZSU-23-4 and ZSU-57-2 SP guns.
SAM (mobile systems): SA-4 *Ganef*, SA-6 *Gainful*, SA-7 *Grail*, SA-8 *Gecko*, SA-9 *Gaskin*, SA-11.
SSM (nuclear-capable): about 1,300 launchers (units organic to formations), incl some 680 *FROG* (482 facing NATO area, some 186 in Far East); SS-21 (replacing *FROG*), 540 *Scud* A/B (410 NATO area, 130 Far East), SS-23 (replacing *Scud*), 120 SS-12 (65 NATO area, 55 Far East), to be replaced by SS-22.

DEPLOYMENT:
Central and Eastern Europe: 30 divs (15 tk, 15 motor rifle) plus 1 arty: East Germany, 9 tk, 10 motor rifle, plus 1 arty; Poland, 2 tk; Hungary, 2 tk, 2 motor rifle; Czechoslovakia, 2 tk, 3 motor rifle, 10,500 med tks.[15]
European USSR Military Districts (MD): 67 divs (23 tk, 38 motor rifle, 6 AB), plus 7 arty: Baltic, 3 tk, 5 motor rifle, 2 AB, plus 2 arty; Belorussian, 9 tk, 2 motor rifle, 1 AB, plus 1 arty; Carpathian, 2 tk, 9 motor rifle, plus 1 arty; Kiev, 7 tk, 4 motor rifle, plus 1 arty; Leningrad, 8 motor rifle, 1 AB, plus 1 arty; Moscow, 2 tk, 4 motor rifle, 1 AB; Odessa, 6 motor rifle, 1 AB, plus 1 arty.
Central USSR: 6 divs (1 tk, 5 motor rifle): Ural, 1 tk, 2 motor rifle; Volga, 3 motor rifle.
Southern USSR: 24 divs (1 tk, 21 motor rifle, 2 AB) plus 3 arty: N. Caucasus, 1 tk, 5 motor rifle, plus 1 arty; Trans-Caucasus, 11 motor rifle, 1 AB, plus 1 arty; Turkestan, 5 motor rifle, 1 AB, plus 1 arty.
Sino-Soviet border: 46 divs (6 tk, 40 motor rifle), plus 3 arty: Central Asian, 1 tk, 6 motor rifle. Under High Command Far East: Siberian, 5 motor rifle; Transbaykal, 3 tk, 7 motor rifle, plus 1 arty; Far Eastern, 1 tk, 20 motor rifle, plus 2 arty; Mongolia, 1 tk, 2 motor rifle.
Afghanistan: perhaps 5 motor rifle, 1 AB (parent MD unknown; incl with MD totals above).
Soviet divs have three degrees of combat readiness: Category 1, between three-quarters and full strength, with complete eqpt; Category 2, between half and three-quarters strength;

complete with fighting vehicles; Category 3, about one-quarter strength, possibly complete with fighting vehicles (some obsolescent).

The 30 divs and 1 arty div in Eastern Europe are Category 1. About half those in European USSR and the Far East are in Category 1 or 2.

Most of the divs in Central and Southern USSR are likely to be Category 3. Tk divs in Eastern Europe have some 335 med tks, motor rifle divs up to 266, but elsewhere holdings may be lower.

Navy: 443,000 (some 75% conscripts), incl 59,000 Naval Air Force, 12,000 Naval Infantry, and 8,000 Coastal Artillery and Rocket Troops; 259 cruise-missile and attack subs (99 nuclear, 160 diesel), 294 major surface combat ships. A further 115 attack subs and 25 major surface combat ships are in reserve.

Submarines, cruise-missile: 69:
- 47 nuclear (SSGN): 1 O-class (20 SS-N-19); 1 P-class (10 msl tubes, possibly SS-N-7); 11 C-I, 5 C-II-class (8 SS-N-7 *Siren* each, some C-II may have SS-N-9); 29 E-II (5 with 8 SS-N-12, 24 with 8 SS-N-3a each).
- 22 diesel (SSG): 16 J-class (4 SS-N-3a each), 4 W-*Long Bin* (4 SS-N-3 each); 2 W-*Twin Cylinder* (2 SS-N-3 each) may be trg vessels.

Submarines, Attack: 190:
- 52 nuclear (SSN): 5 A-, 13 N-, 16 V-I-, 6 V-II-, 7 V-III-, 5 E-I-class.
- 138 diesel (SS): 14 T-, 60 F-, 10 R-, 10 Z-IV-, 40 W-, 4 B-class. (More modern A-, V-, T-class may carry some SS-N-16 and or SS-N-15 ASW msls.)

Surface Ships: 294 major combat vessels.
- 2 *Kiev* carriers of 43,000 tons (2 more building) with 4 twin SS-N-12 SSM, 2 twin SA-N-3/-4 SAM, 1 twin SUW-N-1 ASW, 14 Yak-36 *Forger* A/B VTOL ac, 16 Ka-25 *Hormone* A/B hel.
- 2 *Moskva* ASW hel carriers with 2 twin SA-N-3 SAM, twin SUW-N-1 ASW, 18 Ka-25 *Hormone* hel.
- 1 *Kirov* class nuclear msl cruiser (CGN) with 20 SS-N-19 SSM, 10 SA-N-6, 2 twin SA-N-4 SAM, 2 twin SS-N-14 ASW, 2–4 Ka-25 hel.
- 17 GW ASW cruisers (more building): 7 *Kara* with 2 twin SA-N-3, 2 twin SA-N-4 SAM, 2 quad SS-N-14 SSM, 1 hel; 10 *Kresta*-II with 2 twin SA-N-3, 2 quad SS-N-14, 1 hel.
- 8 GW cruisers: 4 *Kresta*-I with 2 twin SS-N-3b SSM, 2 twin SA-N-1 SAM, 4 *Kynda* with 2 quad SS-N-3b, 1 twin SA-N-1.
- 11 *Sverdlov* cruisers: (1 with twin SA-N-2, 2 with twin SA-N-4, 2 with 1 hel).
- 73 destroyers: 7 SSM/SAM (1 *Sovremenny*, 6 mod *Kashin*); 4 *Kildin* SSM; 29 SAM (13 *Kashin*, 8 *Kanin*, 8 SAM *Kotlin*); 32 gun (18 *Kotlin*, 14 *Skory*); 1 *Udaloy* ASW msl with 2 quad SS-N-14 (on trials).
- 180 frigates: 72 GW (30 *Krivak*-I/-II with 1 quad SS-N-14, 2 twin SA-N-4 (more building), 2 *Koni* with twin SA-N-4, 40 *Grisha*-I/-III with twin SA-N-4); 108 gun (6 *Grisha*-II (with KGB), 18 *Mirka*, 48 *Petya*, 36 *Riga*).

834 minor surface combatants:
- 23 GW corvettes: 2 *Tarantul* with 2 twin SS-N-2), 21 *Nanuchka* with 6 SS-N-9, 1 twin SA-N-4.
- 128 FAC(M): 13 hydrofoil (1 *Sarancha* with 2 twin SS-N-9, twin SA-N-1, 12 *Matka* with 2 SS-N-2c); 70 *Osa*-I, 45 *Osa*-II with 4 SS-N-2b).[16]
- 220 FAC(T): 64 *Poti*, 90 *Stenka*, 30 *Shershen*, 1 *Slepen* (trials); 1 *Babochka*, 34 *Turya* hydrofoils.
- 66 patrol craft: 40 SO-1, 6 *Susanin*, 20 T-58.
- 45 coastal patrol craft((mostly KGB): 20 *Pchela* hydrofoils, 25 *Zhuk*.
- 127 ocean minesweepers: 33 *Natya*, 49 *Yurka*, 45 T-43 (11 more are T-43/PFR radar pickets).
- 166 coastal minesweepers: 3 *Andryusha*, 40 *Sonya*, 3 *Zhenya*, 8 *Sasha*, 72 *Vanya*, 40 *Evgenya*(.
- 59 minesweeping boats(: 10 *Ilyusha*, 4 *Olya*, 5 TR-40, 40 K-8.

84 amph ships:
- 1 *Ivan Rogov* with twin SA-N-4, 3 hovercraft (more building); 14 *Alligator*;[16] 12 *Ropucha* LST; 52 *Polnocny*;[16] 5 MP-4 LSM.

Some 85 amph craft:
- Some 35 LCU: 20 *Vydra*, 15 SMB-1.
- 50 hovercraft: 9 *Aist*, 11 *Lebed*(, 30 *Gus*(.

200 principal auxiliary ships of various configurations, 28 fleet replenishment, 28 spt tankers, 96 supply and cargo ships. 18 submarine tenders, 30 repair ships. Civilian sealift, 2,475 ships, could augment these.

58 intelligence collection vessels (AGI); 110 naval, 340 civilian oceanographic, space-associated, and hydrographic research vessels.

Ships in reserve: 10 Z-, 90 W-, 15 Q-class subs; 1 *Sverdlov* cruiser; 12 *Skory* destroyers; 12 *Riga* frigates; 20 T-43 minesweepers.

NAVAL AIR FORCE: (59,000); some 755 combat ac, 245 hel.

Four Fleet Air Forces; organized in air divs, each with 2–3 regts of HQ elements and 2 sqns; recce, ASW, transport organized in independent regiments or squadrons.

Strike bbrs: some 70 Tu-22M *Backfire* B with AS-4 *Kitchen* ASM.

Med bbrs: 310: 240 Tu-16 *Badger* C/G with AS-2 *Kipper*/AS-5 *Kelt*/AS-6 *Kingfish*, 30 Tu-16 *Badger* A, some 40 Tu-22 *Blinder* A.

FGA: 85: 45 Yak-36 *Forger* A/B VTOL, 40 Su-17 *Fitter* C/D.

ASW: 190: some 50 Tu-95 *Bear* F, 50 Il-38 *May*, 90 Be-12 *Mail*.

MR/ECM: 100: some 40 Tu-16 *Badger* D/E/F, 45 Tu-95 *Bear* D, 5 Tu-22 *Blinder* C, 10 An-12 *Cub* C.

Tankers: 70 Tu-16 *Badger*.

ASW hel: 245: 65 Mi-14 *Haze*, 180 Ka-25 *Hormone* A/B.

ASM: AS-2 *Kipper*, AS-4 *Kitchen*, AS-5 *Kelt*, AS-6 *Kingfish*.

220 misc tpts and trainers, and tpt hel.

NAVAL INFANTRY (Marines): (12,000).

5 naval inf regts (each 3 inf, 1 tk bn), one each with Northern, Baltic, and Black Sea Fleets, Marine div of two regts with Pacific Fleet.

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

COAST ARTILLERY AND ROCKET TROOPS: (8,000).

Hy coastal guns, 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):

Northern Fleet: 135 subs (plus 45 SSBN), 82 major, 120 minor surface combatants, 12 amph, 72 principal auxiliary spt, 80 bombers. Severomorsk (HQ), Motovskij Gulf, Polyarny, Severodvinsk, Archangelsk.

Baltic Fleet: 22 subs, 42 major, 294 minor surface combatants, 50 amph, 19 principal auxiliary spt, 120 bombers, Baltiysk (HQ), Kronshtadt, Tallin, Liepaja, Riga.

Black Sea Fleet (incl Caspian Flotilla and Mediterranean Sqn): 22 subs, 84 major, 210 minor surface combatants, 53 amph, 36 principal auxiliary spt. 80 bombers. Sevastopol (HQ), Poti, Odessa.

Pacific Fleet: 80 subs (plus 24 SSBN), 86 major, 210 minor combatants, 54 amph, 73 major auxiliary spt, 330 combat ac incl 100 bombers. Vladivostok (HQ), Petropavlovsk, Sovyetskaya Gavan. Detachments from this fleet serve in the Indian Ocean; facilities also in Vietnam (Da Nang and Cam Ranh Bay); Aden (Socotra) and Ethiopia (Dahlak Is).

Air Force: 475,000.[17]

Tactical Air Force: 195,000; some 5,300 combat aircraft, some 1,100 armed hel.

16 Air Armies of varying strengths (totalling 124 ac regts, and some indep ac sqns), mostly organized in divs of 3 regts (each regt usually of a single ac type in 3 sqns, totalling 45 ac).

FGA: 2,650: some 750 MiG-21 *Fishbed*, 500 MiG-27 *Flogger* D, 165 Su-7 *Fitter* A, 700 Su-17 *Fitter* C/D/H, 480 Su-24 (Su-19) *Fencer*, 50 Yak-28 *Brewer* A/B/C. Sukhoi 'RAM-J' in production.

Fighters: 1,700: 400 MiG-21 *Fishbed* C/D/F, 1,300 MiG-23 *Flogger* B.

Recce: 735: 160 MiG-25 *Foxbat* B/D, 175 MiG-21 *Fishbed* H, 200 Yak-28 *Brewer* D, 200 Su-17 *Fitter* H.

ECM: 40 Yak-28 *Brewer* E.

Hel: Some 3,500: 300 Mi-1/-2 *Hare*/*Hoplite*, 100 Mi-4 *Hound* A, 500 Mi-6 *Hook*, 1,600 Mi-8 *Hip* C/E, 950 Mi-24 *Hind* A/B/C/D/E.

Trainers: Some 1,100 ac; 700 hel.

AAM: AA-1 *Alkali*, AA-2 *Atoll*, AA-7 *Apex*, AA-8 *Aphid*.

ASM: AS-7 *Kerry*, AS-10; hel-borne: AT-2 *Swatter*, AT-6 *Spiral*.

Military Transport Aviation: 125,000; some 1,300 aircraft. Organized in regiments.

Incl some 750 An-12 *Cub*, 125 Il-76 *Candid*, 50 An-22 *Cock* hy. Some 1,400 of the 1,650 civil Aeroflot ac are med-and long-range and could augment military airlift.

DEPLOYMENT:

4 Tactical Air Armies (2,000 ac) in Eastern Europe, 1 in each of 12 MD in the USSR (not in N. Caucasus, Turkestan, Ural, Volga).

Afghanistan: possibly 1 air div: 1 air, 1 hel regt, tpts.

RESERVES (all services):

Soviet conscripts have a Reserve obligation to 50. Total Reserves could be 25,000,000, of which some 5,000,000 have served in last five years.

Soviet forces abroad: Afghanistan, 85,000; Angola, 200; Cuba, 2,600; Ethiopia, 1,000; Iraq, 1,000; Kampuchea, 300; Libya, 1,750; Mali, 200; Mauritania, 200; Mozambique, 400; Seychelles, some 100; Vietnam, 4,500; Syria, 2,500; N. Yemen, 500; S. Yemen, 1,500.

Para-Military Forces: 560,000.

300,000 KGB border troops, 260,000 MVD security troops. Border troops equipped with tks, SP guns, AFV, ac and ships; MVD with tks and AFV. By law part of armed forces of USSR.

Part-time military training organization (DOSAAF) conducts such activities as flight training, shooting, parachuting, and pre-military training of those aged 15 and over in schools, colleges, and workers' centres. Claimed active membership 80 million, with 5 million in instructors and activists; effectives likely to be much fewer.

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[1]Revised outlay requested in President Carter's last budget proposal; Total Obligational Authority for FY 1982 was $196.7 bn, and Budget Authority $195.7 bn. President Reagan has increased the Budget Authority to $226.3 bn, incl Civil Defence spending of $4.1 bn.

[2]Manpower included in Army, Navy, and Air Force totals.

[3]One National Guard bde is incorporated in 2 mech and 2 inf divs.

[4]One armd, 1 mech divs, 1 armd cav regt have hy eqpt stockpiled in FRG.

[5]Excluding ac in SAC and NORAD; incl ac in ANG and Air Force Reserve.

[6]Includes those stockpiled for the Strategic Reserve formations. The armd and 2 mech bdes are from the divs in the US earmarked to reinforce 7th Army.

[7]Marine Amphibious Units are 5–7 amph ships with a composite Marine bn gp incl tks, arty, and hel embarked. Only 1 in Mediterranean and 1 in Pacific are regularly constituted. 1 Bn Landing Team (MAU less hel) also deployed in the Pacific; 1 occasionally formed for the Atlantic.

[8]Excludes some 560,000 Border Guard, internal security, railroad, and construction troops.

[9]Official exchange rate 1979, $1 = 0.657 roubles.

[10]The SRF and *PVO-Strany*, separate services, have their own manpower.

[11]Figures may vary slightly during conversion.

[12]There are 360 SS-19 silos.

[13]As of 1 July 1981. By mid-August 1981 holdings of up to 250 with 1 ready reload were reported.

[14]There are also staging and dispersal points in the Arctic.

[15]Excluding from the area tks in reserve (replaced by new ones but not withdrawn).

[16]Some *Osa*, *Alligator*, and *Polnocny* units are fitted with SA-N-5 SAM.

[17]Excluding *PVO-Strany* and Long-Range Air Force.

SOVIET DEFENCE EXPENDITURE

No single figure for Soviet defence expenditure can be given, since precision is not possible on the basis of present knowledge. The declared Soviet defence budget is thought to exclude a number of elements such as military R&D, stockpiling and civil defence—indeed some contend that it covers only the operating and military construction costs of the armed forces. The problem of arriving at a current budgetary figure was discussed in *The Military Balance 1973–1974*, pp. 8–9, and on pp. 109–110 of the 1976–1977 edition. The official defence budget for 1980 of 17.1 bn roubles equals about 6% of the total government expenditure, or 2.8% of GNP, according to non-Soviet estimates of the latter.

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

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

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

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

SOVIET UNION

Source		Price base	Defence expenditure 1970	1975	1979	1980	1970–1979 % annual growth rate	1970–1979 Burden (% of GNP)
Billions of Roubles								
CIA	(1)	1970	40–45	50–55	58–64	—	4.5	11–13
Lee	(2)	1970	43–49	72–79	99–111	—	8–10	14–15
Lee	(2)	Current	43–49	67–76	—	—	—	—
China	(3)	Current	49	72.5	102	—	8.26	15+
USSR	(4)	Current	17.9	17.4	17.2	17.1	n.a.	n.a.
Britain	(5)	Current	—	—	76–81	81–86	4.0	12–14
Billions of Dollars								
CIA	(6)	1979	131	152	180	185	3	—
CIA	(7)	Current	66–99	105–108	165	—	—	—
Lee	(8)	1970	80–105	97–133	124–162	—	5	—

(1) *Estimated Soviet Defense Spending in Roubles*, CIA SR 78-10121, June 1978.

(2) W. T. Lee, 'Soviet Defense Expenditures in the 10th FYP', *Osteuropa Wirtschaft*, No. 4, 1977; W. T. Lee, *The Estimation of Soviet Defense Expenditures, 1955–75: An Unconventional Approach* (New York: Praeger, 1977).

(3) *Peking Review*, November 1975, January 1976. Extrapolation to 1979 using the Chinese growth rate.

(4) Official declared budget.

(5) *Statement on the Defence Estimates 1981*, HMSO Cmnd 8212, April 1981, p. 4.

(6) *Soviet and US Defense Activities 1970–79: A Dollar Cost Comparison*, CIA SR 80-10005, January 1980. 1970 and 1975 figures taken from diagram.

(7) *Ibid.*: 1979 prices converted to current ones using wholesale price index.

(8) W. T. Lee, 'Soviet Defense Expenditures' in W. Schneider and F. P. Hoeber (eds), *Arms, Men & Military Budgets, Issues for Fiscal Year 1977* (New York: Crane Russak, 1976). 1979 figures by extrapolation.

THE MILITARY BALANCE 1981/82

The Warsaw Pact

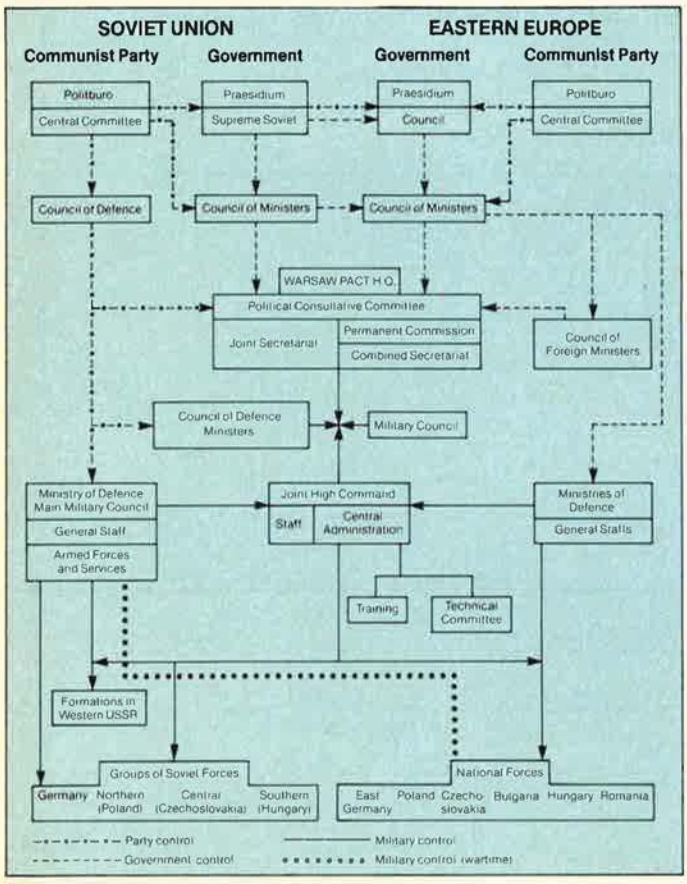
TREATIES

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

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

WARSAW PACT

1. Bulgaria
2. Czechoslovakia
3. German Democratic Republic (East Germany)
4. Hungary
5. Poland
6. Romania



ORGANIZATION

The senior formal political body is the Political Consultative Committee (PCC) which comprises the First Secretaries of the Communist Parties, Heads of Government, or their representatives, the Foreign and the Defence Ministers of all the member countries, the Soviet Chief of General Staff, and the Commander-in-Chief (C-in-C) and Chief of Staff (C of S) of the Pact Joint High Command. Its executive agency is the Joint Secretariat, with representatives from each country, which is responsible for armaments and logistics and for preparing the PCC's agendas. It also has a Permanent Commission responsible for recommendations on general questions of foreign policy. Both are located in Moscow.

The Council of Foreign Ministers advises the PCC on foreign policy, working with the permanent Commission

and the Combined Secretariat. The senior military body is the Council of Defence Ministers. Chaired by the C-in-C, Warsaw Pact, it includes his C of S, the Deputy Ministers of Defence of the Pact nations, Deputy C-in-C, Soviet Air Defence Forces (whose operational area includes Central Europe), and probably the Inspector-General of the Pact and the Chairman of the Technical Committee. This Council meets infrequently to supervise the work of the Permanent Joint High Command (JHC). That Command is headed by a Soviet Marshal, who is also the Soviet First Deputy Minister of Defence. Each Pact Defence Ministry has a senior general as a permanent representative on the JHC staff, while a Soviet general is assigned to each national HQ, except in Romania. The Staff is responsible for operational plans and for managing the Pact field exercises. The Pact military representatives also form the Military Council which, chaired by the C-in-C, and including the C of S, advises the JHC on non-operational matters, and controls the Central Administration for training, standardization, and, possibly, technical affairs. The offices of C-in-C and C of S and all important staff posts have always been held by Soviet officers.

The JHC controls the Soviet Forces in Eastern Europe and Western USSR. The East European Pact armies remain under the national control until war breaks out, when they are expected to come under command of the JHC. Among the Soviet military HQ in the Warsaw Pact area are the Group of Soviet Forces, Germany (GSFG) at Zossen-Wünsdorf near Berlin; the Northern Group of Forces, (NGF) at Legnica, Poland; the Central Group of Forces (CGF) at Milovice, north of Prague; and the Southern Group of Forces (SGF) at Budapest. A Soviet Tactical Air Army is located with each Group of Forces. Command of the air defence system covering the whole Warsaw Pact area, with the probable exception of Romania, is centralized in Moscow and is directed by the C-in-C of the Soviet Air Defence Forces, *Voyska Protivovozdushnoy Oborony Strany (PVO-Strany).*

NUCLEAR WEAPONS

The Soviet Union has deployed short-range surface-to-surface launchers and nuclear-capable aircraft in Eastern Europe. East European countries also have short-range SSM launchers, but there is no evidence that nuclear warheads have been supplied, nor is there any reason to assume so. Soviet longer-range SSM and aircraft are based in the Soviet Union.

BULGARIA

Population: 8,900,000.
Military service: Army and Air Force 2 years, Navy 3 years.
Total regular forces: 149,000 (94,000 conscripts).
Estimated GNP 1980: $37.4 bn.
Defence expenditure 1981: 924 m leva ($1.34 bn).
$1 = 0.69 leva.

Army: 105,000 (70,000 conscripts).
3 Military Districts:
8 motor rifle divs.[1]
5 tk bdes.
3 SSM bdes with *Scud.*
4 arty regts.
3 AA arty regts.
1 mountain bn.
2 recce bns.
Special commando coys.
200 T-34, 1,600 T-54/-55, some 60 T-72 med tks; 290 BRDM-1/-2 scout cars; 1,500 BTR-60, FUG-70, 35 OT-62 APC; 76mm, 85mm, 100mm, 400 122mm, 130mm towed, SU-100 SP guns; 122mm, 100 152mm how; 100 BM-21 122mm MRL; 36 *FROG*-7, 30 *Scud* SSM; 90 57mm ATK guns; 82mm, 350 120mm, 160mm mor; 150 SPG-9 73mm, B-10 82mm RCL; *Sagger, Snapper* ATGW; 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4 SP AA guns; SA-6/-7 SAM.

RESERVES: 200,000.

Navy: 10,000 (6,000 conscripts); 12 combat hel.
4 ex-Sov subs: 2 R-, 2 W-class.
2 *Riga* frigates.
3 *Poti* corvettes.
8 patrol craft: 6 SO-1,[2] 2 *Kronshtadt.*
4 FAC(M) (3 *Osa*-I, 1 *Osa*-II) with *Styx* SSM.
14 FAC(T): 6 *Shershen*, 8 P-4⟨.
28 MCM vessels: 2 T-43 ocean, 4 *Vanya* coastal, 18 PO-2,[2] 4 *Yevgenya*⟨ inshore.
18 *Vydra* LCU, 9 MFP D-3 landing craft.
1 underway replenishment ship.
2 hel sqns: 1 ASW with 12 Mi-14 *Haze;* 1 SAR with 6 Mi-2, 6 Mi-4.
2 coastal arty regts (1,000): 20 btys; 100mm, 150mm guns.
2 indep *Samlet* SSM bns.
3 Naval Guard coys.

Bases: Varna, Burgas, Sozopol, Atiya.

RESERVES: 20,000.

Air Force: 34,000 (18,000 conscripts); some 248 combat ac, some 12 armed hel.
1 air division: 3 combat regts:
6 FGA sqns with 64 MiG-17, some 20 MiG-23.
8 interceptor sqns: 6 with 80 MiG-21; 2 with 60 MiG-17.
2 recce sqns with 24 MiG-17.
1 tpt regt with 10 Il-14, 4 An-24, 2 Tu-134, 9 An-2.
1 hel regt with 30 Mi-2, 40 Mi-4/-8, 12 Mi-24, 12 Ka-26.
Trg ac incl 80 L-29, Yak-11/-18, 30 MiG-15UTI.
AAM: AA-1 *Alkali*, AA-2 *Atoll.*
1 para regt.
1 air defence division: 3 air defence zones: Some 22 SAM sites with 150 SA-2/-3.

RESERVES: 20,000.

Para-Military Forces: 15,000 Ministry of Interior border guards, 16 bdes; 10,000 security police; 150,000 People's Territorial Militia; 'Voluntary Organization for Co-operation in National Defence'.[3]

CZECHOSLOVAKIA

Population: 15,400,000.
Military service: Army 2 years, Air Force 3 years.
Total regular forces: 194,000 (117,000 conscripts).
Estimated GNP 1980: $92 bn.
Defence expenditure 1980: 22.4 bn koruny ($3.52 bn).
$1 = 6.36 koruny.

Army: 140,000 (100,000 conscripts).
2 Military Districts:

The MiG-21, first flown in 1955, continues to perform an assortment of roles within the Soviet and Warsaw Pact air forces. Here, a Czechoslovakian Fishbed-J.

[1] See p. 65 for all footnotes.

Designed primarily for cargo transport, the USSR's An-26 can be readily adapted to haul passengers or casualties. The Antonov-developed aircraft, designated "Cub" by NATO, also serves in the air forces of Cuba, Hungary, Poland, Romania, and Peru.

5 armd divs (2 at Category 2 status).[1]
5 motor rifle divs.[1]
1 arty div: 2 arty, 2 AA, 3 *Scud* SSM bdes, 2 ATK regts (6 bns).
1 AB bde.
6 engr bdes.
3,400 T-54/-55, 20 T-72 med tks; 680 OT-65, BRDM scout cars; 650 BMP MICV, 3,000 OT-62/-64/-810 and *TOPAZ* (BTR-50) APC; 85mm, 150 100mm, 400 122mm, 50 130mm guns; 230 152mm SP how (incl truck-mounted); 150 RM-70 122mm, 120 M-51 130mm MRL; 40 *FROG*, 27 *Scud* SSM; 81mm mor; 125 82 mm RCL; 150 AT-4 *Spigot*, *Sagger* ATGW; 500 57mm towed, M-53/-59 30mm AA guns; SA-4/-6/-7 SAM.

RESERVES: 295,000 (liability to age 50).

Air Force: 54,000 (17,000 conscripts); 471 combat ac, some 12 armed hel.
2 air armies: 3 air divs: 15 combat regts:
14 FGA sqns: 6 with 80 Su-7BM/U; 1 with 12 MiG-23, 3 with 42 MiG-21/-21U; 3 with 30 MiG-15.
18 interceptor sqns with 252 MiG-21/-21U/-23.
3 recce sqns: 1 with 25 MiG-21RF; 2 with 30 L-29/-39.
2 tpt regts with 6 An-24, 40 Il-14, 1 Tu-134, LET L-410M, Tu-154B.
1 hel regt, 3 indep hel sqns with Mi-1/-2, 70 Mi-4, 20 Mi-8, 12 Mi-24.
Trg ac incl 150 L-29, 24 L-39, Zlin 326.
AAM; AA-2 *Atoll*.
3 air defence divs:
6 SAM regts: some 30 sites with 200 SA-2/-3.

RESERVES: 30,000.

Para-Military Forces: 11,000 border troops: 7 bdes, 28 bns, some AFV, ATK guns; 24,000 Interior Guard; 2,500 Civil Defence Troops; about 120,000 part-time People's Militia. 'Association for Co-operation with the Army'.[3]

GERMAN DEMOCRATIC REPUBLIC

Population: 16,750,000.
Military service: Army, Border Guard 18 months; Navy and Air Force 24 months.
Total regular forces: 167,000 (92,000 conscripts).
Estimated GNP 1980: $106 bn.
Defence expenditure 1981: 14.1 bn ostmarks ($6.96 bn).
$1 = 2.03 ostmarks.

Army: 113,000 (67,000 conscripts).
2 Military Districts, 2 Army HQ:
2 tk divs (each 3 tk, 1 motor rifle regts).[1]
4 motor rifle divs (each 1 tk, 3 motor rifle regts).
2 SSM bdes with *Scud*.
2 arty regts.
2 AA regts with 57mm, 100mm guns.
2 AD regts with SA-4 SAM.
3 sigs regts.
1 engr regt and 2 engr bns.
1 railway construction regt.
2 ATK bns.
2 AB bns.
About 1,500 T-54/-55, T-72 med tks (1,600 more tks in storage); 880 BRDM-1/-2 and FUG-70 scout cars; 700 BMP MICV, 1,000 BTR-50P/-60P/-152 APC; 335 122mm, 100 130mm, 72 152mm, guns/how, incl M-1973 152mm SP; 108 RM-70 122mm MRL; 24 *FROG*-7, 18 *Scud* B SSM; 250 120mm mor; 120 100mm ATK guns; AT-3 *Sagger*, AT-4 *Spigot* ATGW; 48 57mm, 48 100mm towed, 96 ZSU-23-4 SP AA guns; SA-4/-6/-7/-9 SAM.

RESERVES: 250,000.

Navy: 16,000 (10,000 conscripts).
3 sqns.
2 *Rostock* frigates (ex-Sov *Koni*).
1 *Koralle* corvette (more building).
12 *Hai* large patrol craft.
15 *Osa*-I FAC(M) with *Styx* SSM.
49 FAC(T): 18 *Shershen*, 31 *Libelle*(.
50 coastal minesweepers: 14 *Kondor*-I, 36-II.
12 *Frosch* LST.
2 *Kondor*-I intelligence collection vessels (AGI).
8 supply ships and tankers, incl 2 modified *Frosch* lt tpts.
1 hel sqn with 8 Mi-4, 5 Mi-8.
Coastal Frontier Brigade (3,000): 12 inf, arty bns, 8 boat sqns; 18 vessels, 152mm guns, *Samlet* SSM.

Bases: Peenemünde, Rostock/Warnemünde, Sassnitz, Wolgast, Tarnewitz.

RESERVES: 25,000.

Air Force: 38,000 (15,000 conscripts); 359 combat ac, 5 armed hel.
2 air divs:
4 FGA sqns: 3 with 35 MiG-17; 1 with 12 MiG-23.
1 recce sqn with 12 MiG-21.
Air Defence Command:
2 air divs:
6 AD regts: 18 sqns with 300 MiG-21F/MF/FL/R/U/-23.
7 SAM regts, some 30 sites with 200 SA-2/-3.
2 radar regts.
1 tpt regt: 3 tpt sqns with 20 Il-14, 15 Tu-134, An-2, An-14.
2 hel regts: 6 hel sqns with 40 Mi-2/-4, 70 Mi-8, 15 Mi-24.
Trg ac incl Yak-11, L-29/-39, Zlin 226, MiG-15UTI.
AAM: AA-2 *Atoll*. ASM: AT-3 *Sagger* ATGW.

RESERVES: 30,000.

Forces abroad: Algeria; Angola (800); *Ethiopia; Libya* (1,600); *Mozambique; S. Yemen* (100); *Syria*.

Para-Military Forces: 70,200. 46,500 border guards: 18 border, 2 indep, 1 special, 6 trg regts with some 66 bns, 1 boat sqn with 24 patrol craft. 1 MFS Guard (Berlin) regt (6,200): 4 motor rifle, 1 hy, 1 trg bns; FUG-70 AFV, 85mm, 100mm ATK, 120mm mor, ZU-23 AA guns, hel. 17,500 security troops: 21 bns; APC, 82mm mor. Workers' Militia: 15,000 combat groups; AFV, APC, 76mm ATK, 82mm, 20mm mor, 23mm, 37mm AA guns. 'Sport and Technology Association': 450,000 (75% active); 1 central and 14 regional gps, small arms.[3]

HUNGARY

Population: 10,740,000.
Military service (incl Border Guard): 18 months.
Total regular forces: 101,000 (58,000 conscripts).
Estimated GNP 1980: $46 bn.
Defence expenditure 1981: 19.06 bn forints ($1.24 bn).
$1 = 15.37 forints.

Army: 80,000 (50,000 conscripts) incl Danube Flotilla.
1 tk div.[1]
5 motor rifle divs.[1]
1 arty, 1 AA arty, 1 SAM regts, 1 SSM bde with *Scud*.
1 AB bn.
About 1,200 T-54/-55, 30 T-72 med, 100 PT-76 lt tks; 60 BMP-1 MICV; about 300 BRDM and some 400 FUG-65 scout cars; 1,400 PSzH (FUG-70) APC; 250 122mm, 18 122mm SP how; 100 152mm gun/how; 50 BM-21 122mm MRL; 24 *FROG*, 12 *Scud* SSM; 300 82mm, 100 120mm mor; 150 SPG-9 73mm, 107mm RCL; 150 85mm, 100mm ATK guns; 100 *Sagger*, *Snapper* ATGW; 150 57mm towed, 50 ZSU-23-4 and ZSU-57-

2 SP AA guns; 50 SA-6, 300 SA-7, 50 SA-9 SAM.
Danube Flotilla (part of Army): 700.
10 100-ton patrol craft, some river MCM, 5 small landing craft, some small tp tpts.

Air Force: 21,000 (8,000 conscripts); 130 combat ac, 12 armed hel.
1 air div:
2 AD fighter regts: 6 interceptor sqns with 115 MiG-21/F/PF/U, 15 MiG-23.
1 tpt regt: 2 tpt sqns with 24 An-2/-24/-26, Il-14, 2 Tu-134.
1 hel regt: 3 hel sqns: 1 with 35 Mi-4/-8, 1 with 12 Mi-24, 1 with 12 Ka-26.
Trg ac incl Yak-11/-18, L-29, MiG-15UTI.
AAM: AA-2 *Atoll*.
1 AD div:
3 SAM regts, some 20 sites with 120 SA-2/-3.

RESERVES (all services): 143,000.

Para-Military Forces: 15,000 border guards (11,000 conscripts): 11 districts. 60,000 part-time Workers' Militia. 'Sport Association for National Defence'.[3]

POLAND

Population: 35,900,000.
Military service: Army, internal security forces, Air Force 2 years; Navy, special services 3 years.
Total regular forces: 319,500 (187,000 conscripts).
Estimated GNP 1980: $155 bn.
Defence expenditure 1980: 70.4 bn zloty ($4.67 bn).
$1 = 13.9 zloty.

Army: 210,000 (154,000 conscripts).
3 Military Districts.
5 armd divs.[1]
8 mech divs.[1]
1 AB div.[1]
1 amph assault div.[1]
3 arty bdes, 1 arty regt, 5 AA arty regts.
3 ATK regts.
1 SAM bde with SA-4.
4 SSM bdes with *Scud*.
3,400 T-54/-55, 30 T-72 med, 130 PT-76 lt tks; 2,000 OT-65 and BRDM-1/-2 scout cars; 5,500 BMP-1, OT-62/-64 APC; 400 76mm, 100mm, 122mm guns; 122mm incl SP, 250 152mm guns/how; 250 BM-21 122mm, 140mm, 240mm MRL; 51 *FROG*-3/-7, 36 *Scud* SSM; 680 57mm, 85mm towed, ASU-85 SP ATK guns; 600 82mm, 120mm mor; 73mm, 82mm, 107mm RCL; *Snapper*, AT-4 *Spigot*, *Sagger* ATGW; 400 23mm, 57mm, 85mm and 100mm towed, 100 ZSU-23-4 SP AA guns; SA-4/-6/-7/-9 SAM.

Forces Abroad: Syria (UNDOF): 129.

Navy: 22,500 (6,000 conscripts).
4 W-class submarines.
1 *Kotlin* destroyer with twin *Goa* SAM.
13 *Osa* FAC(M) with *Styx* SSM.
17 FAC(T): 4 *Pilica*, 10 *Wisla*(, 3 P-6(.
23 large patrol craft: 13 *Obluze*, 1 *Oksywie*, 9 *Gdansk* (some coastguard).
23 ocean minesweepers: 12 *Krogulec*, 11 T-43.
25 K-8 minesweeping boats.
23 *Polnocny* LCT, 4 *Marabut* LCM, 15 *Eichstaden* LCA.
3 intelligence vessels (AGI): 1 B-10, 2 *Moma*.
1 Naval Aviation Div (52 combat aircraft):
1 attack regt: 3 sqns with 42 MiG-17.
1 recce sqn with 10 Il-28.
1 hel regt: 2 sqns with 25 Mi-2/-4/-8.
SSM: *Styx*/*Samlet*.

Bases: Gydnia, Hel, Swinoujscie, Kolobrzeg, Ustka.

Air Force: 87,000 (27,000 conscripts); 705 combat ac, 5 armed hel.
4 air divs:
3 FGA regts: 18 FGA sqns: 3 with 35 Su-7/-7U; 3 with 35 Su-20; 12 with 150 MiG-17.
10 AD regts: 33 AD sqns with some 430 MiG-17/-21/-21U.
6 recce sqns with 35 MiG-21RF, 5 Il-28, 15 LIM-6.
2 tpt regts with 9 An-2, An-12, 12 An-26, 12 Il-14.
1 comms/liaison sqn with 2 Tu-134A, 5 Yak-40, Il-18 ac; 4 Mi-8 hel.
3 hel regts with 165 Mi-1/-2, 5 Mi-4, 22 Mi-8, 5 Mi-24.
300 trainers: TS-8, TS-11, MiG-15/-21UTI, Su-7U.
AAM: AA-1 *Alkali*, AA-2 *Atoll*.
3 AD divs:
9 SAM regts, some 50 sites, 300 SA-2/-3.

RESERVES (all services): 605,000.

Para-Military Forces: 72,000. 16,000 border troops (Ministry of Interior): 12 bdes, some 34 coastguard patrol craft. 56,000 internal defence troops: tks, AFV, ATK guns. 350,000 Citizen's Militia, 'League for National Defence' (some 200,000 active).[3]

Initially a two-seat primary and advanced trainer, Poland's TS-11 Iskra has also been produced in light attack and reconnaissance versions.

ROMANIA

Population: 22,310,000.
Military service: Army and Air Force 16 months, Navy 2 years.
Total regular forces: 184,500 (110,000 conscripts).
Estimated GNP 1980: $104 bn.
Defence expenditure 1981: 10.4 bn lei ($1.35 bn).
$1 = 7.7 lei.

Army: 140,000 (95,000 conscripts).
3 Military Districts:
2 tk divs.[1]
8 motor rifle divs.[1]
3 mountain bdes.
2 arty bdes, 3 arty, 2 AA arty, 3 ATK regts.
2 *Scud* SSM bdes.
1 AB regt.
200 T-34, 1,600 T-54/-55/-72, some M-77 med tks; 600 BRDM-1/-2 scout cars; 2,000 BTR-50/-60, TAB-70/-72 (BTR-60), OT-810 APC; 150 76mm, 50 85mm, 100mm and 130 SU-100 SP guns; 600 122mm, 150 152mm guns/how; 122mm, 150 130mm MRL; 30 *FROG*, 20 *Scud* SSM; 57mm ATK guns; 1,000 82mm, 200 120mm mor; 73mm, 260 76mm and 82mm RCL; 120 *Sagger*, *Snapper* ATGW; 400 30mm, 37mm, 250 57mm, 85mm, 100mm AA guns; SA-6/-7 SAM.

Navy: 10,500 (5,000 conscripts).
Black Sea Fleet, Danube Sqn, Coastal Defence
3 *Poti* corvettes.
5 *Osa* FAC(M) with *Styx* SSM.
3 *Kronshtadt* large patrol craft.
19 ex-Ch *Shanghai* FAC(G/P/ASW).
25 FAC(T): 19 ex-Ch *Huchwan* hydrofoils, 6 ex-Sov P4(.
46 river patrol craft (monitor [gun vessel] building).
14 minesweepers (4 ex-GDR M-40 coastal, 10 ex-Sov T-301 inshore); 8 ex-Pol TR-40, 8 VD-141 minesweeping boats(.
4 Mi-4 SAR hel.
Coastal Defence (2,000): HQ Constanta, 4 sectors: 18 arty btys with some 108 130mm, 150mm, 152mm guns. Observer Post tps, naval engineers. Would get 2 regts of naval inf on mobilization.

Bases: Mangalia, Constanta; Breila, Galati, Giurgiu, Sulina, Tulcea (Danube).

Air Force: 34,000 (10,000 conscripts); 328 combat aircraft.
2 air divs: 4 combat regts:
6 FGA sqns with 70 MiG-17.
12 interceptor sqns with 240 MiG-21F/PF/U/-23.
1 recce sqn with 18 Il-28.
1 tpt regt with 3 Il-14, 4 Il-18, 1 Il-62, 10 An-24, 6 An-26, 5 Li-2, 1 Boeing 707.
1 hel regt: 10 Mi-4, 25 Mi-8, 45 IAR-316B (*Alouette* III), 15 IAR-330 (*Puma*).
Trg ac: 50 L-29, 50 MiG-15UTI.
AAM: AA-2 *Atoll*.
1 AD div with 108 SA-2 at some 18 SAM sites.
(On order: 23 IAR-93 *Orao*).

RESERVES (all services): 300,000.

Para-Military Forces: 37,000: 17,000 border guards; 12 bdes. 20,000 Ministry of Defence security troops with AFV, ATK guns. Some 900,000 Patriotic Guard. 'Voluntary Sports Association'.[3]

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

[2] May be non-operational.

[3] These 'voluntary' organizations correspond to the DOSAAF organization in the Soviet Union.

The North Atlantic Treaty

TREATIES

The Brussels Treaty of 1948 commits its signatories—Belgium, Britain, France, Luxembourg, and the Netherlands—to give one another 'all the military and other aid and assistance in their power' if one is the subject of 'armed aggression in Europe'. The Treaty's duration is 50 years.

The North Atlantic Treaty was signed in 1949 by Belgium, Britain, Canada, Denmark, France, Iceland, Italy, Luxembourg, the Netherlands, Norway, Portugal, and the United States; Greece and Turkey joined in 1952, and West Germany in 1955. The Treaty unites Western Europe and North America in a commitment to consult together if the security of any one member is threatened, and to consider an armed attack against one as an attack against all, to be met by such action as each of them deems necessary, 'including the use of armed force, to restore and maintain the security of the North Atlantic area'. The Paris Agreements of 1954 added a Protocol aimed at strengthening the NATO structure and revised the Brussels Treaty, to enable West Germany and Italy to join it. The Treaty had no date of termination. France withdrew from the military organization in 1966; Greece, which left in 1974, has now rejoined it. A 1969 amendment requires members to give one year's notice of their intention to withdraw from it.

The US also maintains a number of important bilateral treaties with NATO and non-NATO European countries covering the stationing of US forces in Europe and the American use of bases and facilities. Iceland, Italy, Norway, Portugal, and Turkey are among those which have such ties. Norway and the US reached agreement over pre-positioning military stores in January 1981. The US–Turkish Treaty was revised in 1980.

THE NORTH ATLANTIC TREATY ORGANIZATION

1. Belgium
2. Britain
3. Canada (not included in map)
4. Denmark
5. France
6. Germany: Federal Republic (West Germany)
7. Greece
8. Italy
9. Luxembourg
10. Netherlands
11. Norway
12. Portugal
13. Turkey

ORGANIZATION

The Organization of the Alliance is known as NATO. Its governing body is the North Atlantic Council, with its headquarters in Brussels, which consists of representatives from the fifteen member countries—usually the Foreign Ministers, who normally meet twice a year, and permanent ambassadors representing each government, who meet at least weekly. The Council has a President, appointed annually from each member nation in alphabetical order. The Secretary General is a permanent appointment; he is Chairman of the Council. With the International Staff, he advises the Council and its Committees on political, military, financial, economic, and scientific aspects of defence planning.

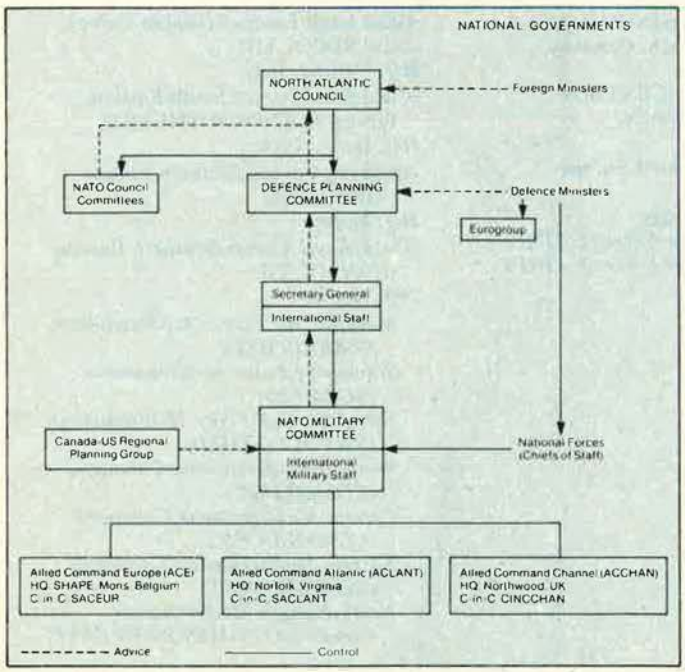
The Council controls a number of specialist Committees. Their recommendations or decisions represent the collective views of the member governments. They include: Political Affairs, Defence Review, Armaments, Civil Emergency Planning, Pipelines, European Air Space, the Nuclear Affairs Defence Council (NADC; formed 1966, and comprising all members except France, Iceland, and Luxembourg), and the Nuclear Planning Group (NPG; also formed 1966, and comprising all members except France and Iceland) which is responsible for the detailed work required as the basis for nuclear policy. The Council meets twice a year at the deputy minister level and more often at the ambassadorial and staff levels. Military policy is the responsibility

of the Defence Planning Committee (DPC), composed of representatives of the member nations.

The Eurogroup, an informal advisory body of the West European Alliance members (except France and Iceland), was set up in 1968. It has produced the European Defence Improvement Programme (EDIP, 1970) and the Independent European Programme Group (IEPG, 1976) and agreements on principles of co-operation in the fields of armaments (1972), training (1973), logistics (1975), battlefield communications, and procurement. It meets frequently to discuss and to recommend improvements in European defences.

The International Staff comprises the Offices of the Secretary General, of the Executive Secretary, of Security, of Management, and of the Financial Controller, and five Divisions, each under an Assistant Secretary General. These are: Political Affairs; Defence Planning and Policy; Defence Support; Infrastructure, Logistics, and Council Operations; and Scientific and Environmental Affairs. Of these, Defence Planning and Policy and Defence Support are the most directly involved in defence matters. Planning and Policy provides analysis and planning in the fields of force structures, nuclear and civil emergencies. Defence Support deals with armaments research, development, production and procurement; air defence systems; and command control and communications. Its particular responsibility is the NATO Air Defence Ground Environment System (NADGE).

The highest military authority in the Alliance is the Military Committee. It comprises the Chiefs-of-Staff of all member countries except France, which maintains a liaison staff, and Iceland, which has no military forces. The Chiefs appoint Military Representatives who are in permanent session at NATO HQ in Brussels. The Committee has a President, who changes annually and is provided by member countries in alphabetical order, and a Chairman, elected for a two- to three-year term, who is the Committee's representative on the Council. The Committee makes recommendations to the Council and Defence Planning Committee on military questions and advises Allied Commanders and subordinate military authorities. The Committee controls a number of agencies through the International Military Staff (IMS).



The Treaty covers all member countries in Europe and North America, Turkey in Asia Minor, the islands under the jurisdiction of any member in the North Atlantic area north of the Tropic of Cancer, and any Allied military presence in that area or in the Mediterranean. The area is divided among three Allied Commands: Europe, Atlantic, and Channel, which are further subdivided. The accompanying tables show this division and the subordinate Commands. The defences of North America are developed by the joint Canada–US Planning Group. Strategic nuclear forces are outside NATO command, but Europe and Atlantic Commands participate in the US Joint Strategic Planning System. The Supreme Allied Commander Europe (SACEUR) exercises planning control over a small number of US and all the British ballistic missile submarines. The Supreme Allied Commander Atlantic (SACLANT) has control over a larger US SSBN contingent.

(I) Allied Command Europe (ACE—European area, less Britain, France, Iceland, and Portugal), with its HQ (Supreme Headquarters Allied Powers Europe, or SHAPE), prepares defence plans for the area and, in wartime, would control all land, sea, and air operations including the air defence of Britain. Internal defence, including coastal waters, remains a national responsibility. National authorities maintain a representative at SHAPE.

The European Command has some 6,000 tactical nuclear warheads in its area. The number of delivery vehicles (aircraft, missiles, and howitzers) is over 3,000, spread among all countries excluding Luxembourg. The nuclear explosives, however, are maintained in American custody, with the exceptions of certain British weapons and of French tactical nuclear weapons, which are only held in France. Norway and Denmark do not permit nuclear weapons on their soil in peacetime. There is a large number of low-yield weapons, but the average yield of bombs is about 100 kilotons and that of missile warheads 20 kilotons.

About 66 division-equivalents are earmarked for assignment, or assigned, to SACEUR in peacetime. The Command also has some 3,400 tactical aircraft, based on about 200 standard NATO airfields, backed up by a system of jointly financed storage depots, fuel pipelines, and signal communications. Most land and air forces stationed in the Command are assigned to SACEUR, while naval forces are normally earmarked. A 1978 decision to deploy an integrated force of early warning and control system (AWACS) aircraft has led to the formation of NATO Early Warning Command (NAEW Comd), and delivery of the aircraft, with which the British *Nimrod* AEW aircraft will be compatible, is beginning.

The 2nd French Corps of three divisions (which is not integrated in NATO forces) is stationed in Germany under a status agreement reached between the French and German Governments. Co-operation with NATO forces and commands has been agreed between the commanders concerned.

(a) Allied Forces Central Europe (AFCENT) has command of both the land forces and the air forces in the Central European Sector. These forces include 26 divisions, and about 2,200 tactical aircraft. Northern Army Group (NORTHAG), responsible for the sector north of the Göttingen-Liège axis, includes the Belgian, British, and Dutch divisions and four German divisions and is supported by 2nd Allied Tactical Air Force (2 ATAF), composed of Belgian, British, Dutch, and German units and one American brigade. American forces, seven German divisions, and the Canadian brigade group are under Central Army Group (CENTAG), supported by 4 ATAF, which includes American, German, and Canadian units and an American Army Air Defense Command. Allied Air Forces, Central Europe (AAFCE) was set up in 1974 to provide centralized control of air forces in the sector.

(b) Allied Forces Northern Europe (AFNORTH) is responsible for the defence of Denmark, Norway, Schleswig-Holstein, and the Baltic approaches. Most of the Danish and Norwegian land, sea, and tactical air forces are earmarked for it, and most of their active reserves assigned to it. Germany has assigned it one division, two combat air wings, and her Baltic fleet. Apart from exercises and some small units, US naval forces do not normally operate in this area. Some Allied equipment is pre-positioned in Norway.

(c) Allied Forces Southern Europe (AFSOUTH) is intended to deter aggression, to safeguard the sea lanes of communication in the Mediterranean, and to defend the territorial integrity of Greece, Italy, and Turkey. It is responsible for the air defence of the Southern Region in peace and war and for naval operations in the Mediterranean and Black Seas. The ground defence system is based upon two separate commands: the Southern (LANDSOUTH), comprising Italy and its approaches, and South-eastern (LANDSOUTHEAST), covering Turkey. There is also an overall air command (AIRSOUTH), and there are two naval commands (NAVSOUTH and STRIKEFORSOUTH) responsible to AFSOUTH. Ground forces include 22 division-equivalents from Turkey, 8 from Italy, and 13 from Greece, as well as the tactical air forces of these countries. Other forces have been earmarked, as have the US Navy's Sixth Fleet and naval forces from Greece, Italy, and Turkey.

Maritime patrol aircraft from Southern Region nations and the United States operate in the Mediterranean, coordinated by Maritime Air Forces Mediterranean (MARAIRMED), a functional command of NAVSOUTH; French aircraft participate. Submarine Force Mediterranean (SUBMED), another functional command of NAVSOUTH, is responsible for the conduct of submarine operations throughout the Mediterranean.

The Allied Naval On Call Force Mediterranean (NAVOCFORMED) consists of a ship from each of the allied powers concerned with the Southern Region, including the United Kingdom and the United States, and is normally activated twice each year for a month.

(d) ACE Mobile Force (AMF), has been formed with particular reference to the northern and south-eastern flanks. Provided by seven countries, it comprises seven infantry battalion groups, an armoured reconnaissance squadron, six artillery batteries, helicopter detachments, and ground-support fighter squadrons, but has no air transport of its own. The composition of the Force varies depending on the flank to which it is to be deployed. Approximately half of the forces listed are declared for each flank.

(II) ALLIED COMMAND ATLANTIC (ACLANT) is responsible for the North Atlantic area from the North Pole to the Tropic of Cancer, including Portuguese coastal wa-

ALLIED COMMAND EUROPE

Allied Forces Northern Europe (AFNORTH)
HQ: Kolsaas, Norway
- Allied Forces North Norway (COMNOR)
  HQ: Bodö
- Allied Forces South Norway (COMSONOR)
  HQ: Oslo
- Allied Forces Baltic Approaches (BALTAP)
  HQ: Karup, Denmark

Allied Command Europe Mobile Force (AMF)
HQ: Seckenheim, Germany

United Kingdom Air Forces Command (UKAIR)
HQ: High Wycombe, UK

NATO Early Warning Command (NAEW Comd)
HQ: Maisières, Belgium

Allied Forces Central Europe (AFCENT)
HQ: Brunssum, Netherlands
- Northern Army Group (NORTHAG)
  HQ: München-Gladbach, Germany
- Central Army Group (CENTAG)
  HQ: Seckenheim, Germany
- Allied Air Forces Central Europe (AAFCE)
  HQ: Ramstein, Germany
  - *2 Allied Tactical Air Force (2 ATAF)*
  - *4 Allied Tactical Air Force (4 ATAF)*

Allied Forces Southern Europe (AFSOUTH)
HQ: Naples, Italy
- Allied Land Forces Southern Europe (LANDSOUTH)
  HQ: Verona, Italy
- Allied Land Forces South-Eastern Europe (LANDSOUTHEAST)
  HQ: Izmir, Turkey
- Allied Air Forces Southern Europe (AIRSOUTH)
  HQ: Naples
- Allied Naval Forces Southern Europe (NAVSOUTH)
  HQ: Naples
  - *Maritime Air Forces Mediterranean (MARAIRMED)*
  - *Submarine Force Mediterranean (SUBMED)*
  - *Naval On Call Force Mediterranean (NAVOCFORMED)*
  - *Western Mediterranean Command (COMMEDOC)*
  - *Central Mediterranean Command (COMMEDCENT)*
  - *Eastern Mediterranean Command (COMMEDEAST)*
  - *North-Eastern Mediterranean Command (COMMEDNOREAST)*

ALLIED COMMAND ATLANTIC

Western Atlantic Command (WESTLANT)
HQ: Norfolk, Virginia
Submarine Force Western Atlantic Area
Ocean Sub-Area
Canadian Atlantic Sub-Area
Bermuda Island Command
Azores Island Command
Greenland Island Command

Submarines Allied Command Atlantic
HQ: Norfolk, Virginia

Eastern Atlantic Command (EASTLANT)
HQ: Northwood, UK
Maritime Air Eastern Atlantic Area
Northern Sub-Area
Maritime Air Northern Sub-Area
Central Sub-Area
Maritime Air Central Sub-Area
Submarine Force Eastern Atlantic Area
Iceland Island Command
Faeroes Island Command

Standing Naval Force Atlantic (STANAVFORLANT)
HQ: Afloat

Striking Fleet Atlantic Command
HQ: Afloat
Carrier Striking Force
Carrier Striking Groups One and Two

Iberian Atlantic Command (IBERLANT)
HQ: Lisbon, Portugal

ters. In the event of war, its duties are to participate in the strategic strike and to protect sea communications. There are no forces assigned to the command in peacetime except Standing Naval Force Atlantic (STANAVFORLANT), which normally consists, at any one time, of four destroyer-type ships. However, for training purposes and in the event of war, forces which are predominantly naval are earmarked for assignment by Britain, Canada, Denmark, Germany, the Netherlands, Portugal, and the United States. There are six subordinate commands: Western Atlantic, Eastern Atlantic, Iberian Atlantic, Striking Fleet Atlantic, Submarine Command, and STANAVFORLANT. The nucleus of the Striking Fleet Atlantic has been provided by the United States Second Fleet with some five attack carrier groups; carrier-based aircraft share the nuclear strike role with missile-firing submarines.

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

COMMANDERS

Unlike the Warsaw Pact, high command of NATO forces is not restricted to one nation. Senior commanders reflect the major contributing components of the force. SACEUR and SACLANT have always been American Officers, and the Commander-in-Chief Channel (CINCCHAN), one of the two Deputies to SACEUR and the Deputy SACLANT, British; the other Deputy to SACEUR is German. SACEUR is also Commander-in-Chief of the United States Forces in Europe (CINCUSEUR). AFCENT is commanded by a German general, AFNORTH by a British general, and AFSOUTH by an American admiral, with LANDSOUTH and LANDSOUTHEAST under Italian and Turkish commanders respectively, and MARAIRMED and SUBMED under American rear-admirals.

ALLIED COMMAND CHANNEL

Plymouth Channel Command (PLYMCHAN)
HQ: Plymouth, UK
Maritime Air PLYMCHAN

Standing Naval Force Channel (Mine Counter-Measures) (STANAVFORCHAN)
HQ: Afloat

Nore Channel Command (NORECHAN)
HQ: Rosyth, UK
Maritime Air NORECHAN

Benelux Channel Command (BENCHAN)
HQ: Walcheren, Netherlands

Allied Maritime Air Force Channel Command (COMMAIRCHAN)
HQ: Northwood, UK

BELGIUM

Population: 9,903,000.
Military service: 8 or 10 months.[1]
Total armed forces: 89,500 (3,400 women; 24,600 conscripts).
Estimated GDP 1980: $114.84 bn.
Defence expenditure (NATO and national definition): 121.76 bn francs ($3.56 bn).
$1 = 34.2 francs (1981), 30.46 francs (1980).

Army: 65,000 (incl Medical Service; 20,000 conscripts).
1 corps HQ, 1 div HQ.
1 armd bde.
3 mech inf bdes.
1 para-cdo regt.
3 recce bns.
2 mot inf bns.
3 arty bns.
1 SSM bn with 4 *Lance*.
2 SAM bns with 36 *HAWK*.
5 engr bns (3 fd, 1 bridge, 1 eqpt).
4 aviation sqns.
334 *Leopard*, 55 M-47 med, 133 *Scorpion* lt tks; 153 *Scimitar* AFV; 1,123 APC (M-75, AMX-VCI, 266 *Spartan*); 21 105mm, 14 203mm how; 96 M-108 105mm, 26 M-44, 41 M-109 155mm, 10 M-110 203mm SP how; 5 *Lance* SSM; 80 JPK C-90 SP ATK guns; 180 *Milan* ATGW; 43 *Striker* AFV with *Swingfire* ATGW; 115 20mm, 55 *Gepard* 35mm SP AA guns; 60 *HAWK* SAM; 12 *Islander* ac, 68 *Alouette* II hel.
(On order: 514 MICV, 525 M-113, 80 BDX APC; 240 *Milan* ATGW; *Improved HAWK* SAM.)

Forces Abroad: Germany: 25,000; 1 corps HQ, 1 div HQ, 1 armd, 1 mech inf bdes, 1 *HAWK* bn.

RESERVES: 133,000 (incl Medical Service), some on immediate recall status; 11,000 train every year, 1 mech, 1 mot inf bde train every three years.

Navy: 4,400 (1,000 conscripts).
4 E-71 frigates with 4 *Exocet* SSM, 8 *Sea Sparrow* SAM.
7 ex-US Type 498 ocean minehunters.
5 ex-US Type 60 coastal MCM (4 in reserve).

[1]See p. 75 for all footnotes.

14 *Herstal* inshore minesweepers.
2 log support and comd ships (MCM).
3 *Alouette* III hel.

Bases: Kallo, Ostend, Zeebrugge.

RESERVES: 4,500 (on immediate recall status).

Air Force: 20,100 (3,600 conscripts); 144 combat aircraft.
5 FGA sqns: 3 with 54 *Mirage* 5BA/D: 2 with 36 F/TF-104G (to be replaced by F-16A/B).
2 AD sqns: 1 with 18 F-16A/B; 1 with 18 F-104G/TF-104G (being replaced by F-16A/B).
1 recce sqn with 18 *Mirage* 5BR.
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*.
Trg and liaison sqns ac incl 32 SF-260MB, 23 Fouga CM-170. 2 sqns with 32 *AlphaJet*.
AAM: *Sidewinder*.
8 SAM sqns with 72 *Nike Hercules*.
(On order some 98 F-16A fighters; *Sidewinder* AAM; 43 BDX *(Timoney)* APC.)

Para-Military Forces: 16,000 Gendarmerie with 62 FN armd cars, 5 *Alouette* II, 3 *Puma* hel.
(On order: 80 BDX *(Timoney)* APC.)

BRITAIN

Population: 55,968,000.
Military service: voluntary.
Total armed forces: 343,646, incl 16,696 women and some 9,300 enlisted outside Britain.
Estimated GDP 1980: $485.14 bn.
Defence expenditure 1981–82: £12.275 bn ($27.77 bn); NATO definition $28.66 bn.[2]
$1 = £0.442 (1981), £0.455 (1980).

Strategic Forces:
SLBM: 4 *Resolution*-class SSBN, each with 16 *Polaris* A3 msls with 3 MRV (to be modified with *Chevaline*).
Ballistic Missile Early Warning System (BMEWS) station at Fylingdales.

Army: 176,248 (incl 6,546 women and 8,960 enlisted outside Britain, of which 7,100 are Gurkhas).
1 corps, 4 armd, 1 arty div HQ.
11 armd regts.
8 armd recce regts.
48 inf bns (incl 1 demonstration bn).
5 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.
3 AD regts with *Rapier* SAM.
18 arty regts (1 hy, 13 fd, 1 GW, 1 cdo, 1 ATK, 1 locating).
11 engr regts (incl 4 armd div, 1 amph, 1 Gurkha).
6 army aviation regts.
AFV: 900 *Chieftain* med (60 in reserve), 271 FV101 *Scorpion* lt tks; 243 FV601 *Saladin* armd cars; 290 FV107 *Scimitar*, 1,429 *Ferret*, 200 *Fox* recce; 2,338 FV432, 600 FV603 *Saracen*, 60 FV103 *Spartan* APC.
Arty: 100 105mm pack how and lt guns; 93 FH-70 155mm how, FV433 *Abbot* 105mm, 50 M-109 155mm, 31 M-107 175mm, 16 M-110 203mm SP guns/how; 12 *Lance* SSM.
ATK: Carl Gustav 84mm, 120mm RCL; *Milan, Swingfire* ATGW; FV102 *Striker*, 178 FV438/FV712 AFV with *Swingfire* ATGW.
AD: Blowpipe, 108 *Rapier/Blindfire* SAM.
Air: 100 *Scout*, 7 *Alouette* II, 20 *Sioux*, 158 *Gazelle*, 30 *Lynx* hel.
14 landing craft (2 tk, 12 med).
(On order: 240 *Challenger* med tks; 1,900 MCV-80 MICV; 102 FH-70 155mm how, 69 M-109A2 SP how; *LAW* RL; *Milan, TOW* ATGW; 48 *Blowpipe* SAM; 25 *Gazelle*, 98 *Lynx* hel).

DEPLOYMENT (see also *Forces Abroad*, below):
United Kingdom Land Forces (UKLF): United Kingdom Mobile Force (UKMF)—6th Field Force with 5 (3 regular, 2 TA) inf bns and log spt gp; 7th Field Force with 3 regular, 2 TA units; 8th Field Force (3 regular, 2 TA bns for Home Defence); 1 bn gp (for ACE Mobile Force (Land)), 1 SAS regt (part), 1 Gurkha inf bn.
HQ Northern Ireland: 9,128; 3 inf bde HQ, 1 armd recce regt, variable number of major units in inf role,[3] 1 SAS, 3 engr sqns, 2 army aviation sqns.

RESERVES: 137,000 Regular Reserves. 69,500 Territorial Army (TA): 2 armd recce regts, 38 inf bns, 2 SAS, 3 fd, 3 lt AD, 7 engr regts. 7,500 Ulster Defence Regiment (11 bns).

Navy: 74,687 (incl Fleet Air Arm, Royal Marines, 4,065 women, and 330 enlisted outside Britain); 62 major surface combat vessels.
Submarines, attack: 28
12 nuclear (6 *Swiftsure*, 3 *Churchill*, 2 *Valiant*, 1 *Dreadnought*), 16 diesel (13 *Oberon*, 3 *Porpoise*).
Surface Ships:
2 ASW carriers: 1 *(Invincible)* with 5 *Sea Harrier* V/STOL, 9 *Sea King* hel, twin *Sea Dart* SAM; 1 *(Hermes)* with 5 *Harrier* V/STOL, 12 *Sea King* hel, 2 quad *Seacat* SAM.
14 GW destroyers: 6 *County* (1 trials, 5 with 1 *Wessex* ASW hel, twin *Seaslug*, 2 quad *Seacat* SAM, 4 also have 4 *Exocet* SSM); 1 Type 82 with twin *Sea Dart* SAM, *Ikara* ASW; 7 Type 42 with twin *Sea Dart*, 1 *Lynx* ASW hel.
46 frigates; 45 GP (3 Type 22 with 4 *Exocet* SSM, 2 *Sea Wolf* SAM, 1 *Lynx* hel; 8 Type 21 with quad *Seacat* SAM, 1 *Wasp/Lynx* hel (5 with quad *Exocet*); 26 *Leander* with 1 *Wasp/Lynx* (7 with 4 *Exocet*, 3 quad *Seacat;* 8 with *Ikara* ASW, 2 quad *Seacat;* 10 converting to quad *Exocet, Sea Wolf*); 8 *Rothesay* (2 trg/trials) with quad *Seacat*, 1 *Wasp* hel); 1 Type 12 ASW (trg).
38 minesweepers/minehunters: 2 *Hunt*, 2 *Venturer* (trg), 29 *Ton* (9 Reserves), 1 coastal, 4 inshore (trg). 2 MCM spt *(Abdiel*, VT-2 hovercraft).
25 patrol craft: 7 *Island*, 6 *Ton*, 4 *Bird* (2 trg), 2 *Loyal*, 2 *Ford* (trg), 3 FAC(P) (trg), 1 Boeing hydrofoil (trials).
2 LPD assault ships with 4 LCM, 4 LCVP, 4 quad *Seacat* SAM.
Amphibious vessels incl: 1 hel spt ship, 6 landing ships, 16 LCM, 29 LCVP.
1 ice patrol, 1 Royal Yacht/hospital, 6 depot/support ships, 15 tankers (1 trg).
5 hovercraft: 3 SRN-6, 1 BH-7, 1 SRN-5 (trg).
Included in above refitting or in reserve are: 1 SSBN, 3 nuclear, 4 diesel subs, 1 GW destroyer, 9 frigates, 1 MCM, 3 FAC(P), 1 LPD, 1 landing ship, 2 depot/spt ships, 1 tanker.
(On order: 2 ASW carriers, 3 *Trafalgar* SSN, 2 Type 42 destroyers, 3 Type 22 frigates, 2 *Castle* patrol craft, 7 *Hunt* MCM, 2 fleet tenders, *Harpoon* SSM.)

Bases: Chatham, Devonport, Faslane, Portland, Portsmouth, Rosyth.

FLEET AIR ARM: 20 combat ac, some 90 armed hel.
3 FGA sqns (1 HQ) with 20 *Sea Harrier* FRS-1.
6 ASW hel sqns: 5 with 42 *Sea King* HAS-2/-5 (3 sqns embarked). 1 (23 flts) with 26 *Lynx* HAS-2.
24 ASW flts: 22 with *Wasp* HAS-1, 2 with *Wessex* HAS-3.
2 cdo assault sqns; 1 with 10 *Sea King* HU-4, 1 with 20 *Wessex* HU-5.
8 SAR and trg hel sqns: 1 with 12 *Wessex* HAS-3, 3 with 37 *Wessex* HU-5, 1 with 16 *Sea King* HAS-1/-2/-5, 1 with 11 *Wasp* HAS-1, 1 with 8 *Lynx* HAS-2, 1 with 18 *Gazelle* HT-2.
3 flts with 2 *Sea Heron* C-2, 1 *Heron* C-4, 2 *Sea Devon* C-20, 2 *Chipmunk* T-40 ac.
1 observer trg sqn with 13 *Jetstream* T-2, 1 trg flt with 10 *Chipmunk* T-10.
1 fleet requirements and direction trg unit with 12 *Canberra* T-4/TT-18/T-22, 22 *Hunter* T-8C/GA-11.
(On order: 13 *Sea Harrier* FRS-1, 1 T-4 V/STOL, 3 *Hunter* T-8M, 2 *Jetstream* T-2 ac; 10 *Sea King* HAS-2, 5 *Sea King* HU-4, 17 *Lynx* HAS-2 hel.)

ROYAL MARINES: (7,899).
1 cdo bde with 3 cdo gps, 2 cdo sqns (army), 1 log regt, 1 lt hel sqn, spt units.
1 Special Boat, 2 Raiding sqns.
Milan ATGW; *Blowpipe* SAM; 12 *Gazelle* AH-1, 6 *Scout* AH-1 hel.
(On order: 4 *Lynx* hel.)

RESERVES (Navy and Marines): 25,000 Regular and 9,000 Volunteer, 9 MCM vessels.

Air Force: 92,701 (incl 6,085 women); some 700 combat ac.
17 strike/attack sqns: 6 with some 48 *Vulcan* B-2 (to be disbanded from 1981); 5 with some 60 *Buccaneer* S-2A/B; 6 with 72 *Jaguar* GR-1.
3 close support sqns with 48 *Harrier* GR-3/T-4 V/STOL.
9 interceptor sqns: 2 with 24 *Lightning* F-6/F-3 (24 more ac in reserve); 7 with 88 *Phantom* (4 with FGR-2, 3 with FG-1).
5 recce sqns: 1 with 8 *Vulcan* SR-2, 2 with 24 *Jaguar* GR-1, 2 with 22 *Canberra* PR-7/-9.
1 AEW sqn with 6 *Shackleton* AEW-2 (5 in reserve).
4 MR sqns with 28 *Nimrod* MR-1/-1A, MR-2.
2 tanker sqns with 16 *Victor* K-2.
1 strategic tpt sqn with 11 VC-10C1.
4 tac tpt sqns with 45 C-130H (6 C-130HC3) (+11 active reserve).
3 comms sqns with 6 HS-125 CC1/2, 4 *Andover*, 6 *Pembroke*, 13 *Devon* ac, 2 *Whirlwind*, 1 *Gazelle* hel.
Queen's Flt with 3 *Andover* ac, 2 *Wessex* hel.
4 ECM/target facilities/calibration sqns with 45 *Canberra*, 3 *Nimrod* R-1, 5 *Andover* E-3/C-1.
11 OCU: 1 NATO with 23 Br, 16 FGR *Tornado* GR-1; 10 others with 9 *Vulcan* B-2; 14 *Buccaneer* Mk 2; 24 *Phantom* FGR-2; 26 *Jaguar* GR-1/T-2; 27 *Harrier* GR-3/T-4 V/STOL; 3 *Nimrod* MR; 7 *Canberra* B-2/T-4; 5 C-130; 3 *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 60 *Hunter* F-6/GA-9/T-7, 46 *Hawk* T-1, 2 *Jet Provost*.
6 hel sqns: 4 tac tpt (2 with 40 *Wessex*, 2 with 26 *Puma* HC-1); 2 SAR with 10 *Whirlwind*, 8 *Wessex;* 14 *Sea King*.
Trg units with 83 *Hawk* T-1, 151 *Jet Provost*, 11 *Jetstream* T-1, 113 *Bulldog* T-1, 60 *Chipmunk* T-10, 19 *Dominie* T-1, 1 *Husky* T-1 ac, 5 *Whirlwind*, 5 *Wessex* Mk 5, 25 *Gazelle* HT-3 hel.
AAM: *Sidewinder, Sparrow, Red Top, Firestreak.*
ASM: *Martel.*
8 SAM sqns: 2 with *Bloodhound* 2, 6 (RAF Regt) with *Rapier*.
(On order: 24 *Harrier* GR-3, 123 *Tornado* (out of 220 GR-1 FGA, 165 F-2 AD planned), 11 *Nimrod* AEW-3, 46 *Hawk*, 9 VC-10 tankers, 27 CH-47D *Chinook*, 7 *Puma* hel, AIM-9L *Sidewinder, Sky Flash* AAM, *Sea Eagle* ASM.)

ROYAL AIR FORCE REGIMENT:
4 wing HQ.
6 SAM sqns *(Rapier)* and 5 fd sqns.
(On order: *Scorpion* lt tks, *Spartan* APC.)

DEPLOYMENT:
The Royal Air Force includes an operational home command (Strike Command), responsible for the UK Air Defence Region and the Near and Far East, and 1 overseas command (RAF Germany).

RESERVES: 28,000 Regular; about 400 Volunteer; 3 AD sqns.

Forces Abroad:
Antarctica: Navy: 1 ice patrol ship.
Belize: Army: 1 inf bn, 1 armd recce tp, 1 arty

bty, 1 lt AD tp, 1 engr sqn (part), 1 hel flt. RAF: 1 flt; 4 *Harrier* GR-3 FGA, 4 *Puma* hel, 1 *Rapier* AD det RAF Regt. Navy: 1 destroyer/-frigate (guard ship), 1 spt ship.
Brunei: 1 Gurkha inf bn.
Canada: Army training team.
Cyprus: Army: 1 inf bn less 2 coys, 1 armd recce sqn, 1 hel flt and log support with UNFICYP (817); 1 inf bn plus 2 inf coys, 1 armd recce, 1 engr spt sqns, 1 hel flt in garrison at Sovereign Base Areas. RAF: 4,500: 1 *Whirlwind* sqn (incl 1 flt (4 ac) with UNFICYP), periodic dets of other ac, 1 fd sqn RAF Regt.
Falkland Islands: 1 Marine det.
Germany: British Army of the Rhine (BAOR): 55,000: 1 corps HQ, 4 armd divs, 1 arty div, 5th Field Force; Berlin Inf Bde: 3,100. RAF: 10,800: 2 *Phantom* FGR-2, 2 *Buccaneer*, 5 *Jaguar* (1 recce), 2 *Harrier*, 1 *Wessex* (tpt), 1 *Bloodhound*, 4 *Rapier* sqns, 1 fd sqn RAF Regt.
Gibraltar: Army: 1 inf bn, 1 engr team, 1 arty surveillance tp. Navy: 1 destroyer, 1 spt ship.
Hong Kong: Army: 7,100: Gurkha Field Force with 1 British, 3 Gurkha inf bns (to be 4), 1 Gurkha engr regt, 1 hel sqn, spt units. Navy: 5 *Ton* patrol craft, 2 SRN-6 hovercraft, 1 Marine Raiding sqn. RAF: 1 *Wessex* sqn.
Indian Ocean (intermittent): 4 destroyers/frigates, 2 spt ships. *Diego Garcia*, 1 naval det.

Para-Military Forces: Royal Ulster Constabulary: 6,950, some 3,000 reserves.

CANADA

Population: 24,375,000.
Military service: voluntary.
Total armed forces: 79,497 (10,480 women).[4]
Estimated GDP 1980: $US 242.1 bn.
Defence expenditure 1981–82: $Can 5.91 bn ($US 4.99 bn); NATO definition not available. $US 1 = $Can 1.18 (1981), $Can 1.19 (1980).

Army (Land Forces): 13,000.[4]
Mobile Command (about 19,000 land and air).[5]
2 bde gps each comprising:
1 armd regt, 3 inf bns, 1 arty regt (2 close spt, 1 AD btys), 1 engr regt, spt units.
1 special service force comprising:
1 armd regt, 1 inf bn, 1 AB regt, 1 arty regt, 1 engr regt, spt units.
1 mech bde gp (under command Canadian Forces, Europe) comprising:
1 armd regt, 2 mech inf bns, 1 med SP arty, 1 mech engr regts, spt units, 1 lt hel sqn.
114 *Leopard* C-1 med tks; 100 *Lynx*, 177 *Cougar* AFV; 955 M-113, 243 *Grizzly* APC; 55 105mm pack, 159 105mm how, 50 M-109 155mm SP how; 810 *Carl Gustav* 84mm RCL; 149 *TOW* ATGW; 10 40mm AA guns; 113 *Blowpipe* SAM.
(On order: 150 *Cougar*, *Grizzly* APC.)

RESERVES: about 15,500 Militia; 100 combat arms units plus spt units (all in Mobile Command), plus 1,560 in Communications Reserves.

Navy (Maritime): 5,500.[4]
Maritime Command (about 9,300).[5]
3 *Oberon* submarines.
4 DD280 ASW hel destroyers, each with 2 *Sea King* hel and 2 quad *Sea Sparrow* SAM.
19 ASW frigates (2 *Annapolis* with 1 hel; 4 *Mackenzie*, 4 *Improved Restigouche* with *ASROC*; 6 *St Laurent* with 1 hel; 3 *Restigouche* in reserve).
3 replenishment spt ships (2 with 3 *Sea King* hel each).
6 coastal patrol ships (trg).
6 small patrol craft.
(On order: 6 destroyers.)

DEPLOYMENT:
Atlantic: 3 subs, 13 surface (1 in reserve), 2 replenishment spt ships with 1 hel.
Pacific: 10 surface (2 in reserve), 1 replenishment spt ship.
Bases: Halifax, Esquimalt.

RESERVES: about 3,250.

Air Force (Air): 15,300;[4] some 247 combat aircraft.
Air Command (23,000).
1 Air Group (1 CAG):
3 fighter sqns with 42 CF-104/CF-104D.
1 hel sqn with 11 CH-136 (Kiowa).
1 Tactical Air Group (10 TAG):
2 fighter sqns with 20 CF-116 (F-5A), 4 CF-116D (F-5D).
6 hel sqns with 31 CH-135 (UH-1N), 36 CH-136, 8 CH-147 *(Chinook)*.
Air Defence Group (NORAD-assigned):
3 AWX sqns and 1 OCU with 54 CF-101 *Voodoo*, 18 CT-133 *(Silver Star)*.
1 EW sqn with 7 CF-100 (to retire end-1981), 3 CC-117 (*Falcon* 20, to be 6 end-1981); 16 CT-133.
4 main, 17 auxiliary sites of Distant Early Warning *(DEW)* Line.
24 long-range radar sites *(CADIN/Pine Tree Line)*.
Maritime Air Group:
3 maritime patrol sqns, 1 trg and 1 testing sqn with 17 CP-140 *Aurora*, 10 CF-107 *Argus* (being replaced by CP-140).
1 MR, 1 trg and 1 reserve sqns with 15 CP-121 *Tracker*.
2 ASW hel sqns and 1 trg sqn with 35 CH-124 *(Sea King)*.
2 utility sqns with 9 T-33, 3 CP-121 ac and 2 CH-135 hel.
Air Transport Group:
4 tpt sqns: 2 with 24 CC-130E/H; 1 with 5 CC-137 (Boeing 707); 1 with 4 CC-117, 7 CC-109 *Cosmopolitan*, 2 CC-132 (DHC-7R).
4 tpt/SAR sqns with 11 CC-115 (DHC-5), 8 CC-138 (DHC-6) ac, 3 CH-113 *Labrador*, 7 CH-113A *Voyageur*, 3 CH-135 *(Twin Huey)* hel.
1 SAR unit with 3 CH-113 *Labrador*.
4 base flts with 1 CC-129 (C-47), 9 CH-118 *Iroquois*, 2 CH-135.
3 trg sqns: 1 with 14 CF-116 (F-5A), 21 CF-116D (F-5D); 1 with 10 CF-104, 10 CF-104D; 1 with 4 CT-114C *Tutor*, 4 CC-130E; 5 CC-129 (to retire 1981), 2 CT-133.
2 schools: 1 with 21 CT-134 *(Musketeer)* ac, 13 CH-136 hel; 1 with 122 CT-114.
1 test unit with 3 CF-104, 4 CF-116, 4 CT-133 ac; 2 CH-135, 1 CH-136 hel.
(On order: 113 CF-18A, 25 CF-18B *Hornet* fighters; 21 CT-134 ac; 14 CH-139 (Bell 206B *Jet Ranger*).)

RESERVES: Air Reserve Group; 2 wings with 22 CSR-123 (DHC-3 *Otter*) ac, 3 CH-136 hel.

Forces Abroad:
Europe: One mech bde gp of 3,000 with 59 *Leopard* med tks, 375 M-113 APC/recce, 24 M-109 155mm SP how, 40 *TOW* ATGW, 50 40mm AA guns, 70 *Blowpipe* SAM, hel. (2,500 additional tps in Canada as reinforcements.)
1 Air Group: 764: 3 fighter sqns with 42 CF-104/CF-104D; 1 hel sqn with 11 CH-136 hel; 2 CC-132, 4 CT-133 liaison ac.
Cyprus: (UNFICYP): 515.
Syria/Israel: (UNDOF): 220.
Other Middle East: (UNTSO): 20.

Para-Military Forces:
Coast Guard: 18 icebreakers, 13 patrol craft, 2 DHC-7R ac, 35 hel; 3 SRN 5/6 hovercraft.

DENMARK

Population: 5,146,000.
Military service: 9 months.
Total armed forces: 32,600 (500 women; 11,000 conscripts).
Estimated GDP 1981: $58.1 bn.
Defence expenditure 1981: kr 10.05 bn ($1.53 bn); NATO definition $1.52 bn.
$1 = 6.56 kroner (1981), 5.91 kroner (1980).

Army: 19,300 (7,700 conscripts); being reduced.
3 mech inf bdes, each with 1 tk, 2 mech, 1 arty bns, 1 recce sqn, 1 engr coy, spt units.
2 mech inf bdes, each with 1 tk, 2 mech, 1 arty bns, 1 engr coy, spt units.
1 indep recce bn.
Some indep mot inf bns.
120 *Leopard* I, 60 *Centurion* med, 20 M-41 lt tks; 650 M-113, M-106 mortar-armed APC; 24 155mm guns; 144 105mm, 96 155mm, 12 M-115 203mm how; 72 M-109 155mm SP how; 81mm, 120mm mor; 252 106mm RCL; *LAW* RL; *TOW* ATGW; 224 L/60 and L/70 40mm AA guns; *Hamlet (Redeye)* SAM; 15 Saab T-17 lt ac; 12 Hughes 500A hel.
(On order: 84mm *Carl Gustav* RCL; 840 *TOW* ATGW.)

RESERVES: 5,000 Augmentation Force, subject to immediate recall; 41,000 Field Army Reserve, comprising 12,000 Covering Force Reserve (to bring units to war strength and add 1 mech bn to each bde) and 29,000 to provide combat and log support; 24,000 Regional Defence Force, (being reorganized into Regimental Combat Teams) with 21 inf, 2 tk, 7 arty bns, ATK sqns, spt units; 56,500 Army Home Guard (12,000 women).

Navy: 5,700 (1,400 conscripts).
6 submarines: 2 *Narhvalen*, 4 *Delfinen* (1 to retire in 1981).
5 frigates with 8 *Harpoon* SSM, *Sea Sparrow* SAM: 2 *Peder Skram*, 3 *Niels Juel*.
5 *Hvidbjørnen* fishery-protection frigates, each with 1 hel.
10 *Willemoes* FAC(M) with *Harpoon* SSM.
6 *Søløven* FAC(T) (some in reserve).
22 large patrol craft: 8 *Daphne*, 3 *Agdleq*, 2 *Maagen*, 9 *Barsø*.
28 coastal patrol craft(.
7 minelayers: 4 *Falster*, 2 *Lindormen*, 1 *Langeland* (to retire 1983).
6 ex-US Type 60 coastal minesweepers.
Coastal defence unit:
8 *Alouette* III, 7 *Lynx* hel.
(On order: 4 Type 210 submarines, 15 *Harpoon* SSM, *Sea Sparrow* SAM, 1 *Lynx* hel.)

Bases: Copenhagen, Korsør, Frederikshavn.

RESERVES: 4,000; Navy Home Guard 4,900. 20 coastal patrol craft.

Air Force: 7,600 (1,900 conscripts); 116 combat aircraft.
3 FGA sqns: 1 with 20 F-35XD *Draken*, 1 with 20 F-100D/F, 1 with 20 F-16.
2 interceptor sqns each with 20 F-104G.
1 recce sqn with 16 RF-35XD *Draken*.
1 tpt sqn with 3 C-47, 3 C-130H.
1 SAR sqn with 8 S-61A hel.
Trainers: F-16B, TF-35XD *Draken*, 16 Saab T-17.
2 SAM bns: 1 with 36 *Nike Hercules*, 1 with 24 *Improved HAWK*.
AAM: *Sidewinder*. ASM: *Bullpup*.
(On order: 34 F-16A/B fighters, 10 *Gulfstream* III MR/lt tpt ac.)

RESERVES: 7,500; Air Force Home Guard 11,900.

Forces Abroad: Cyprus (UNFICYP): 1 bn (365).

FRANCE

Population: 53,800,000.
Military service: 12 months; 18 months for overseas.
Total armed forces: 504,630[6] (15,000 women; 262,280 conscripts).

Estimated GDP 1980: $632 bn.
Defence expenditure 1981: fr 104.44 bn ($21.23 bn); NATO definition: $26.0 bn.
$1 = 4.92 francs (1981), 4.38 francs (1980).

Strategic Forces: (21,100; some 2,800 Army, 5,500 Navy, 12,000 Air Force, 800 Gendarmerie).
SLBM: 5 SSBN, each with 16 M-20 msls (1 more building), (M-4 msl to replace M-20).
IRBM: 18 in 2 sqns, 1 with 9 SSBS S-3 msls, 1 with S-2 (being replaced by S-3).
Aircraft:
Bombers: 6 sqns with 33 *Mirage* IVA (AN-22 nuclear bombs).
Recce/trg: 1 sqn with 4 *Mirage* IVA.
2 trg sqns: 1 with 4 *Mirage* IIIB/BRU; 1 with 5 *Noratlas* N-2501/SNB.
Tankers: 1 wing (3 sqns) with 11 KC-135F.
Reserve: 10 *Mirage* IVA (incl 8 recce).

Army: 321,320, incl Army Aviation, 6,500 women (203,830 conscripts).
1 army HQ.
3 corps HQ.
8 armd divs.
4 motor rifle divs.
1 alpine div.
1 air-portable mot div (Marines).
1 para div.
1 lt bde (overseas intervention).
Berlin sector force (1 armd regt, 1 inf regt).
Indep regts:
5 recce, 2 drone regts.
5 motor rifle regts.
6 arty regts, 5 AA arty regts.
6 engr regts.
8 sigs regts.
2 CW defence regts.
3 logistics bdes.
5 SSM regts with 42 *Pluton*.
5 SAM regts: 3 with 60 *HAWK*, 2 with 24 *Roland* I.
1,114 AMX-30 med, 340 AMX-13 lt tks, 39 AMX-10RC, 230 Panhard EBR hy, 440 AML lt armd cars; 600 AMX-10P MICV, 1,540 AMX-13 VTT, 900 VAB APC; 10 155mm GCT SP, 195 105mm HM-2, AU-50, 205 155mm F-3 how, 112 155mm BF-50 SP how; 42 *Pluton* SSM; 315 120mm mor; 105/6mm RCL; SS-11, 840 *Milan*, 97 *HOT*, *ENTAC* ATGW; 20mm, 100 40mm towed, 48 30mm SP AA guns; *HAWK*, 50 *Roland* SAM; R-20 recce drones.
(On order: 145 AMX-30 med tks; 110 AMX-10RC, 100 ERC-90S armd cars; 185 AMX-10 MICV, 155mm GCT SP guns; 1,235 VAB APC; 35 *HOT*, 140 *Milan* ATGW; 216 twin 20mm AA guns; 71 *Roland* II SAM.)

ARMY AVIATION (ALAT): (6,450).
5 combat hel regts; 7 lt gps, 9 indep regts, 5 overseas sqns. 190 *Alouette* II, 69 *Alouette* III, 132 SA-330 *Puma*, 166 SA-341F and 19 SA-342M *Gazelle* hel; 20 *Broussard*, 70 L-19 lt ac.

RESERVES: about 280,000 (10 inf divs, and 4 divs formed from military schools, unit equivalents of 30 regts).

Navy: 69,600 incl Naval Air, 18,000 conscripts (700 women); 44 major surface combat vessels. 4 comds: 2 home (CECLANT, CECMED), 2 overseas.
21 submarines (4 *Agosta*, 9 *Daphne*, 2 *Arethuse*, 6 *Narval*).
2 *Clemenceau* carriers: 1 attack with 40 ac (2 flts with 20 *Super Etendard*, 1 with 10 F-8E, 1 with 10 *Alizé*), 4 hel; 1 ASW with 40 hel.
1 *Jeanne d'Arc* hel carrier (trg ship, capacity 8 hel) with *Exocet* SSM.
1 command cruiser with 4 *Exocet* SSM, 1 twin *Masurca* SAM.
20 destroyers: 2 C-70 with 4 *Exocet* SSM, 20 *Crotale* SAM, 2 hel; 2 *Suffren* with 4 *Exocet*, 1 *Malafon* ASW/SSM, 2 twin *Masurca;* 3 Type F-67 with 6 *Exocet*, 8 *Crotale*, 2 hel; 1 Type 56 with 1 *Malafon*, 1 hel; 2 Type T-53 (1 ASW with 4 *Exocet*, 1 hel; 1 air-direction); 9 Type T-47 (4 with *Tartar* SAM; 5 ASW with 1 *Malafon*); 1 Type C-65 with 4 *Exocet*, *Malafon*.
20 frigates: 9 *Rivière* (8 with 4 *Exocet*); 1 Type E-52; 10 Type A-69 (3 with 2 *Exocet*).
5 FAC(M): 4 *Trident* with 6 SS-12; 1 *La Combattante* with quad SS-11 SSM.
9 large patrol craft: 4 *Sirius*, 1 *Le Fougueux*, 4 ex-Can *La Dunkerquoise*.
5 *Circe* minehunters, 10 ex-US *Aggressive* ocean minesweepers/minehunters.
17 coastal minesweepers: 5 *Sirius*, 12 ex-US *Adjutant* (6 in reserve).
2 assault ships with 3 *Super Frelon* or 10 *Alouette* hel, 18 LCM or 2 LCT.
5 LST, 11 LCT, 4 log spt ships, 26 LCM.
9 tankers, 1 maintenance ship.
(On order: 3 subs, 5 C-70 destroyers, 1 frigate, 2 ASW corvettes, 15 minehunters, 2 log vessels.)

Bases: Cherbourg, Brest, Lorient, Toulon.

NAVAL AIR FORCE: (13,000); 146 combat ac, 45 hel.
3 strike sqns with 36 *Super Etendard* (AN-52 nuclear weapons).
1 interceptor sqn with 15 F-8E (FN) *Crusader*.
2 ASW sqns with 24 *Alizé*.
5 MR sqns: 4 with 28 *Atlantic*, 1 with 7 SP-2H *Neptune*.
1 recce sqn with 7 *Etendard* IVP.
1 OCU with 12 *Etendard* IVM, 12 *Magister*, 5 *Alizé*.
4 AWS hel sqns with 16 *Super Frelon*, 24 *Lynx*.
1 assault hel sqn with 5 *Super Frelon*.
2 SAR/trg/liaison hel sqns with 24 *Alouette* II/III.
1 hel OCU with *Alouette* II/III.
7 comms flts with 8 Nord 262, 6 *Falcon*, 4 SP-2H *Neptune*, C-47, DC-6A, Nord 2504, 11 *Navajo* ac, *Alouette* II/III, 2 *Super Frelon*, 2 *Lynx* hel.
3 trg and liaison sqns with 8 Nord 262, 20 C-47, 6 CAP-10, 8 *Paris*, 15 *Rallye* ac, *Alouette* II/III hel.
(On order: 20 *Super Etendard* fighters, 5 *Gardien* MR; 16 EMB-121 *Xingu* tpt ac, 14 *Lynx* hel; Matra SATCP SAM.)

MARINES: 1 bn. (On order: 50 ERC-90S armd cars.)

RESERVES: about 50,000.

Air Force: 103,460 (40,450 conscripts, 5,000 women); 460 combat aircraft.
Air Defence Command (CAFDA): (6,300).
9 interceptor sqns: 2 with 30 *Mirage* IIIC, 7 with 105 *Mirage* F-1C (1 OCU with 15 *Mirage* F-1B forming).
4 liaison and comms flts with 30 *Magister* and *Broussard*.
6 SAM sqns with 24 *Crotale* (6 more forming).
Air-defence system: automatic *STRIDA II*, radar stations.
AAM: R-530, R-550 *Magic*, Super 530.
Tactical Air Force (FATAC): (25,000).
5 strike sqns: 3 with 45 *Jaguar*, 2 with 30 *Mirage* IIIE (AN-52 nuclear weapons).
12 FGA sqns: 5 with 75 *Mirage* IIIE, 2 with 30 *Mirage* 5F, 5 with *Jaguar* A.
3 recce sqns with 45 *Mirage* IIIR/RD (to be replaced by *Mirage* F-1R).
2 OCU: 1 with 20 *Mirage* IIIB/BE, 1 with 20 *Jaguar* A/E.
8 liaison/comms flts with 38 *Magister*, 10 *Broussard*, 4 *Paris*, 3 *Frégate*, 6 *Noratlas*, 2 *Mystère* 20 ac, 13 *Alouette* II/III hel.
AAM: *Sidewinder*, R-550 Magic, R-530.
ASM: AS-30, AS-37 *Martel*.
Air Transport Command (COTAM): (4,600).
7 tac tpt sqns: 3 with 56 Transall C-160, 4 with 48 *Noratlas*.
1 OCU with 19 C-160, *Noratlas*, *Frégate*.
4 tpt sqns, plus misc units: 5 DC-8F (1 ECM), *Frégate*, *Mystère* 20, 10 DHC-6, 1 *Falcon* 50, *Paris*, *Broussard* ac; 12 *Puma*, 3 *Alouette* III hel.
5 hel sqns with 33 *Alouette* II, 24 *Alouette* III, 8 *Puma*.
1 hel OCU with 15 *Alouette* II/III, 2 *Puma*.
Training Command (CEAA): Some 400 aircraft, incl 80 *AlphaJet*, *Magister*, T-33A, *Mystère* IV, *Falcon*, 40 *Flamant*, *Noratlas*, *Broussard*, *Paris*, 28 CAP-10B, 25 CAP-20.
(On order: 14 *Mirage* F-1B, 36 F-1C, 62 F-1R, 48 *Mirage* 2000 fighters; 95 *AlphaJet* trg ac; 25 Transall C-160 tpts; 25 *Xingu*, 30 *Epsilon* trg ac; 24 *Crotale*, Matra SATCP SAM.)

RESERVES: 120,000.

Forces Abroad:
Europe:
Germany: 48,500; 3 armd divs.
Berlin: 2,700; 1 armd regt, 1 inf regt.
Overseas Dependencies: 16,400: some 9,800 army, 2,000 navy, 1,600 air, 3,000 Gendarmerie.
Four inter-service overseas commands: Antilles-Guyana (3 inf regts); South Indian Ocean (1 para regt, 1 inf coy); New Caledonia (1 inf regt); Polynesia (2 inf regts). Two naval commands: Indian Ocean (ALINDIEN) and Pacific (ALPACI). (160 lt tks, 10 *Mirage* IIIC, 7 MR, 15 tpt ac; 36 hel, 17 patrol vessels.)
Other Overseas: some 23,000, all services (numbers vary according to local circumstances): eqpt incl 120 AFV, 15 combat vessels, 25 combat and 23 tpt ac, 43 hel, 18 spt vessels.
Deployed:
Central African Republic: 1,200: para, Legion Marine units; armd cars, 120mm mor, *Milan* ATGW, 1 hel sqn.
Djibouti: 4,000; 2 inf regts, 2 armd sqns, 2 arty btys; 1 air sqn with *Mirage*, naval elements.
Gabon: 650: 4 *Jaguar*, 3 C-160, 1 *Atlantic* ac.
Ivory Coast: 450.
Lebanon (UNIFIL): 730; engr coy, log unit.
Saudi Arabia: 80 (technical advisers).
Senegal: 1,300; marine inf.
Zaire: trg team.

Para-Military Forces: 82,000 Gendarmerie (5,400 conscripts): 907 territorial units, 155 traffic units, 130 mobile squadrons, 225 overseas units with 36 AMX-13/75 lt tks; 120 AML armd cars, 33 AMX-13 VTT, 155 VRBG APC; 280 81mm mor; 6 Cessna 206C ac, 43 *Alouette* II/III and *Ecureuil* hel; 6 patrol boats (on order: VBC-90 armd cars). 6,900 *Service de Santé* (230 conscripts).

GERMANY: FEDERAL REPUBLIC

Population: 61,665,000 (incl West Berlin).
Military service: 15 months.
Total armed forces: 495,000 (60 women, 225,000 conscripts);[7] mobilization strength about 1,250,000.
Estimated GDP 1980: $792 bn.
Defence expenditure 1981: DM 42.09 bn ($20.17 bn); NATO definition: $25.0 bn.
$1 = DM 2.09 (1981), DM 1.89 (1980).

Army: 335,200 (176,000 conscripts).
Field Army: 272,000 (under reorganization; complete late 1981). 3 corps: 12 divs (6 armd, 4 armd inf, 1 mountain, 1 AB) totalling 67 tk, 62 armd inf, 12 para bns. Comprises:
17 armd bdes (each with 3 tk, 1 armd inf, 1 armd arty bns).
15 armd inf bdes (each with 1 tk, 3 armd inf, 1 armd arty bns).
1 mountain bde.
3 AB bdes.
1 AD regt; 3 bns with *Gepard* SP AA guns and *Roland* II SAM.
11 AA regts with *Gepard* 35mm SP.
4 SSM bns with 26 *Lance*.
3 army aviation comds, each with 1 lt, 1 med tpt hel regt (3 hel ATGW regts, 1 indep hel sqn forming).

On the runway: C-160 Transalls of West Germany's Transport Command.

Territorial Army: 38,000.
3 Territorial Commands, 6 Military Districts, 6 Home Defence bdes (each with 2 tk, 2 inf, 1 arty bns and manned, on average, at 60%). 6 more Home Defence bdes planned (each with 1 tk, 2 inf, 1 fd arty bns): weapons storage units only in peacetime. Security troops: 15 Home Defence Regiments (45 mot inf bns), 150 coys, 300 security platoons; defensive, comms, military police, and service units on mobilization.
AFV: 1,200 M-48A2/A2G2, 2,437 *Leopard* I, 150 *Leopard* 2 med tks; 408 SpPz-2 *Luchs*, 1,000 SPz 11-2, 280 SPz 12-3 (HS-30) armd cars; 2,136 *Marder* MICV, 270 TPZ-1, 4,000 M-113 APC.
Arty: 200 105mm, 164 FH-70 155mm how; 586 M-109 155mm how, 60 M-107 175mm guns (being replaced by 203mm), 77 M-110 203mm SP how; 1,000 120mm mor; 208 *LARS* 110mm MRL; 26 *Lance* SSM.
ATK: 770 JPz 4-5 90mm SP ATK guns; 200 106mm RCL; 170 SS-11, 1,700 *Milan*, 347 *TOW* ATGW, 200 RJPz-(*HOT*) SP ATGW launchers.
AD: 1,745 20mm, 200 40mm towed, 400 *Gepard* 35mm SP AA guns; 800 *Redeye*, 100 *Roland* SAM.
Air: 190 UH-1D, 200 *Alouette* II/III, 25 PAH-1 (Bo-105P with *HOT*), 25 Bo-105M, 108 CH-53G hel.
(On order: 1,550 *Leopard* 2 tks; 576 TPZ-1 APC; 52 FH-70 155mm, improved 203mm how; 182 *Milan* ATGW, 762 RJPz-(*TOW*), 174 RJPz-(*HOT*) SP ATGW launchers; 200 *Roland* II SAM; 152 PAH-1, 75 Bo-105M hel.)

Navy: 36,500, incl naval air arm (11,000 conscripts).
24 submarines (18 Type 206, 6 Type 205).
9 destroyers: 3 *Adams* with 1 *Tartar* SSM and 8 *ASROC;* 4 *Hamburg* with 2 twin *Exocet* SSM; 2 ex-US *Fletcher*.
6 *Köln* frigates.
6 corvettes: 5 *Thetis*, 1 *Hans Bürkner*.
30 FAC(M) with 4 *Exocet* SSM: 10 Type 143, 20 Type 148.
10 Type 142 FAC(T).
18 *Lindau* MCM: 6 coastal minesweepers, 12 Type 331 *Troika* control minehunters; 18 F-1 drone MCM vessels.
22 *Schütze* coastal minesweepers.
18 inshore minesweepers: 4 Type 393/394B, 14 Type 393/394A.
10 *Rhein* depot, 8 *Lüneberg* spt ships, 6 tpts, 7 tankers.
22 Type 520 LCU, 28 Type 521 LCM.
(On order: 6 Type 122 frigates, 10 Type 143A FAC(M).)

Bases: Flensburg, Wilhelmshaven, Kiel, Olpenitz.

NAVAL AIR ARM: 112 combat aircraft.
3 attack sqns with 66 F-104G.
1 recce sqn with 27 RF-104G.
2 MR sqns with 14 *Atlantic*, 5 ELINT *Atlantic*.
1 SAR hel sqn with 21 *Sea King* Mk 41.
1 utility sqn with 20 Do-28-2 ac.
Trg: 9 TF-104F.
ASM: AS-20, AS-30, AS-34 *Kormoran*.
(On order: 112 *Tornado* MRCA, 4 *Westwind* ac, 12 *Lynx* hel, AS-34 *Kormoran* ASM.)

Air Force: 106,000 (38,000 conscripts); 552 combat aircraft.
Tactical Command (GAFTAC): 479 combat ac.
12 FGA sqns: 8 with 144 F-104G; 4 with 60 F-4F.
7 lt FGA sqns: 5 with 90 *AlphaJet;* 2 with 42 G-91R3 (converting to 36 *AlphaJet*).
4 interceptor sqns with 60 F-4F.
4 recce sqns with 60 RF-4E.
1 OCU with 18 TF-104G; 5 HFB-320 *Hansa Jet* ECM trg.
8 SSM sqns with 72 *Pershing* 1A.
3 SAM regts (each of 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.
AAM: *Sidewinder*.
Transport Command.
3 tpt sqns with 75 Transall C-160 (some being withdrawn).
5 hel sqns with 92 UH-1D.
1 special air mission sqn 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: 73 combat ac.
Combat trg wing (Luke Air Force Base, USA) with 30 F-104G (+10 in store), 17 TF-104G (+11 in store).
Combat trg: 1 sqn (Cottesmore, Britain) with 16 *Tornado;* 1 det at Goose Bay, (Canada).
OCU (George Air Force Base, USA): 10 F-4E.
Pilot trg wing (Sheppard Air Force Base, USA) with 35 T-37B, 41 T-38A.
Primary trg unit with 31 P-149D.
Miscellaneous liaison, range, and base flts with 21 G-91R3 (reserve), 113 Do-28D.
(On order: 109 *Tornado* (86 FGA, 23 trainers), 36 *AlphaJet* FGA.)

RESERVES: 750,000 (all services).

GREECE

Population: 9,585,000.
Military service: Army 22, Navy 26, Air Force 24 months.
Total armed forces: 193,500 (834 women; 150,000 conscripts).
Estimated GDP 1980: $44 bn.
Defence expenditure 1980: 71.25 bn drachmas ($1.77 bn); NATO definition not available.
$1 = 40.17 drachmas (1980).

Army: 150,000 (123,000 conscripts).
3 Military Regions; 4 corps HQ.
1 armd div.
1 mech div.
12 inf divs.
1 para-cdo div (1 para, 1 cdo bdes; 1 marine, 1 cdo bns).
3 armd bdes.
1 marine inf regt.
12 fd, 3 AA arty bns.
2 SSM bns with 8 *Honest John* (1 more to be formed).
1 SAM bn with 18 *Improved HAWK*.
14 army aviation coys, 1 indep flt.
350 M-47, 810 M-48, 230 AMX-30 med, 80 M-41, 190 M-24 lt tks; 665 M-3A1, 240 M-8, 40 M-20 armd cars; 120 AMX-10P MICV, 80 *Leonidas*, 120 M-2, 460 M-3 half-track, 460 M-59, 820 M-113 APC; 600 25-pdr, 36 M-2 155mm, 36 M-107 175mm guns; 108 75mm pack, 324 M-101 105mm, 270 M-114A1 155mm, 72 M-115 203mm towed; 126 M-52A1 105mm, 54 M-44, 60 M-109A2 155mm, 20 M-110 203mm SP how; 24 *Honest John* SSM; 700 106mm RCL; 64 M-18 SP ATK guns; SS-11, 400 *Cobra*, *TOW*, *Milan* ATGW: twin 20mm RH-202, 40mm, 75mm, 90mm AA guns; 18 *Improved HAWK*, *Redeye* SAM; 1 *Super King Air*, 2 Aero *Commander*, 50 U-17A ac; 5 Bell 47G, 22 UH-1D, 50 AB-204B/-205 hel.
(On order: 55 AMX-30, 106 *Leopard* 1A4 med tks, 12 M-113A2, 8 *Leonidas* APC, 37 *Chaparral* SAM, 6 CH-47, 8 AH-1 hel with *TOW*.)

RESERVES: about 350,000, incl some 100,000 National Guard, 3 Territorial, 17 Sub-Commands: 12 indep inf bdes, some 100 Home Guard bns (mainly coastal defence); M-41, M-24 lt tks, 70 M-3A1, armd cars, M-2, M-3 half-track, 75mm pack, 25-pdr, 105mm guns/how, 106mm RCL.

Navy: 19,000 (12,000 conscripts).
10 submarines: 8 Type 209, 2 ex-US *Guppy*.
16 ex-US destroyers: 6 *Gearing*, 9 *Fletcher*, 1 *Sumner*.
6 frigates: 1 *Kortenaer*, 1 ex-*Rhein*, 4 ex-US *Cannon*.
15 FAC(M): 13 *La Combattante* II/III (8 with *Exocet*, 5 with *Penguin* SSM), 2 with SS-12 SSM.
12 FAC(T): 7 *Jaguar*, 5 *Nasty*(.
3 coastal patrol craft.
2 coastal minelayers.
14 coastal minesweepers (9 MSC-294, 5 ex-US *Adjutant*).
1 LSD, 7 LST, 5 LSM, 10 LCU, 13 LCM, 14 LCA, 34 LCVP.
1 ASW hel sqn with 12 AB-212.
(On order: 1 FAC(M) with *Penguin*, 32 *Harpoon* SSM.)

Bases: Patrai, Salamis, Thessaloniki, Suda Bay.

RESERVES: about 20,000.

Air Force: 24,500 (15,000 conscripts); 409 combat ac, 4 armd hel.
Tactical Air Force: 7 combat wings: 1 tpt wing.
12 FGA sqns: 3 with 54 A-7H, 6 TA-7H; 3 with 54 F-4E; 2 with 33 F/TF-104G; 4 (reserve) with 96 F-84.
6 interceptor sqns: 3 with 43 F-5A, 2 with 38 *Mirage* F-1CG, 1 (reserve) with 24 F-102A/TF-102A.
2 recce sqns: 1 with 16 RF-5A, 6 RF-4E; 1 (reserve) with 18 RF-84F.
1 OCU with 9 F-5B.
1 MR sqn with 12 HU-16B *Albatross* ac, 4 *Alouette* III hel.
3 tpt sqns with 12 C-130H, 6 YS-11, 8 C-47, 30 *Noratlas*, 1 *Gulfstream*, 7 CL-215.
3 hel sqns with 12 AB-205, 2 AB-206A, 10 Bell 47G, 8 UH-19D, 35 UH-1D.
Air Training Command: incl 42 T-33, 20 T-41A, 1 sqn with 16 T-37C, 1 sqn with 36 T-2E.
AAM: *Sparrow*, *Sidewinder*, *Super Sidewinder*, *Falcon*, R-550 *Magic*.
ASM: *Maverick*, *Bullpup*.
1 SAM wing: 1 bn with 36 *Nike Hercules;* 1 with 36 *Nike Ajax*.
(On order: 8 CH-47C hel, 300 *Super Sidewinder* AAM, 200 *Maverick* ASM.)

RESERVES: about 20,000.

Para-Military Forces: Gendarmerie (30,000): Mowag *Roland*, 15 UR-416 APC. Coastguard and Customs (4,000): some 100 patrol craft.

ITALY

Population: 57,200,000.
Military service: Army and Air Force 12 months, Navy 18 months.
Total armed forces: 366,000 (239,300 conscripts).
Estimated GDP 1980: $384 bn.
Defence expenditure 1981: 7,500 bn lire ($7.2 bn); NATO definition $8.89 bn.
$1 = 1,040.5 lire (1981), 878.5 lire (1980).

Army: 255,000 (188,000 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 *HAWK* SAM bns).
550 M-47, 300 M-60A1, 900 *Leopard* I med tks; 4,100 M-106, M-113, M-548 and M-577 APC; 36 M-107 175mm SP guns; 1,067 how, incl 334 105mm pack, 697 155mm (incl 62 FH-70 and 205 M-109E SP), 36 203mm; 81mm, 107mm, 120mm mor; 6 *Lance* SSM; 57mm, 106mm RCL; *Cobra*, SS-11, *TOW*, *Milan* ATGW; 230 40mm AA guns; 22 *Improved HAWK* SAM.
(On order: 105 *Leopard* I med tks, 400 M-113 APC; 180 FH-70 155mm towed, SP-70, M-109 155mm SP how; *TOW*, *Milan* ATGW.)

ARMY AVIATION: 20 units with 35 O-1E, 80 SM-1019 lt ac; hel incl 70 AB-47G/J, 36 AB-204B, 98 AB-205A, 140 AB206A/A-1, 24 CH-47C, 5 A-109 *Hirundo*.
(On order: 60 A-129 *Mangusta*, 2 CH-47C, 10 AB-212 hel.)

RESERVES: 550,000.

Navy: 42,000, incl 1,500 air arm, 1,000 marines, and 23,000 conscripts.
9 submarines: 2 *Sauro*, 4 *Toti*, 2 ex-US *Tang*, 1 ex-US *Guppy* III.
1 *Vittorio Veneto* hel carrier with 9 AB-212 ASW hel, twin *Terrier* SAM.
2 *Andrea Doria* cruisers with 4 ASW hel, twin *Terrier*.
4 GW destroyers: 2 *Audace* with 2 ASW hel, 1 *Tartar* SAM; 2 *Impavido* with 1 *Tartar*.
1 *Impetuoso*-class destroyer.
12 frigates: 4 *Lupo* with 8 *Otomat* SSM, 8 *Sea Sparrow* SAM, 1 ASW hel; 2 *Alpino* with 2 hel; 3 *Bergamini* with 1 hel; 3 *Centauro* (to retire).
8 corvettes: 4 *De Cristofaro*, 4 *Albatross*.
1 *Sparviero* hydrofoil with *Otomat* SSM.
4 FAC: 2 *Freccia* (1 with 5 *Sea Killer* SSM), 2 *Lampo*.
4 ex-US *Aggressive* ocean, 7 ex-US *Adjutant* and 11 *Agave* coastal, 5 *Aragosta* inshore minesweepers; 5 ex-US *Adjutant* minehunters.
2 ex-US *De Soto County* LST, 19 ex-US LCM.
2 *Stromboli* replenishment tankers.
1 Marine inf bn (600) with M-113A1, LVTP-7 APC, 81mm, 106mm RCL.
(On order: 2 *Sauro* subs, 1 hel carrier, 2 *Audace* destroyers, 6 *Maestrale* frigates, 6 SSM hydrofoils, 4 *Lerici*-class minehunters.)

Bases: La Spezia, Taranto, Ancona, Brindisi, Augusta, Messina, La Maddalena, Cagliari, Naples, Venice.

NAVAL AIR ARM: 88 combat hel.
5 ASW hel sqns: 2 with 24 SH-3D; 1 with 18 AB-204AS; 2 with 46 AB-212.
1 utility sqn with 12 AB-204B hel.
1 trg sqn with 12 AB-47J hel.
(On order: 17 AB-212, 16 SH-3D hel.)

RESERVES: 160,000; 41,000 active.

Air Force: 69,000 (28,300 conscripts); some 310 combat aircraft.
6 FGA sqns: 1 with 18 F-104G, 3 with 54 F-104S, 2 with 36 G-91Y.
3 lt attack/recce sqns with 54 G-91R/R1/R1A.
6 interceptor sqns with 72 F-104S.
2 recce sqns with 24 F/RF-104G.
2 MR sqns with 14 *Atlantic* (Navy assigned).
1 ECM/recce sqn: 1 G-222, 6 PD-808, 11 EC-47.
1 OCU with 12 TF-104G.
3 tpt sqns: 2 with 32 G-222, 1 with 10 C-130H.
4 comms sqns with 26 P-166M, 32 SIAI-208M, 8 PD-808, 2 DC-9 ac; 2 SH-3D, 20 AB-47 hel.
4 SAR sqns with 15 AB-204, 20 HH-3F hel.
6 trg sqns with 70 G-91T, 100 MB-326/-339, 14 P-166M, 20 SF-260M ac; 35 AB-47J, 5 AB-204B hel.
AAM: AIM-7E *Sparrow*, AIM-9B *Sidewinder*, *Aspide* 1A.
8 SAM groups with 96 *Nike Hercules*.
(On order: 100 *Tornado* MRCA, 100 MB-339 trg, 7 G-222 tpt ac, *Kormoran* ASM.)

RESERVES: 28,000; some additional aircraft.

Forces Abroad: Lebanon (UNIFIL): 340.

Para-Military Forces: 84,500 *Carabinieri:* 1 mech bde with 13 bns, 1 AB bn, 2 cav sqns with 29 M-47 med tks, 9 Fiat 6616, 120 M-6, M-8 armd cars, 470 Fiat 242/18AD, 200 M-113 APC, 23 AB-47, 2 A-109, 5 AB-205, 23 AB-206 hel. 68,436 Public Security Guard: 12 mobile units with 30 VTC 6614 APC, 3 P-64B ac, 1 AB-47J, 3 A-109, 13 AB-206A, 2 AB-212 hel. 45,064 Finance Guards with 14 AB-47J, 61 NH-500M hel, patrol craft.
(On order: 41 Fiat 6616 armd cars, 10 VTC 6614 APC, 2 A-109, 2 AB-212 hel.)

LUXEMBOURG

Population: 364,000.
Military service: voluntary.
Total armed forces: 690.
Estimated GDP 1980: $4.17 bn.
Defence expenditure 1981: 1.23 bn francs ($35.9 m); NATO definition: $50.6 m.
$1 = 34.2 francs (1981), 30.46 francs (1980).

Army: 690.
1 lt inf bn.
1 indep coy.
81mm mor; *LAW* RL; *TOW* ATGW.
(On order: 5 V-150 *Commando* APC.)

Para-Military Forces: 450 Gendarmerie.

NETHERLANDS

Population: 14,178,000.
Military service: Army 14–16 months, Navy and Air Force 14–17 months.
Total armed forces: 102,800 (1,316 women; 49,300 conscripts).
Estimated GDP 1980: $15.43 bn.
Defence expenditure 1981: 11.397 bn guilders ($4.94 bn); NATO definition: $4.93 bn.
$1 = 2.31 guilders (1981), 2.07 guilders (1980).

Army: 67,000 (42,500 conscripts), but see Reserves.
2 armd bdes.
4 mech inf bdes.
1 SSM bn with *Lance*.
3 hel sqns (Air Force-manned).
468 *Leopard*, 1,343 *Centurion* med, 131 AMX-13 lt tks; 242 AMX-VCI, 744 M-113, 743 YP-408 (to retire), 871 YPR-765 APC; 44 105mm, 140 155mm, 28 203mm how; 82 AMX 105mm (being replaced by M-109 155mm), 136 M-109 155mm, 26 M-107 175mm (being replaced by 203mm), 13 M-110 203mm SP guns/how; 6 *Lance* SSM; 81mm, 194 107mm, 149 120mm mor; *Carl Gustav* 84mm, 106mm RCL; *LAW* RL; *TOW* ATGW; 131 L-40/70 40mm towed, 95 *Gepard* 35mm SP AA guns; 48 *Alouette* III, 24 Bo-105 hel.
(On order: 445 *Leopard* 2 med tks; 144 M-198 155mm how; 37 M-110A2 203mm SP how; 350 *Dragon* ATGW.)

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. A number of inf bdes could be mobilized for territorial defence.

Navy: 16,800, incl marines and naval air arm (2,200 conscripts).
6 submarines: 2 *Zwaardvis*, 2 *Potvis*, 2 *Dolfijn*.
2 *Tromp* GW destroyers (flagships): 16 *Harpoon* SSM, 1 *Tartar*, 8 *Sea Sparrow* SAM, 1 *Lynx* hel.
3 *Friesland* destroyers (being replaced by *Kortenaer* frigates).
10 frigates: 4 *Kortenaer* with 8 *Harpoon*, *Sea Sparrow*; 1 *Lynx* hel; 6 *Van Speijk* with 8 *Harpoon*, 2 quad *Seacat* SAM, 1 hel.
6 *Wolf* corvettes.
5 *Balder* large patrol craft.
3 *Onversaagd* MCM spt ships; 15 *Dokkum* coastal minehunters; 16 *Van Straelen* inshore minesweepers.
2 *Poolster* fast combat spt ships.
10 LCA(.
(On order: 2 *Walrus* subs, 8 frigates, 15 *Alkmaar* minehunters, *Harpoon* SSM.)

Bases: Den Helder, Flushing, Curacao.

MARINES: 2,900.
2 amph combat gps.
1 mountain/arctic warfare coy.

NAVAL AIR ARM: 1,800; 17 combat ac, 9 hel.
2 MR sqns with 6 SP-13A *Atlantic*, 10 P-2 *Neptune*, 1 P-3C *Orion*.
2 ASW hel sqns with 9 *Lynx* HAS-27.
1 SAR hel sqn with 6 *Lynx* HAR-25.
(On order: 12 P-3C *Orion* ASW, 2 F-27 MR ac; 8 *Lynx* ASW hel.)

RESERVES: about 20,000; 9,000 on immediate recall.

Air Force: 19,000 (4,600 conscripts); 182 combat aircraft.
Tactical Air Command:
5 FGA sqns: 3 with 54 NF-5A, 2 with 36 F-104G.
2 interceptor sqns: 1 with 18 F-16; 1 with 18 F-16 converting.
1 recce sqn with 18 RF/TF-104G.
3 OCU: 1 with 18 NF-5B; 1 with 8 TF-104; 1 with 8 F-16A, 4 F-16B (for FGA sqn trg).
1 tpt sqn with 12 F-27.
1 SAR flt with 4 *Alouette* III.
AAM: AIM-9 *Sidewinder*.
11 SAM sqns with 66 *Improved HAWK* (8 in Germany).
4 SAM sqns with 16 *Nike Hercules*.
(On order: 76 F-16 FGA, incl F-16B trainers; 25 *Shorad/Flycatcher* AA systems.)

RESERVES: about 6,000.

Forces Abroad:
Germany: Army: 5,500; 1 armd bde, 1 recce, 1 engr bns, spt elements.
Lebanon (UNIFIL): Army: 1 bn (816).
Netherlands Antilles: Navy: 1 destroyer, 1 amph combat det, 1 MR det (3 ac).

Para-Military Forces: 8,400: Royal Military Constabulary (*Koninklijke Marechaussee*) 3,650 regulars, 450 conscripts; 3 divisions comprising nine districts with 87 brigades. Home Guard: 4,300; 3 sectors; inf weapons.

NORWAY

Population: 4,100,000.
Military service: Army 12 months, Navy and Air Force 15 months.
Total armed forces: 37,000 (6,065 women; 26,500 conscripts).
Estimated GDP 1980: $55.7 bn.
Defence expenditure 1980: 7.21 bn kroner ($1.57 bn); NATO definition not available.
$1 = 5.08 kroner (1980).

Army: 18,000 (16,095 conscripts).
1 bde gp of 3 inf bns, 1 bn gp, in North Norway.
Indep armd sqns, inf bns, and arty regts.
78 *Leopard*, 38 M-48 med, 70 NM-116 (M-24/90) lt tks; M-113 APC; 250 105mm, 155mm how; 130 M-109 155mm SP how; 107mm mor; *Carl Gustav* 84mm, 106mm RCL; *ENTAC*, *TOW* ATGW; Rh-202, 20mm, L/70 40mm AA guns; RBS-70 SAM; 24 O-1E, 24 L-18 lt ac.

RESERVES: 122,000: 11 Regimental Combat Teams (bdes) of about 5,000 men each, spt units and territorial forces; 21 days refresher training each 3rd/4th year. Home Guard (all services) 85,000 (90 days initial service).

Navy: 9,000, incl 1,600 coast artillery (5,000 conscripts).
15 Type 207 *Kobben* submarines.
5 *Oslo* frigates with 6 *Penguin* SSM, 8 *Sea Sparrow* SAM.
2 *Sleipner* corvettes.
40 FAC(M) with *Penguin* SSM: 20 *Storm*, 14 *Hauk*, 6 *Snögg*.
8 *Tjeld* FAC(T).
1 *Vadsø* patrol craft.
2 *Vidar* coastal minelayers, 9 ex-US MSC-60 coastal minesweepers, 1 minehunter.
1 *Horten* depot ship.
7 LSM: 2 *Kvalsund*, 5 *Reinøysund*.
33 coast arty btys: 75mm, 105mm, 127mm, 150mm guns.
(On order: 8 T-210 submarines, 2 *Hauk* FAC(M), 1 inshore minesweeper, 3 fishery protection ships, 120mm guns.)

Bases: Horten, Bergen, Harstad, Tromsø.

RESERVES: 22,000. Coastguard established as part of Navy; 2 Type 320 patrol vessels with 6 *Penguin* II SSM, 1 *Lynx* hel; 12 armd vessels (1 Type 320 on order).

Air Force: 10,000 (5,485 conscripts); 115 combat ac, 4 armed hel.
4 FGA sqns: 3 with 54 F-5A; 1 with 16 CF-104G/D, 2 TF-104B.
1 interceptor sqn with 16 F-16A.
1 recce flt with 3 RF-5A.
1 MR sqn with 7 P-3B.
1 OCU with 13 F-5B, 4 F-16B.
1 ASW hel sqn with 6 *Lynx* (2 coastguard).
2 tpt sqns: 1 with 6 C-130H, 3 *Falcon* 20S; 1 with 5 DHC-6 ac; 8 UH-1B hel.
1 SAR hel sqn with 10 *Sea King* Mk 43.
2 utility hel sqns with 26 UH-1B.
27 *Safir* trainers (being replaced by *Safari*).
AAM: *Sidewinder*. ASM: *Bullpup*.
4 lt AA bns with L/70 40mm guns.
1 SAM bn (4 btys) with 128 *Nike Hercules*.
(On order: 44 F-16A, 8 F-16B fighters; 2 P-3C MR, 16 *Safari* trg ac; 1 *Sea King* hel; 40 *Roland* II, RBS-70 SAM; *Penguin* III ASM.)

RESERVES: 18,000. 7 lt AA bns for airfield defence with L/60 40mm guns.

Forces Abroad: Lebanon (UNIFIL): 952; 1 bn, 1 service coy, 1 medical coy, 1 hel flt.

PORTUGAL

Population: 10,067,000.
Military service: Army 16 months; Navy, Air Force 24 months.
Total armed forces: 70,926 (18,000 conscripts).
Estimated GDP 1980: $23.91 bn.
Defence expenditure 1981: 49.0 bn escudos ($869 m); NATO definition: $944 m.
$1 = 56.39 escudos (1981), 50.45 escudos (1980).

Army: 47,000 (10,000 conscripts).
6 regional commands (4 military regions, 2 island commands).
1 inf bde.
1 tk regt.
3 cav regts.
14 inf regts, 1 indep inf bn.
1 cdo regt.
3 fd regts, 2 indep fd arty bns.
1 AA and coast arty bn.
2 engr regts.
1 sigs regt, 1 sigs bn.
34 M-47, 23 M-48A5 med, 11 M-24 lt tks; 34 Panhard EBR hy, 27 AML lt, 32 *Ferret* Mk 4 armd cars; 86 M-113, 79 *Chaimite (Commando)* APC; 95 5.5-in (140mm) guns, 216 M-101A1, M-18 105mm guns/how; 54 107mm, 82 120mm mor; 12 90mm, 131 106mm RCL; 21 *TOW* ATGW; 56 150mm, 152mm, 234mm coast arty; 288 40mm AA guns.

Navy: 13,426 incl 2,689 marines (5,200 conscripts).
3 *Albacora* (Fr *Daphne*) submarines.
17 frigates: 4 *Andrade*, 6 *Coutinho*, 4 *Belo*, 3 *Silva*.
10 *Cacine* large patrol craft.
16 coastal patrol craft, incl 4 *Sao Roque* minesweepers.
2 LCT, 11 LCM, 1 LCA.
(On order: 3 modified *Kortenaer* frigates.)

Base: Lisbon (Alfeite).

Air Force: 10,500, incl 2,000 para (2,800 conscripts); 85 combat aircraft.
1 combat, 5 administrative wings:
2 FGA sqns: 1 with 20 G-91R3, 8 G-91T3; 1 with 21 G-91R4, 2 G-91T3.
1 recce sqn with 4 CASA C-212B.
1 OCU with 18 T-33A, 12 T-38 COIN ac.
3 tpt sqns: 1 with 5 C-130H; 2 with 16 CASA C-212 *Aviocar*.
2 SAR hel sqns with 11 SA-330 *Puma*.
2 hel/utility sqns with 30 *Alouette* III.
2 liaison sqns with 32 Reims-Cessna FTB 337G.
3 trg sqns: 1 with 2 CASA C-212A ac, 3 *Alouette* III hel; 1 with 25 T-37C; 1 with 35 *Chipmunk*.
1 para regt (3 bns).
(On order: 20 A-7P FGA ac, 12 A-109A hel (4 with *TOW*).)

Para-Military Forces: National Republican Guard: 14,600; Public Security Police: 15,290; Fiscal Guard: 7,385.

TURKEY

Population: 46,263,000.
Military service: 20 months.
Total armed forces: 569,000 (489,000 conscripts).
Estimated GNP 1978: $45.3 bn.
Defence expenditure 1981: 298 bn liras ($3.1 bn); NATO definition not available.
$1 = 95.95 liras (1981), 25 liras (1978).

Army: 470,000 (420,000 conscripts).[8]
4 army HQ: 8 corps HQ.
1 armd div.
2 mech inf divs.
14 inf divs.
6 armd bdes.
4 mech bdes.
8 inf bdes.
1 para bde, 1 cdo bde.
4 SSM bns with 16 *Honest John*.
3,000 M-47, 500 M-48 med tks; M-8 armd cars; 1,600 M-113, 400 M-59, 900 M-2/-3 and *Commando* APC; 1,500 75mm, 105mm, 155mm (incl M-109 SP), and 203mm (incl M-110 SP) how; 400 105mm, 210 155mm, 36 175mm SP guns; 1,750 60mm, 81mm, 4.2-in (107mm), 120mm mor; 18 *Honest John* SSM; 1,200 57mm, 390 75mm, 800 106mm RCL; M-18, M-36 76mm SP ATK guns; 85 *Cobra*, SS-11, *TOW* ATGW; 900 40mm, M-51 75mm, M-117/-118 90mm AA guns;
2 DHC-2, 18 U-17, 6 Cessna 206, 3 Cessna 421, 7 Do-27, 9 Do-28, 20 *Baron*, 40 *Citabria* 150S trg ac; 100 AB-205/-206, 20 Bell 47G, 48 UH-1D hel.
(On order: 70 *Leopard* 1A3 med tks; *TOW*, 2,500 *Milan* ATGW.)

RESERVES: 400,000.

Navy: 46,000, incl marines (36,000 conscripts): 22 combat ac, 9 armed hel.
14 submarines (2 in reserve): 4 Type 209, 9 ex-US *Guppy*, 1 *Tang*.
14 ex-US destroyers: 7 *Gearing* with *ASROC*, 4 *Fletcher*, 1 *Sumner*, 1 *Smith*, 1 *Carpenter*.
2 *Berk* frigates, each with 1 hel.
13 FAC(M): 4 *Dogan* (Lürssen) with quad *Harpoon* SSM. 9 *Kartal* with *Penguin* SSM.
8 FAC(T): 7 *Jaguar*, 1 *Girne*.
45 large patrol craft (incl 2 ex-US *Asheville*, 6 PC-1638, 4 PGM-71, 3 SAR 33 type), some with Gendarmerie.
4 83-ft coastal patrol craft.
1 *Nusret*, 9 coastal minelayers.
26 minesweepers: 12 ex-US *Adjutant*, 4 ex-Can MCB, 6 ex-Ger *Vegesack* coastal, 4 ex-US *Cape* inshore.
5 LST, 36 LCT, 16 LCU, 20 LCM.
1 ex-Ger depot ship (trg), 5 tankers.
1 ASW sqn: 8 S-2A, 12 S-2D/E, 2 TS-2A *Tracker* ac; 3 AB-204B, 6 AB-212 ASW hel.
1 marine bde (5,000): HQ, 3 bns, 1 arty regt (18 guns), spt units.
(On order: 1 Type 209 sub, 4 FAC(M), 1 LST, *Harpoon* SSM, 10 AB-212 ASW hel.)

Bases: Gölcuk, Istanbul, Izmir, Eregli, Iskenderun.

RESERVES: 25,000.

Air Force: 53,000 (33,000 conscripts); 325 combat aircraft.
2 tactical, 1 administrative, 1 air training commands.
16 FGA sqns: 4 with 70 F-4E, 8 RF-4E; 5 with 70 F-5A/B; 3 with 48 F-100C/D/F, 4 RF-84F; 4 with 62 F/TF-104G.
2 interceptor sqns with 32 F-104S/TF-104S.
2 recce sqns with 27 RF-5A, 4 F-5B.
5 tpt sqns with 7 C-130E, 16 Transall C-160, 30 C-47, 3 C-54, 3 *Viscount* 794, 2 *Islander*, 2 CASA C-212, 6 Do-28, 3 Cessna 421 ac; 5 UH-19D, 6 HH-1H, 10 UH-1D hel.
Trainers incl 40 T-33A, 24 T-34, 25 T-37B/C, 30 T-38A, 20 T-41D, 5 T-42, 50 F-100C/F.
AAM: *Sidewinder, Sparrow, Falcon, Shafrir*.
ASM: AS-12, *Bullpup, Maverick*.
8 SAM sqns with 96 *Nike Hercules*.
(On order: 15 F-4E, 22 F-104, 12 G-91, 30 T-38A ac; *Super Sidewinder, Sparrow* AAM.)

Forces Abroad: Cyprus: 1 corps of 2 inf divs (20,000), 150 M-47/-48; M-113.

Para-Military Forces: 120,000 Gendarmerie (incl 3 mobile bdes), large patrol craft.

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[1] Conscripts serve 8 months if posted to Germany, 10 months if serving in Belgium.

[2] NATO budget content is standardized and differs from national.

[3] 5 resident inf bns, 4 units in inf role.

[4] The Canadian Armed Forces were unified in 1968. Of the total strength, some 46,000 are not identified by service.

[5] 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 are also a Communications Command and a Canadian Forces Training System.

[6] Incl 10,250 on inter-service central staff.

[7] The military divisions of the Ministry of Defence, Central Military Agencies, and Central Medical Agencies comprise 11,300 military personnel. The overall strength of the armed forces includes 6,000 reserve duty training positions.

[8] About half the divs and bdes are below strength, much eqpt is unserviceable.

Other European Countries

Albania: Albania joined the Warsaw Pact in 1955 but left it in 1968, moving into a closer relationship with China. After 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: The State Treaty of 1955, which re-established Austrian independence, prohibits Austria from acquiring 'nuclear weapons, long-range artillery, chemical and biological weapons, self-propelled missiles, submarines, assault craft, manned torpedoes, and sea mines'. Austria's constitution contains a declaration of permanent neutrality. A small indigenous arms industry supplies the armed forces and provides a few foreign sales.

Cyprus: Independent as a bi-national state in 1960, the Turkish occupation of the northern part of Cyprus since July 1974 has effectively produced two entities, each with its own small armed forces. Both Greece and Turkey are also entitled, under an associated Treaty of Alliance with the Republic of Cyprus, to maintain a contingent in the island. Britain—a signatory with Greece and Turkey of the 1959 Treaty of Guarantee which guarantees the independence, territorial integrity, and security of the Republic—maintains a garrison in two Sovereign Base Areas at Akrotiri and Dhekelia. The United States maintains a signals establishment. The United Nations has a peace-keeping force (UNFICYP) on the island.

Eire: Independent since 1922, Eire plays an active role in UN peace-keeping operations. With no significant arms industry, Eire has bought arms from many sources, *e.g.*, Britain, France, Sweden, and the US.

Finland: A 1948 Treaty of Friendship, Co-operation, and Mutual Assistance enables Finland to call upon the USSR for assistance to repel an aggressor. 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.

Malta: After independence in 1964, Malta had a defence agreement with Britain. The island became a NATO base in 1972; NATO and Italy bore part of the cost until the Treaty expired in 1979 and NATO troops were withdrawn. 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 was attacked and to guarantee her independence.

OTHER EUROPEAN COUNTRIES

1. Albania
2. Austria
3. Cyprus
4. Eire
5. Finland
6. Malta
7. Spain
8. Sweden
9. Switzerland
10. Yugoslavia

Spain: Following the Civil War in 1936–9, Spain remained neutral during World War II. In 1953 an agreement granted the United States air base rights at Torrejón, Morón, and Zaragoza, and an air and naval base at Rota. These rights were renegotiated in 1976. Morón remains as a stand-by base, and nuclear weapons have been withdrawn from Rota, though it is still an active air base. The agreement is being renegotiated in 1981. Spain has her own arms industry.

Sweden: Neutral in both world wars. Sweden's permanent peace-keeping organization 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.

Switzerland: Permanently neutral since 1815, Switzerland belongs to no defence organization. Her small arms industry produces most of her equipment, but Austria, France, Britain, and the US have also supplied material.

Yugoslavia: Expelled from the Cominform in 1948, she has since been a leading force in the Non-Aligned Movement and has maintained a balanced relationship with each bloc. She has no defence alliances but has purchased most of her military equipment from the USSR.

ALBANIA

Population: 2,750,000.
Military service: Army 2 years; Air Force, Navy, and special units 3 years.
Total armed forces: 43,000 (23,000 conscripts).
Estimated GNP 1974: $1.1 bn.
Defence expenditure 1980: 915 m leks ($199 m).
$1 = 4.46 leks (1981), 4.59 leks (1980).

Army: 30,000 (20,000 conscripts)[1]
1 tk bde.
8 inf bdes.
1 arty regt.
1 AD regt.
8 lt coastal arty bns.
70 T-34, 15 T-54, 15 T-59 med tks; BRDM-1 scout cars; 20 BA-64, BTR-40/-50/-152, K-63 APC; 76mm (incl SU-76 SP), 85mm, 122mm, 152mm guns; 122mm, 152mm how; 82mm, 120mm, 160mm mor; Type-63 107mm MRL; T-21 82mm RCL; 45mm, 57mm, 85mm ATK guns; 37mm, 57mm, 85mm, 100mm AA guns; SA-2 SAM.

RESERVES: 100,000.

Navy: 3,000 (1,000 conscripts).[1]
3 ex-Sov W-class submarines.
2 ex-Sov *Kronshtadt* large patrol craft.
42 FAC(T)(: 32 ex-Ch *Huchwan* hydrofoils, 10 P-4).
6 ex-Ch *Shanghai*-II FAC(G).
10 PO-2K patrol craft.
5 ex-Sov minesweepers: 2 T-43 ocean, 3 T-301 inshore.

Bases: Durres, Valona, Sazan Island, Pasha Liman.

Air Force: 10,000 (2,000 conscripts); 100 combat aircraft.[1]
6 fighter sqns with 20 MiG-15/F-2, 30 MiG-17/F-4, 30 MiG-19/F-6, 20 MiG-21/F-7.
1 tpt sqn with 4 Il-14, 10 An-2.
2 hel sqns with 30 Mi-4.
1 trg sqn with 10 MiG-15UTI.

RESERVES: 5,000.

Para-Military Forces: 13,000. Internal security force 5,000; frontier guard 8,000.

AUSTRIA

Population: 7,505,000.
Military service: 6 months, followed by 60 days reservist, 30–90 days specialist for 12 years.
Total armed forces: 50,300 (34,000 conscripts; total mobilizable strength 167,000). In addition some 70,000 reservists called up for trg during the year.
Estimated GNP 1980: $73 bn.
Defence expenditure 1981: 12.86 bn schilling ($870 m).
$1 = 14.78 schilling (1981), 13.56 schilling (1980).

Army: 46,000 (32,000 conscripts).
1 mech div of 3 mech bdes, each with 1 tk, 1 mech inf, 1 armd arty bns; 1 bde with 1 armd ATK bn, 3 AA coys.
28 *Landwehrstammregimente* (trg regts) to train and form reserves.
3 ordnance (log) regts.
3 arty bns.
2 armd ATK bns.
3 SP AA arty bns.
3 engr bns.
5 sigs bns.
2 indep boat coys.
100 M-47, 120 M-60A1 med tks; 460 Saurer 4K4F APC; 300 M-68 105mm turret mounted, 36 SFKM2 155mm fortress guns; 108 IFH 105mm, 24 FHM-1 155mm, 38 M-109 155mm SP how; 18 Steyr 680M3 130mm MRL; 300 81mm, 100 M-2/M-30 107mm, 100 120mm mor; *LAW*, 74mm, 84mm, 480 M-40 106mm RCL; 240 M-52/M-55 85mm towed, 153 *Kuerassier* SK 105mm SP ATK guns; 4 patrol boats.
(On order: 50 M-60A3 med tks, 18 M-109A2 155mm SP how.)

RESERVES: 8 reserve bdes (each of 3 inf, 1 arty, 1 engr/ATK, 1 cmd and spt bns) and 26 inf regts (*Landwehr*) distributed among 8 regional military cmds. 910,000 have a reserve commitment.

Air Force: 4,300 (2,000 conscripts); 34 combat aircraft.[2]
4 FGA sqns with 34 Saab 105O.
1 tpt wing with 2 *Skyvan*, 12 *Turbo-Porter*.
7 hel sqns with 13 AB-206A, 21 AB-212, 21 AB-204, 24 *Alouette* III, 12 OH-58B, 2 S-65-O (HH-53).
1 trg sqn with 19 Saab 91D.
Other ac incl 17 Cessna L-19, 2 L-20, 2 DHC-2.
3 indep AD bns with 370 20mm *Oerlikon*, 72 35mm GDF-001, 60 L/70 40mm towed (reserves), M-42 SP AA guns; *Super-Bat* and *Skyguard* AD system.

Forces Abroad: Cyprus (UNFICYP): 1 medical bn, (314); *Syria* (UNDOF): 1 bn (532); *Other Middle East* (UNTSO): 13.

CYPRUS

Population: 630,000 (490,000 Greek, 113,000 Turkish, 27,000 Other).

1. GREEK-CYPRIOT FORCES
Military service: 26 months.
Total armed forces: 8,000.
Estimated GNP 1979: $1.97 bn (whole island).
Defence expenditure 1981: £C 10.6 m ($27.3 m).
$1 = £C 0.388 (1981), £C 0.357 (1979).

Army: 8,000.[3]
1 armd bn.
2 recce/mech inf bns.
20 inf bns (under strength).
7 arty gps.
8 spt units.
10 T-34 med tks; 17 BTR-50 APC; 20 Marmon-Harrington armd cars; 120 100mm, 105mm and 25-pdr guns and 75mm how; 40mm, 3.7-in AA guns.

RESERVES: 37,000: 3,000 immediate; 34,000 second line.

Para-Military Forces: 3,000 armd police.

2. TURKISH-CYPRIOT SECURITY FORCE
About 4,500 men, organized in a number of inf bns. Some T-34 med tks.

RESERVES: 5,500 first-line, 10,000 second-line.

EIRE

Population: 3,450,000.
Military service: voluntary.
Total armed forces: 14,012.
Estimated GNP 1979: $15 bn.
Defence expenditure 1980: £E 144m ($285 m).
$1 = £E 0.506 (1980), £E 0.49 (1979).

Army: 12,428.
4 mobile bdes: each with 2 inf bns (1 has 3), 1 fd arty regt (1 has 1 AA regt in lieu), 1 motor sqn, 1 engr, 1 ordnance, 1 supply/tpt coys.
2 indep inf bns.
8 *Scorpion* lt tks; 20 AML-90, 32 AML-60 armd cars; 60 Panhard VTT/M3, 7 *Unimog*, 5 *Timoney* APC; 48 25-pdr gun/how; 6 M-56 105mm how; 199 60mm, 201 81mm, 72 120mm mor; 447 *Carl Gustav* 84mm, 96 PV-1110 90mm RCL; 4 *Milan* ATGW; 24 L/60, 2 L/70 40mm AA guns; RBS-70 SAM.
(On order: 8 *Scorpion* lt tks, M-56 105mm how, 81mm and 120mm mor, 7 L/70 AA guns.)

RESERVES: 22,098. 538 first line, 21,560 second line. 4 second line Reserve Army Groups (garrisons): 2 with 6 inf bns (1 has 4, 1 has 2), 2 fd arty regts (2 have 1), all with 1 engr, 1 supply/tpt coy.

Navy: 890.
4 corvettes.
2 ex-Br *Ton* coastal MCM (fishery protection).
(On order: 2 frigates.)

Base: Cork.

RESERVES: 5 coys: 450.

Air Force: 694; 15 combat aircraft.
1 COIN sqn with 6 *Super Magister*.
1 COIN/trg sqn with 9 SF-260WU. 2 *Chipmunk*.
1 liaison sqn with 8 Cessna 172H.
1 hel sqn with 8 *Alouette* III, 2 *Gazelle* hel.
1 comms flt with 3 *King Air*, 1 HS-125-700.

Forces Abroad: Cyprus (UNFICYP): 7. *Lebanon* (UNIFIL): 1 bn+ (672), 4 AML-90, 13 VTT/M3. *Other Middle East* (UNTSO): 21.

FINLAND

Population: 4,790,000.
Military service: 8–11 months (11 months for officers and NCOs).
Total armed forces: 39,900 (27,900 conscripts; total mobilizable strength about 700,000).
Estimated GNP 1980: $47.8 bn.
Defence expenditure 1981: 2.874 bn markka ($713 m).
$1 = 4.03 markka (1981), 3.92 markka (1980).

Army: 34,400, incl 3,000 Frontier Guards (24,000 conscripts).
7 Military Regions.
1 armd bde.
7 inf bdes.
3 fd arty regts.
2 coast arty regts (7 bns: 6 static, 1 mobile).
3 indep inf bns.
1 indep fd, 1 indep coast arty bns.
1 AA arty regt, 2 indep AA arty bns.
1 SAM bn with SAM-79 (SA-3 *Goa*).
T-54/-55 med, PT-76 lt tks; BTR-50P/-60 APC; 76mm, 74 105mm, 196 122mm, 130mm, 150mm, 152mm, guns/how; 81mm, 120mm mor; 55mm, *Miniman* 74mm, 95mm RCL; SS-11 ATGW;

[1]See p. 79 for all footnotes.

20mm, 23mm, 30mm, 35mm, 40mm, 57mm towed, ZSU-57-2 SP AA guns; SAM-79 (SA-3), SAM-78 (SA-7) SAM.

Navy: 2,500 (1,900 conscripts).
1 ex-Sov *Riga* frigate.
2 *Turunmaa* corvettes.
5 FAC(M) with MTO *(Styx)* SSM: 4 ex-Sov *Osa*-II, 1 *Isku*.
11 *Nuoli* FAC(G).
5 large patrol craft: 3 *Ruissalo*, 2 *Rihtniemi*.
3 minelayers, 6 *Kuha* inshore minesweepers.
1 HQ/log/trg ship (minelayer)
14 small LCU/tpts, 8 utility/spt ships.
(On order: 8 *Tstv* (PB-80) FAC, 5 log ships.)

Bases: Uppiniemi (Helsinki), Turku.

Air Force: 3,000 (2,000 conscripts); 49 combat ac.
3 AD districts: 3 fighter wings.
2 fighter sqns with 28 MiG-21bis, 12 J-35S *Draken*.
1 OCU with 6 MiG-21U/UM, 3 J-35C.
1 tpt sqn: 7 C-47, 2 F-27-100 ac; 1 hel flt with 6 Mi-8, 2 Hughes 500.
Trainers incl 60 *Magister*, 20 Saab *Safir*, 4 *Hawk*, 4 Leko 70.
Liaison ac: 5 *Cherokee Arrow*, 2 Cessna 402.
AAM: AA-2 *Atoll, Falcon*.
(On order: 3 *Learjet* 35A tpts; 45 *Hawk*, 26 Leko 70 trg ac.)

RESERVES (all services): 700,000 (32,000 a year do training).

Forces Abroad: Cyprus (UNFICYP): 11. *Syria* (UNDOF): 388. *Other Middle East* (UNTSO): 21. *Pakistan* (UNMOGIP): 4.

Para-Military Forces: 4,000 Frontier Guards, 5 large, 11 coastal patrol craft, some 95 smaller craft.

MALTA

Population: 350,000.
Military service: voluntary.
Total armed forces: 800.
Estimated GNP 1980: $1,098 m.
Defence expenditure 1981: £M 3,044 m ($8.8 m).
$1 = £M 0.346 (1981), £M 0.343 (1980).

Army: 800.
1 inf bn (incl 1 arty coy, 40mm AA guns).
1 task force.
1 marine section with 14 launches/patrol craft(.
1 air section with 1 AB-206, 3 *Alouette* II, 4 AB-47G hel.

Para-Military Forces: 3,000 pioneers.

SPAIN

Population: 37,800,000.
Military service: 15 months.
Total armed forces: 342,000 (230,000 conscripts).
Estimated GNP 1979: $197 bn.
Defence expenditure 1981: 337.46 bn pesetas ($3.98 bn).
$1 = 84.61 pesetas (1981); 69.91 pesetas (1979).

Army: 255,000 (190,000 conscripts).
Immediate Intervention Force:
1 corps HQ.
1 armd div, 1 mech div, 1 mot div } each with 2 bdes.
1 armd cav bde.
1 para bde.
1 airportable bde.
1 arty bde, 2 indep arty regts, 1 lt AA regt.
1 engr, 1 sigs, 1 chemical/nuclear defence regts.
Territorial Defence Force:
9 Military Regions:
2 mountain divs.
10 indep inf bdes (incl, 1 Reserve bde).
1 mountain bde.
1 arty bde (incl 1 *HAWK* SAM bn, 1 *Nike Hercules* bty).
3 hy arty regts.
8 coast arty regts.
Overseas Forces:
2 Commands: Balearic, Canary Islands:
7 inf regts.
3 Foreign Legion regts.
6 arty/AA regts.
2 engr regts; 2 indep bns.
2 lt armd car regts, 2 lt cav regts.
4 *Regulares* inf gps.
2 cdo, 2 special sea coys.
Army Aviation: HQ, 2 air bns: 3 hel sqns, 1 trg unit, 1 attack bn with 2 coys (28 hel). 1 tpt hel bn, 1 med tpt, 1 hy tpt coys.
AFV: 200 AMX-30, 390 M-47E, 110 M-48 (105mm) med, 180 M-41 lt tks; 60 AML-60, 80 AML-90 armd cars: 50 BMR-600 MICV, 400 M-113 APC.
Arty: 860 105mm, 200 122mm, 80 155mm, 24 203mm guns/how; 48 M-108 105mm, 10 M-44, 70 M-109 155mm, 12 M-107 175mm, 4 M-110 203mm SP guns/how; 200 88mm; 200 6-in (152.4mm), 24 203mm, 12-in (305mm), 15-in (381mm) coast guns; 18 150mm, 24 203mm, 381mm MRL; 60mm, 860 81mm, 107mm, 400 120mm mor.
ATK: 90mm, 106mm RCL; *Milan, Cobra, Dragon* ATGW.
AD: 54 35/90, 280 40/90, 150 90mm AA guns; *Nike Hercules, Improved HAWK* SAM.
Air: 3 *Puma*, 50 UH-1B/H, 3 *Alouette* III, 30 Bo-105, 1 AB-206A, 10 OH-13, 13 OH-58A, 9 CH-47 hel.
(On order: 100 AMX-30 med tks; 150 BMR-600 MICV, 180 M-113 APC; 18 M-109 155mm SP how; *TOW* ATGW; 96 *Chaparral* SAM; 28 *Skyguard* AD systems; 39 Bo-105 (28 with *HOT* ATGW), 3 CH-47C, 18 OH-58A hel.)

DEPLOYMENT: *Balearic Islands:* 5,800; 3 inf, 2 coast/AA regts, 1 engr bn, 1 lt cav bn, 1 cdo coy. *Canary Islands:* 16,000; 3 inf, 1 Foreign Legion, 2 coast/AA regts, 2 engr bns, 2 lt cav gps, 1 cdo coy. *Ceuta/Melilla:* 19,000; 2 armd cav, 2 Foreign Legion, 2 coast/AA, 2 engr regts, 4 *Regulares* bns, 2 lt cav gps, 2 special sea coys.

Navy: 49,000, incl 10,600 marines (40,000 conscripts).
3 Commands: Escort, Amphibious, Naval Air.
8 submarines (4 *Daphne*, 3 ex-US *Guppy* IIA, 1 ex-US *Balao*).
1 ex-US *Independence* ac carrier (7 AV-8A, 18 hel).
12 destroyers: 7 with 1 hel (2 *Roger de Lauria*, 5 ex-US *Gearing* with 1 *ASROC*), 5 ex-US *Fletcher*.
16 frigates: 4 *Descubierta* with 8 *Harpoon* SSM, 8 *Sea Sparrow* SAM; 5 *Baleares* with 16 *Standard* SAM, 8 *ASROC*; 1 *Audaz*, 1 *Alava*, 1 *Pizarro*, 4 *Atrevida*.
12 FAC(P): 6 *Lazaga*, 6 *Barcelo*.
15 large patrol craft (6 ex-minesweepers).
64 coastal patrol craft(.
3 ex-US *Aggressive* ocean, 6 *Nalon* coastal MCM.
2 attack tpts, 1 LSD, 3 LST, 7 LCT, 2 LCU, 18 LCM, 17 LCA, 43 LCVP.
NAVAL AIR:
1 attack sqn with 8 AV-8A *Matador*, 2 TAV-8A.
1 comms sqn with 4 *Commanche*.
5 hel sqns with 9 SH-3D *Sea King*, 12 AB-212, 11 Bell 47G, 11 Hughes 500HM ASW, 4 AH-1G.
MARINES:
1 marine bde (2 inf bns and spt units).
4 marine lt inf regts.
32 M-48S med tks, 48 *Ontos* AFV with 6 106mm RCL; LVTP-7 amph APC; 48 105mm SP how (trials); 82mm mor; M-72 66mm RL; 72 106mm RCL; *TOW, Dragon* ATGW.

Sweden's Air Force has eight squadrons of Drakens in air defense role.

(On order: 4 *Agosta* subs; 1 aircraft carrier; 3 FFG-7, 4 F-30 frigates; 6 large patrol craft; 1 AV-8A FGA ac; 8 AB-212, 6 SH-3D hel; 30 AMX-30 med tks; *Harpoon* SSM; *Aspide* SAM.)

Bases: El Ferrol (Galicia), Cadiz (San Fernando), Cartagena.

Air Force: 38,000; some 193 combat aircraft.
Air Defence Command (MACOM):
3 wings.
6 interceptor sqns: 2 with 36 F-4C; 2 with 21 *Mirage* IIIEE, 6 IIIED; 2 with 44 *Mirage* F-1CE, 3 F-1CE/BE.
1 liaison flt with 4 Do-27.
(On order: 96 Improved *Chaparral* SAM launchers, 1,760 msls.)
Tactical Command (MATAC):
2 wings.
2 FGA sqns: 1 with 12 F-5A, 8 RF-5A, 2 F-5B; 1 with 19 HA-220 *Super Saeta*.
1 recce sqn with 9 AR-10C (HA-220).
1 MR sqn with 2 P-3A, 4 P-3C.
1 liaison flt with 12 O-1E, 19 Do-27, Do-28.
AAM: *Sparrow, Sidewinder*, R-550 *Magic*.
Air Command, Canary Islands: (MACAN):
1 FGA sqn with F-5/RF-5A, 2 F-5B.
1 SAR sqn with 3 F-27-400 MR ac, 8 AB-205 hel.
1 tpt sqn with 16 CASA C-212.
Transport Command (MATRA):
3 wings.
5 sqns with 7 C-130H, 9 KC-130H, 1 DC-8-52, 10 CASA-207 *Azor*, 58 C-212 *Aviocar*, 10 DHC-4.
Training Command (MAPER):
2 OCU with 22 F-5B, 2 Do-27.
14 sqns with 5 *Aztec*, 35 F-33C *Bonanza*, 10 CASA C-101, 8 C-212E, 1 *Navajo*, 24 T-33A, 14 T-34, 50 T-6, 8 *King Air*, 10 *Baron*, BU-131A/CASA I-131 ac; 2 with 28 AB-47, AB-205, Hughes 300C and UH-1H hel.
Air Force HQ Group (ACGA):
3 tpt sqns with 1 DC-8-2, 3 *Mystère* 20, 1 *Navajo*, 2 CASA C-212, 2 Do-27.
1 spt sqn with 12 CL-215, 2 Do-27.
1 utility hel sqn with 9 *Puma*.
1 SAR sqn with 4 CASA C-212 ac, 9 AB-205 hel.
1 trg sqn with 6 C-101, 1 C-212, 12 HA-200D, 10 T-6.
(On order: 24 *Mirage* F-1B/EE fighters; 2 P-3C *Orion* MR; 4 C-212 SAR, 54 CASA C-101 trg ac; 17 Hughes 300C hel; *Super Sidewinder* AAM.)

RESERVES (all services): 1,085,000. 1 ATK inf, 3 engr. 1 sigs regts.

Para-Military Forces: 64,000 *Guardia Civil;* 40,000 *Policia Armada*.

SWEDEN

Population: 8,335,000.
Military service: Army and Navy 7½–15 months, Air Force 8–12 months.

Total armed forces: 64,300 (47,200 conscripts,[4] mobilizable to about 800,000 in 72 hours).
Estimated GNP 1980: $113 bn.
Defence expenditure 1981–82: Kr 17.312 bn ($3.79 bn).
$1 = 4.573 kronor (1981), 4.400 kronor (1980).

Army: 44,500 (36,000 conscripts).[4]
Peace establishment:
50 non-operational armd, cav, inf, arty AA, engr and sigs trg regts for basic conscript trg.
War establishment (700,000 on mobilization):
4 armd bdes.
20 inf bdes.
4 *Norrland* bdes.
50 indep inf, arty and AA arty bns.
26 Local Defence Districts with 100 indep bns and 400–500 indep coys.
340 Strv-101, Strv-102 (*Centurion*), 330 Strv-103B med, 200 Ikv-91 lt tks; Pbv-302 APC; 105mm, 150mm, 155mm how; 155mm SP guns; 81mm, 120mm mor; *Miniman* 74mm, *Carl Gustav* 84mm, PV-1110 90mm RCL; RB-53 *Bantam* ATGW; 20mm, 40mm AA guns; RB-69 (*Red-eye*), RBS-70, RB-77 (*Improved HAWK*) SAM; 30 SK-61C (*Bulldog*) ac; 12 HKP-3 (AB-204B), 22 HKP-6 (*Jet Ranger*) hel.
(On order: FH-77 155mm how, *TOW* ATGW.)

Navy: 10,000, incl coast arty (6,600 conscripts),[4] 10 combat hel.
12 submarines (3 *Näcken*, 5 *Sjöormen*, 4 *Draken*).
5 destroyers: 2 *Halland*, with RB-08 SSM; 1 *Östergötland* with 1 RB-08, quad RB-07 (*Seacat*) SAM (in reserve).
2 *Visby* frigates (in reserve).
16 *Hugin* FAC(M) with 6 RB-12 (*Penguin*) SSM.
18 FAC(T): 12 *Spica* T-131, 6 *Spica* T-121.
7 large (6 *Hanö*); 26 coastal patrol craft.
2 minelayers, 1 minelayer/trg ship.
9 coastal, 36 inshore minelayers.
11 *Arko* coastal, 15 inshore minesweepers.
9 LCM, 81 LCU, 54 LCA.
15 mobile, 445 static coastal arty btys with 75mm, 105mm, 120mm, 152mm, 210mm guns; RB-08, RB-52 SSM.
2 hel sqns with 4 HKP-2 (*Alouette* II) utility, 10 HKP-4 (Vertol 107) ASW/MCM, 9 HKP-6 liaison.
(On order: 1 A-17-class submarine, 1 minelayer (trg); RBS-15 SSM.)

Bases: Stockholm, Karlskrona, Göteborg.

Air Force: 9,800 (4,600 conscripts);[4] 406 combat aircraft (+ stored ac incl 20 J-35F *Draken*).
13 wings.
6 FGA sqns: 5 with 99 AJ-37 *Viggen*, 1 with 20 SK-60B/C (Saab 105).
12 AD sqns: 8 with 126 J-35F *Draken*, 3 with 54 J-35D, 1 with 18 JA-37 *Viggen*.
3 recce sqns with 54 SH/SF-37 *Viggen*.
2 OCU: 1 with 17 SK-37 *Viggen*; 1 with 18 SK-35C *Draken*.
2 tpt sqns with 6 C-130E/H, 2 *Caravelle*, 6 C-47.
5 comms sqns with 65 SK-60A.
Trainers incl 124 SK-60A/B/C, 57 SK-61, 24 J-32D *Lansen* (drone).
1 SAR sqn with 10 HKP-4 hel.
1 utility sqn with 9 HKP-2, 7 HKP-3 hel.
AAM: *Sidewinder*, RB-27 (*Falcon*), RB-28 (*Improved Falcon*), RB-71 *Skyflash*.
ASM: RB-04E, RB-05A, RB-75 *(Maverick)*.
Semi-automatic control and surveillance system, *Stril* 60, co-ordinates all AD components.
(On order: *Skyflash* AAM.)

Forces Abroad: Cyprus (UNFICYP): 1 inf bn (428).

Para-Military Forces:
Coast Guard: 550: 4 Regions (15 districts); 2 trg stations per district. 1 TV-171 fishery protection vessel (one more building); 45 cutters, 24 inshore rescue boats.
Air Arm: 2 Cessna 337G, 1 402-C (one on order).
RESERVES (all services): voluntary defence organizations 500,000.

SWITZERLAND

Population: 6,320,000.
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 3,500 regular and 17,000 recruits[5] (mobilizable to 625,000 in 48 hours).
Estimated GDP 1979: $99 bn.
Defence expenditure 1981: S.fr 3.49 bn ($1.84 bn).
$1 = 1.90 francs (1981), 1.68 francs (1979).

Army:
War establishment: 580,000 on mobilization.
3 fd corps, each of 1 armd, 2 inf divs.
1 mountain corps of 3 mountain inf divs.
23 indep bdes (11 frontier, 6 territorial, 3 fortress, 3 redoubt).
Indep units: 3 hy arty, 2 engr, 2 sigs regts, 1 armd car bn.
325 *Centurion*, 150 Pz-61, 330 Pz-68 med tks; 1,250 M-113 APC; 750 105mm guns/how; 260 M-109U 155mm SP how; 81mm, 120mm mor; 90mm, 105mm ATK guns; 83mm RL; 106mm RCL; *Bantam*, *Dragon* ATGW; 700 20mm, 500 35mm AA guns.
(On order: 60 Pz-68 med tks, 225 M-113 APC, 207 M-109 155mm SP how, *Dragon* ATGW.)

Air Force:[6] 45,000 on mobilization (maintenance by civilians); 367 combat aircraft.
3 air regts.
12 FGA sqns: 3 with 90 *Venom* FB-50; 9 with 149 *Hunter* F-58/T-68.
4 fighter sqns: 71 F-5E/F.
2 interceptor sqns with 32 *Mirage* IIIS/BS.
1 recce sqn with 18 *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, 79 *Alouette* III hel.
Trainers incl 47 Pilatus P-2, 68 P-3.
AAM: *Sidewinder*, AIM-26B *Falcon*. ASM: AS-30.
1 air force fd bde (3 regts, 1 para coy, 1 lt ac wing).
1 air base bde with 3 regts.
1 AD bde with 1 SAM regt of 2 bns (each with 32 *Bloodhound*) and 7 AA arty regts with 20mm and 35mm guns, *Skyguard* fire control systems.
3 comd and comms regts, 1 log regt.
(On order: 2 *Mirage* IIIB, 32 F-5E, 6 F-5F fighters, 40 PC-7 *Turbo-Trainers*; 60 *Rapier* SAM launchers; 500 AGM-65 *Maverick* ASM.)

RESERVES (all services): 621,500.

YUGOSLAVIA

Population: 22,550,000.
Military service: 15 months.
Total armed forces: 252,500 (154,000 conscripts).
Estimated GNP 1979: $64.4 bn.
Defence expenditure 1981: 101.89 bn dinars ($3.47 bn).
$1 = 29.37 dinars (1981), 18.69 dinars (1979).

Army: 190,000 (140,000 conscripts).
7 Military Regions.
8 inf divs.
8 indep tk bdes.
16 indep inf bdes (incl mech, 3 lt).
1 mountain bde.
1 AB bde.
12 fd, 12 AA arty regts.
6 ATK regts.
1,240 T-34/-54/-55, 60 M-47 med, some PT-76 lt tks; M-3, M-8, BRDM-2 scout cars; some M-980 MICV, 200 BTR-50/-60-152, some M-60 APC; 1,800 M-1955, SU-100 100mm SP, 122mm, 130mm, 152mm guns; M-48 76mm, 105mm incl SP, 122mm, 155mm how; 82mm, 120mm mor; 128mm MRL; *FROG*-7 SSM; 57mm, PAK-40 75mm, T-12 100mm towed, ASU-57, 300 M-18 76mm, M-36 90mm SP ATK guns; 57mm, 75mm, 82mm, 105mm, RCL; *Snapper*, *Sagger* ATGW; 20mm, 30mm, 37mm, 40mm, 57mm, 85mm, 88mm, 90mm, 94mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-6/-7/-9 SAM.
(On order: 500 M-980 MICV.)

RESERVES: 500,000; mobile bdes, bns with arty and AA guns. (M-18 *Hellcat* 76mm, M-36B2 90mm SP ATK guns, T-34/85, M-4 med tks in storage).

Navy: 17,500, incl 2,500 marines (6,000 conscripts).
7 submarines: 2 *Sava*, 3 *Heroj*, 2 *Sutjeska*.
1 *Koni*-class frigate with twin SA-N-4 SAM.
3 corvettes: 2 *Mornar*, 1 *Le Fougueux*.
16 FAC(M) with *Styx* SSM: 6 *Rade Koncar*, 10 ex-Sov *Osa*-I.
15 ex-Sov *Shershen* FAC(T).
20 large patrol craft: 10 *Kraljevica*, 10 Type 131.
30 minesweepers: 4 *Vukov Klanac* coastal, 10 inshore (4 *Ham*, 6 M-117), 16 river(.
18 LCU/minelayers, 20 601-type LCA.
1 ASW hel sqn with Ka-25, Mi-8, *Partizan (Gazelle)*.
1 marine bde (2 regts, each of 2 bns).
25 coast arty btys with *Samlet* SSM; M-44 85mm, ex-Ger 88mm, M-37 122mm, M-54 130mm, 152mm guns.
(On order: 1 *Sava* submarine, 8 FAC(M).)

Bases: Lora/Split, Pula, Sibenik, Kardeljevo, Kotor, Dubrovnik.

Air Force: 45,000 (8,000 conscripts); 341 combat ac.
2 air divisions: 4 air regions.
12 FGA sqns with 12 *Kraguj*, 130 *Galeb/Jastreb*.
9 interceptor sqns with 126 MiG-21F/PF/M/N.
2 recce sqns with 35 *Galeb/Jastreb*.
1 OCU with MiG-21U, 20 *Jastreb*.
2 tpt sqns: 15 C-47, 2 Il-18, 6 Yak-40, 2 An-12, 15 An-26, 4 Li-2, 2 Boeing 727-200.
Trg ac incl 60 *Galeb/Jastreb*, 3 T-33, 15 UTVA-75, 15 *Partizan* hel.
4 hel tpt sqns: 5 AB-205, 18 Mi-4, 50 Mi-8, 5 *Whirlwind*, 5 *Partizan*, 1 A-109 *Hirundo*.
AAM: AA-2 *Atoll*.
Air Defence Force: (Army personnel, eqpt, AF control):
24 AA regts.
8 SA-2, 6 SA-3 SAM bns.
(On order: 25 *Orao* FGA ac, 94 *Partizan* hel.)

Para-Military Forces: 20,000 Frontier Guards; 1–3 million Territorial Defence Force (Partisan); 2,000,000 Civil Defence on mobilization; Workers' Militia State Police with APC.

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[1] Spare parts are in short supply; some equipment may be unserviceable.

[2] Austrian air units, an integral part of the Army, are listed separately for purposes of comparison.

[3] Greek-Cypriot National Guard, mainly composed of Cypriot conscripts, but with some seconded Greek Army officers and NCOs.

[4] There are normally some 120,000 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.

[5] Two recruit intakes a year (Jan/Jun) each of 17,000. Some 400,000 reservists a year do refresher training.

[6] Aviation Corps, an integral part of the Army.

The Middle East and North Africa

BILATERAL AGREEMENTS WITH EXTERNAL POWERS

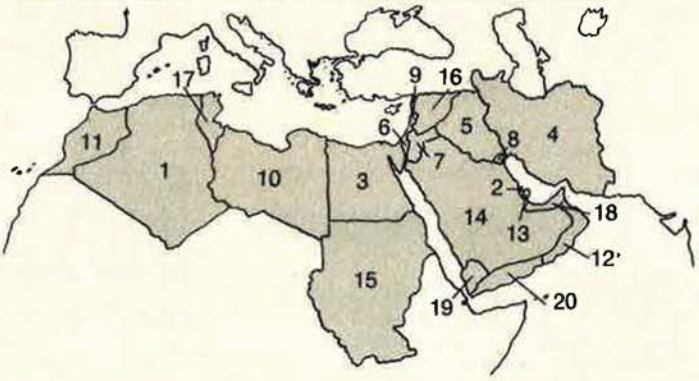
The Soviet Union signed a fifteen-year Treaty of Friendship and Co-operation with Iraq in April 1972, and a further agreement in December 1978. A similar treaty was signed with Syria on 8 October 1980. A Treaty of Friendship and Co-operation, signed with South Yemen in October 1979, was ratified in February 1980. Soviet naval units use Aden's facilities. All three countries have received significant arms deliveries. Despite this, Iraq has been seeking to broaden her contacts with the West, particularly with France and Italy, and to establish herself as a major non-aligned country. The Soviet Union has also sold arms to Algeria, Kuwait, Libya, Morocco, Sudan, and the Yemen Arab Republic (North Yemen). Egypt signed a Treaty of Friendship and Co-operation with the Soviet Union in May 1971 and abrogated it in March 1976; the Soviet Union, formerly a major supplier, has delivered no significant arms supplies to Egypt since. Some supplies may be still coming from other Warsaw Pact nations.

The Defence Ministers of Bulgaria and the People's Democratic Republic of Yemen (South Yemen) signed a Protocol for Co-operation on 2 April 1980. A similar agreement with Hungary was reported on 9 April 1981.

The United States has varying types of security assistance programmes in the region. Military aid to Iran ceased in February–August 1979. Aid continues on a grant, credit, or cash sale basis to Egypt, Israel, Jordan, Kuwait, Lebanon, Morocco, Saudi Arabia, Sudan, and Tunisia. An agreement with Oman to provide economic and military aid in exchange for permission to use Salalah and Masirah as staging bases has been concluded. An agreement with Bahrain permits the US Navy to use port facilities.

China signed a Treaty of Friendship with North Yemen in 1964 under which some economic development took place and minor arms were provided. China has also supplied arms and spare parts to Egypt under an agreement signed in 1978/9. Arms have also been supplied to Sudan.

Britain concluded treaties of friendship with Bahrain, Qatar, and the United Arab Emirates (UAE) in August 1971. Iran ended her military purchases in January 1979. Britain is now supplying arms to Bahrain, Egypt, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan and the UAE. British military personnel are serving with Oman's forces.



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)

France has continuing arms supply arrangements with Morocco and Sudan, and has supplied arms, equipment, and ammunition to a number of countries including Abu Dhabi, Egypt, Iraq, Kuwait, Libya, Qatar, Saudi Arabia, and Tunisia.

The United Nations withdrew the 4,000-man United Nations Emergency Force (UNEF) from the Sinai on 24 July 1979; its duties were assumed by the United Nations Truce Supervisory Organization (UNTSO), 298 officers, which has been active in the region since 1949.

The United Nations also deploys in the Golan Heights the 1,279-man Disengagement Observer Force (UNDOF), made up of contingents from Austria, Canada, Finland, and Poland.

The United Nations Interim Force in Lebanon (UNIFIL) consists of some 6,000 men from Eire, France, Fiji, Ghana, Italy, Nepal, Netherlands, Nigeria, Norway, Senegal, and Sweden.

ARRANGEMENTS WITHIN THE REGION

Algeria, Bahrain, Djibouti, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, the PLO, Qatar, Saudi Arabia, Somalia, 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 forces, which had entered the fighting in Lebanon in April 1976, and which then totalled some 13,000, were augmented by a symbolic Lebanon Peace-keeping Force of Libyan, Saudi, and Sudanese troops. Fighting continued, and a 30,000-man Arab Deterrent Force, mostly Syrian, was approved at Riyadh on 18 October 1976. Subsequently this Force also included forces from Lebanon, Kuwait, the Palestine Liberation Army (PLA), Sudan, and the UAE. All but the Syrian and the PLA contingents have now been withdrawn.

Egypt concluded a defence pact with Syria in November 1966, and with Jordan in May and Iraq in June 1967. These established a Joint Defence Council and a Joint Command. The loosely-associated Eastern Front Command, set up by Iraq, Jordan, and Syria in March 1969, disappeared in December 1970. Iraq and Syria concluded defence pacts in May 1968 and July 1969, and a third, calling for full military union, in October 1978. Little of substance resulted, and unification seems to have been abandoned following a dispute in July 1979. Jordan and Syria later set up a joint consultative body—now presumed to be in abeyance—to co-ordinate military policy. The Federation of Arab Republics, formed by Libya, Syria, and Egypt in April 1971, provided for a common defence policy and a Federal Defence Council, and an Egyptian was appointed Commander-in-Chief of all Federation Forces in January 1973. This agreement was not actively implemented and must be presumed to be in abeyance. Libya and Syria have been discussing a merger since September 1980 but its present status is obscure.

Algeria and Libya signed a defence agreement in December 1975, and Egypt another with Sudan in January 1977. A 1977 agreement between Mauritania and Morocco was abrogated in August 1979. 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 Cooperative Council, created in May 1981 by Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the UAE, may eventually develop a mutual defence structure.

Arms movements in the region are complex. Egypt has supplied arms to Morocco, Sudan, and Iraq. Algeria and Libya reportedly supply arms to *Polisario* guerrillas, and most countries have supplied arms to the Palestinian guerrillas. In some cases a third nation funds the recipient's foreign arms purchases.

In 1975 an Arab Organization for Industrialization (AOI) was set up in Egypt to encourage indigenous Arab arms production. Initially under the aegis of Saudi Arabia, Qatar, the UAE, and Sudan, this project was ended following Egypt's rapprochement with Israel. Egypt is attempting to continue it with British and US support.

In 1979 Iraq, Kuwait, Qatar, Saudi Arabia, and the UAE agreed to set up an $8-bn arms industry in the UAE to replace the AOI.

ALGERIA

Population: 19,330,000.
Military service: 6 months.
Total armed forces: 101,000.
Estimated GDP 1980: $40.68 bn.
Defence expenditure 1981: 3.50 bn dinars ($914 m).
$1 = 3.38 dinars (1981), 4.04 dinars (1980).

Army: 90,000.
5 Military Regions.
1 armd bde.
2 mech bdes.
4 mot inf bdes.
1 AB/special force bde.
1 SSM bde.
3 indep tk bns.
58 indep inf bns.
2 para bns.
5 indep arty bns.
1 AD bns.
4 engr bns.
12 coys desert troops.
200 T-54/-55, 400 T-62, 50 T-72 med, 50 AMX-13 lt tks; 50 AML-60, 200 BRDM-2 armd cars; 300 BMP-1 MICV, 830 BTR-40/-50/-60/-152 APC; 340 85mm, 140 SU-100 SP, 122mm incl ISU-122 and 152mm SP guns; 122mm, M-1974 152mm how and 152mm guns/how; 85 BM-21 122mm, 140mm and 240mm MRL; 50 *FROG*-4/-7 SSM; 230 75mm, 76mm, and 85mm ATK guns; 180 120mm and 160mm mor; *Sagger* ATGW; 440 37mm, 57mm, 85mm, 100mm, 130mm towed, 100 ZSU-23-4 and ZSU-57-2 SP AA guns; SA-7, 30 SA-6/-9 SAM.
RESERVES: up to 100,000.

Navy: 4,000.
1 *Koni*-class frigate with 2 SA-N-4 SAM.
2 *Nanuchka*-class corvettes with 4 SS-N-2bis SSM.
6 ex-Sov SO-1 large patrol craft.
17 ex-Sov FAC(M) with *Styx* SSM: 3 *Osa*-I, 8 *Osa*-II, 6 *Komar*(.
6 ex-Sov P-6 FAC(T)((2 unarmed trg).
2 ex-Sov T-43 ocean minesweepers (in reserve).
1 ex-Sov *Polnocny* LCT.

Bases: Algiers, Annaba, Mers el Kebir.

Coastguard: 2 P-6 FAC(T), 16 Baglietto FAC(G) (6 *Gemini* 36, 10 Type 20().

Air Force: 7,000; 295 combat aircraft, 20 armed hel.
1 lt bbr sqn with 13 Il-28.
6 FGA sqns: 2 with 20 Su-7BM; 2 with 60 MiG-17; 2 with 20 MiG-23BM, some 6 Su-20 (*Fitter* C), 8 MiG-19.
4 interceptor sqns with 90 MiG-21MF, 15 MiG-25 *Foxbat* A.
1 recce sqn with 10 MiG-25R *Foxbat* B.
1 COIN sqn with 26 *Magister*.
1 MR sqn with 12 F-27 (Navy-assigned).
1 OCU with 15 MiG-15.
1 tpt sqn with 8 An-12, 2 Il-18, 1 *Mystère-Falcon*, 1 *Caravelle*.
6 hel sqns with 4 Mi-6, 28 Mi-4, 12 Mi-8, 20 Mi-24, 5 *Puma*, 6 Hughes 269A, 2 *Alouette* II.
Other ac incl 12 *King Air*, 2 *Super King Air* T-200T (MR), 3 *Queen Air*, 2 CL-215.
Trainers incl MiG-15/-17/-21UTI, Su-7U, 2 MiG-23U, 2 MiG-25U, 6 T-34C, 12 *Sierra*.
1 SAM regt: 18 SA-2.
AAM: AA-2 *Atoll*.
(In store: 11 Il-28).

Para-Military Forces: 10,000 Gendarmerie.

BAHRAIN

Population: 400,000.
Military service: voluntary.
Estimated GDP 1979: $1.7 bn.
Total armed forces: 2,500.
Defence expenditure 1981: $51.0 m dinars ($135m).
$1 = 0.377 dinars (1981), 0.384 dinars (1979).

Army: 2,300.
1 inf bn.
1 armd car sqn.
1 arty bty.
1 air wing.
8 *Saladin* armd, 8 *Ferret* scout cars; 110 Panhard (AML-90 armd cars, M-3 APC); AT-105 APC; 8 105mm lt guns; 6 81mm mor; 6 120mm RCL; 6 RBS-70 SAM; 10 AB-212 hel.

Navy: (Coastguard): 200.
2 Lürssen 38-metre FAC(G).
13 coastal patrol craft.
1 hovercraft.
2 landing craft: 1 *Loadmaster*, 1 60-ft.
(On order: 2 Lürssen TNC-45 FAC(M) with *Exocet* SSM.)

Para-Military Forces: 2,500 Police, 2 *Scout*, 3 Bo-105, 2 Hughes 500D hel.

EGYPT

Population: 43,190,000.
Military service: 1 year (selective).
Total armed forces: 367,000 (255,000 conscripts).
Estimated GNP 1979: $17.8 bn.
Defence expenditure 1979–80: £E 1.5 bn ($2.17 bn).
$1 = £E 0.692 (1979, 1981).

Army: 235,000 (180,000 conscripts).
2 corps HQ.
3 armd divs (each with 1 armd, 2 mech bdes).
2 mech inf divs.
5 inf divs (each with 2 inf bdes).
1 Republican Guard Brigade (div).
2 indep armd bdes.
5 indep inf bdes.
2 airmobile bdes.
1 para bde.
4 arty bdes.
2 hy mor bdes.
1 ATGW bde.
6 cdo gps.
2 SSM regts (14 *FROG*-7, 10 *Scud*).
AFV: 850 T-54/-55, 750 T-62, 60 M-60A3 med, 30 PT-76 lt tks; 300 BRDM-1/-2 scout cars; 200 BMP-1 MICV, 2,500 OT-62/-64, BTR-40/-50/-60-152, *Walid*, 50 M-113A2 APC.
Arty: 1,500 85mm, 100mm, incl 200 SU-100, 122mm, 130mm, 152mm, incl SU-152 and 180mm guns; 122mm and 152mm how; 300 120mm, 160mm, and 240mm mor; about 300 122mm (including *Saqr* 30), 132mm, 140mm, and 240mm RL; 14 *FROG*-7, 10 *Scud* B SSM.
ATK: 900 57mm incl SP, 76mm, and 100mm guns; 900 82mm and 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; 250 SA-7/-9, 20 *Crotale* SAM.[1]
(On order: 251 M-60A3 med tks; 1,000 M-113A2 APC; 100 *Kuerassier* SP ATK guns; 52 M-901 SP *TOW* ATGW AFV; 100 M-106A2 and M-125A2 mor carriers; 73 *TOW* launchers, 1,282 msls, *Swingfire* ATGW.)

RESERVES: about 300,000.

Navy: 20,000 (15,000 conscripts).[1]
9 ex-Sov submarines: 5 W- (may be unserviceable), 4 R-class.
5 destroyers: 4 ex-Sov *Skory* (1 with twin *Styx* SSM), 1 ex-Br Z-class.
3 ex-Br frigates: 1 *Black Swan*, 1 *Hunt*, 1 *River* (submarine spt ship).
20 FAC(M): 8 ex-Sov *Osa*-I with SA-7 SAM, *Styx* SSM; 4 *Komar*((3 with *Styx* SSM); 6 *October* 6 (P-6)(, and 2 *Ramadan*(with *Otomat* SSM.
12 ex-Sov SO-1 large patrol craft.
20 ex-Sov FAC(T): 2 *Shershen*, 14 P-6(, 4 P-4(.
4 ex-Sov *Shershen* FAC(G).
14 ex-Sov minesweepers: 10 ocean (6 T-43, 4 *Yurka*), 4 inshore (2 T-301, 2 K-8).
3 SRN-6 hovercraft.
3 ex-Sov *Polnocny* LCT.
14 ex-Sov LCU (10 *Vydra*, 4 SMB1), 10 LCM.
1 ASW hel sqn with 6 *Sea King* Mk 47.
(On order: 4 *Ramadan* FAC(M), 14 SRN-6 hovercraft, 12 *Sea Spectre*, 6 *Aztec* patrol craft, *Otomat* SSM.)
Coastal Defence unit (Army manpower, Navy control): 130mm guns; 30 *Otomat* and *Samlet* SSM.

Bases: Alexandria, Port Said, Mersa Matruh, Port Tewfiq, Hurghada, Safaqa.

RESERVES: about 15,000.

Air Force: 27,000 (10,000 conscripts): about 290 combat ac, 60 armed hel.
1 bbr regt with 16 Tu-16 (some with AS-5 ASM).
5 FGA regts: 2 with 35 F-4E, 35 Ch F-6; 2 with 42 MiG-17, 47 Su-7BM; 1 with 46 *Mirage* IIIDE, 50 *Mirage* 5.
4 hel sqns with 60 *Gazelle* (*HOT* ATGW).
1 recce sqn with 4 *Mirage* 5SDR, 13 MiG-21R.
ELINT ac: 2 EC-130H.
1 tpt bde of 5 sqns with 19 C-130H, 19 Il-14, 10 An-12, 1 *Falcon*, 1 Boeing 707, 1 Boeing 737.
8 utility hel sqns with 20 Mi-4, 12 Mi-6, 55 Mi-8, 29 *Commando*.
Trainers incl 50 MiG-15UTI, 100 L-29, 60 *Gomhouria*, 36 Yak-11, *Wilga* 35/80, Ch FT-6, 5 *Mirage* 5SDD.
AAM: AA-2 *Atoll*, R-530, *Sparrow, Sidewinder*.
ASM: AS-1 *Kennel*, AS-5 *Kelt, Maverick, HOT*.
(Further ac in reserve incl up to 50 MiG-21, 20 MiG-23S/U, 80 MiG-17, 60 Su-7, 40 Su-20, 53 F-6, 6 An-12.)
(On order: 40 F-16A/B, 16 *Mirage* 5, F-7 fighters; 30 *AlphaJet* (8 FGA, 22 trg), 6 C-130H tpt ac; 15 CH-47, 20 *Gazelle* hel; *Sparrow, Sidewinder* AAM; *Maverick* ASM.)

RESERVES: about 20,000.

Air Defence Command: 85,000 (50,000 conscripts); 160 combat ac.
3 interceptor regts: 10 sqns with 160 MiG-21MF/U.
2 AD divs: regional bdes:
100 msl and AA bns, radar bns; some 80 SA-2, 65 SA-3 sites. 360 SA-2, 200 SA-3, 75 SA-6, *Crotale* SAM; 2,500 20mm, 23mm, 37mm, 40mm, 57mm, 85mm, and 100mm AA guns; missile, gun and EW radars.[1]
(On order: Ch CSA-1, 12 btys *Improved HAWK* SAM.)

Forces Abroad: Morocco, 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*, 2 PO-2, 6 *Bertram* patrol boats, 2 fast launches.

IRAN

Population: 39,665,000.
Military service: 24 months.
Total armed forces: 195,000.
Estimated GNP 1979: $81.7 bn.
Defence expenditure 1980: 300 bn rials ($4.2 bn).
$1 = 71.5 rials (1980), 70.5 rials (1979).

Army: 150,000 (100,000 conscripts).[2]
4 armd 'divs' (at least 2 are bdes).
4 inf 'divs' (at least 2 are bdes).
1 AB 'div' (hel-borne bde).
4 SAM bns with *HAWK*.
Army Aviation Command.
620 *Chieftain* Mk 3/5, 390 M-47/-48, 400 M-60A1 med, 220 *Scorpion* lt tks; BMP MICV, about 240 M-113, 400 BTR-40/-50/-60/-152 APC; some 1,000 75mm pack, 85mm, M-101 105mm, 130mm towed, M-107 175mm SP guns, M-114 towed, M-109 SP 155mm, M-115 towed, M-110 SP 203mm how; 65 BM-21 122mm MRL; 81mm, 4.2-in, 120mm mor; 57mm, 75mm, 106mm RCL; *ENTAC*, SS-11/-12, *Dragon, TOW* ATGW; 1,800 ZU-23, ZSU-23-4 SP 23mm, ZSU-57-2 SP 57mm, 75mm, and 85mm AA guns; *HAWK/Improved HAWK* SAM.
Ac incl 40 Cessna 185, 6 Cessna 310, 10 O-2A, 2 F-27, 5 *Shrike Commander*, 2 *Falcon*.
Hel incl 175 AH-1J, 295 Bell 214A, 35 AB-205A, 15 AB-206, 80 CH-47C.

RESERVES: 400,000.

Navy: 10,000, incl naval air and marines.[2]
3 destroyers with quad *Standard* SSM; 1 ex-Br *Battle* with quad *Seacat* SAM, 2 ex-US *Sumner* with 1 hel.
4 *Saam* frigates with quad *Seakiller* SSM, triple *Seacat* SAM.
4 ex-US PF-103 corvettes.
7 *Kaman (La Combattante* II) FAC(M) with 4 *Harpoon* SSM.
7 large patrol craft: 3 Improved PGM-71, 4 *Cape*.
3 ex-US coastal, 2 inshore minesweepers.
14 hovercraft: 8 SRN-6, 6 BH-7.
2 landing ships, 1 ex-US LCU.
1 replenishment, 2 fleet supply, 2 landing ships.
3 marine bns.
(On order: 5 *La Combattante* FAC(M).)

Bases: Bandar Lengel (Abbas), Booshehr, Kharg Island, Bandar-e-Enzli.

NAVAL AIR: 2 combat ac, 13 armed hel.[2]
1 MR sqn with 2 P-3F *Orion*.
1 ASW hel sqn with 7 SH-3D.
1 MCM hel sqn with 6 RH-53D.
1 tpt sqn with 4 *Shrike Commander*, 4 F-27, 1 *Mystère* 20.
Hel incl 7 AB-212.

Air Force: 35,000; some 100 combat ac.[2]
10 FGA sqns with 90 F-4D/E (perhaps 50 serviceable).
8 FGA sqns with F-5E/F.
4 interceptor/FGA sqns with 77 F-14A (perhaps 9 serviceable).
1 recce sqn with RF-4E.
2 tanker/tpt sqns with 12 Boeing 707, 8 Boeing 747.
5 tpt sqns: 4 with 54 C-130E/H; 1 with 18 F-27, 2 Aero *Commander* 690, 4 *Falcon* 20.
Hel: 10 HH-34F, 10 AB-206A, 5 AB-212, 39 Bell 214C, 2 CH-47C, 16 *Super Frelon*, 2 S-61A4.
Trainers incl 45 F33A/C *Bonanza*, 9 T-33.
AAM: *Phoenix, Sidewinder, Sparrow*.
ASM: AS-12, *Maverick*.
5 SAM sqns with *Rapier*, 25 *Tigercat*.

Para-Military Forces: 75,000. Gendarmerie; Revolutionary Guards *Pasdaran* (40,000); *Mujaheddin* (30,000); *Mostazabin* (Guards); Border Tribal Militia. Cessna 185/310 lt ac, AB-205/-206 hel, patrol boats.

IRAQ

Population: 13,835,000.
Military service: Basic 21–24 months; extended for war.
Total armed forces: 252,250 (193,200 conscripts).
Estimated GNP 1979: $35.2 bn.
Defence expenditure 1980: 797 m dinars ($2.7 bn).
$1 = 0.295 dinars (1979, 1980).

Army: 210,000 (180,000 conscripts).[3]
3 corps HQ.
4 armd divs (each with 2 armd, 1 mech bdes).
4 mech divs (each with 1 armd, 2 or more mech bdes).
4 mountain inf divs.
1 Republican Guard armd bde.
3 special forces bdes.
(Additional inf bdes reported mobilized from reserves.)
2,350 T-54/-55/-62, 150 T-72, 100 AMX-30 med, 100 PT-76 lt tks; about 2,000 AFV, incl BRDM, FUG-70, ERC-90, Mowag *Roland*, EE-9 *Cascavel*, EE-3 *Jaracara* armd cars, BMP MICV, BTR-50/-60/-152, OT-62, VCRTT, Panhard M-3, EE-11 *Urutu* APC: 800 85mm, 100mm SU-100 SP, 122mm incl ISU SP, 130mm guns; 122mm incl SP-74, 152mm how; 108-R 108mm, BM-21 122mm MRL; 19 *FROG*-7, 9 *Scud* B SSM; 120mm, 160mm mor; 107mm RCL; 75mm, 85mm, 100mm, 100 *Kuerassier* 105mm SP, EE-17 *Sucuri* 105mm SP ATK guns; *Sagger*, SS-11, *Milan* ATGW; 1,200 23mm, ZSU-23-4 SP, 37mm, 57mm, ZSU-57-2 SP, 85mm, 100mm, 130mm AA guns; SA-2/-3/-6/-7/-9 SAM.
(On order: T-62, AMX-30 med tks; EE-17 *Sucuri* SP ATK guns; EE-9 *Cascavel*, EE-3 *Jar-*

[1]See p. 88 for all footnotes.

araca armd cars; SP-73 152mm SP how; *Scud* B SSM; SS-11 ATGW.)
(Some captured Iranian eqpt, incl tks, AFV, arty, ATGW, may have been taken into service.)

RESERVES: 250,000.

Navy: 4,250 (3,200 conscripts).[3]
1 frigate (trg).
12 ex-Sov FAC(M) with 4 *Styx* SSM: 4 *Osa*-I, 8 *Osa*-II.
5 ex-Sov large patrol craft: 3 SO-1, 2 *Poluchat*⟨.
10 ex-Sov P-6 FAC(T)⟨.
10 ex-Sov coastal patrol craft: 4 *Nyryat* II, PO-2⟨, 4 *Zhuk*⟨.
8 minesweepers: 3 Yug *Nestin*, 5 ex-Sov (2 T-43 ocean, 3 *Yevgenya* inshore).
4 ex-Sov *Polnocny* LCT.
(On order: 1 Yug, 4 *Lupo* frigates, 6 Italian 650-ton corvettes, 1 spt ship.)

Bases: Basra, Umm Qasr.

Air Force: 38,000 incl 10,000 AD personnel (10,000 conscripts); 335 combat aircraft, some 60 armed hel.[3]
1 bbr sqn with 9 Tu-22.
1 lt bbr sqn with 8 Il-28.
11 FGA sqns: 4 with 75 MiG-23BM; 6 with 80 Su-20; 1 with 12 *Hunter* FB-59/FR-10.
5 interceptor sqns with 115 MiG-21, 32 *Mirage* F-1EQ, 4 F-1BQ.
2 tpt sqns with 20 An-2, 8 An-12, 8 An-24, 2 An-26, 12 Il-76 (6 civilian), 3 Tu-124, 13 Il-14, 2 *Heron*.
11 hel sqns with 35 Mi-4, 12 Mi-6, 150 Mi-8, 41 Mi-24, 47 *Alouette* III, 11 *Super Frelon*, 50 *Gazelle*, 13 *Puma*, 7 *Wessex* Mk 52.
Trainers incl MiG-15/-21/-23U, Su-7U, *Hunter* T-69, 10 Yak-11, 40 L-29, 24 L-39, 48 AS-202/18A, 16 *Flamingo*, 5 PC-7 *Turbo-Trainer*.
AAM: AA-2 *Atoll*.
ASM: 360 *HOT*, AS-11/-12, AM-39, *Swatter* ATGW.
SAM: SA-2, SA-3, 25 SA-6.
(On order: 150 MiG-23/-25/-27, 24 *Mirage* F-1 fighters; C-160 tpts; 39 PC-7 *Turbo-Trainer*, *Super Frelon*, 10 *Gazelle*, *Lynx*, 26 *Puma*, Bo-105, Mi-24, 6 AS-61TS, 8 AB-212 (ASW) hel; Super 530 AAM.)

Para-Military Forces: 4,800 security troops; 250,000 People's Army, 75,000 mobilized. 100 T-34 med tks.

ISRAEL

Population: 4,000,000.
Military service: men 36 months, women 24 months (Jews and Druse only; Christians may volunteer). Annual training for reservists thereafter up to age 54 for men, up to 38 (or marriage) for women.
Total armed forces: 172,000 (120,300 conscripts); mobilization to 400,000 in about 24 hours.
Estimated GNP 1980: $23 bn.[4]
Defence expenditure 1981: 62.94 bn shekels ($7.34 bn).[4]
$1 = S 8.58 (1981), S 4.03 (1980).

Army: 135,000 (110,000 conscripts, male and female), 450,000 on mobilization, incl civil defence units.
11 armd divs.
33 armd bdes (3 tk, 1 mech inf bns).
10 mech inf bdes (5 are para-trained).
12 territorial/border inf bdes with *Nahal* militia.
15 arty bdes (each 5 bns of 3 btys).
3,500 med tks, incl 1,100 *Centurion*, 650 M-48, 810 M-60, 250 T-54/-55, 150 T-62, 100 *Merkava* I/II; about 4,000 AFV incl *Shoet* Mk 2 armd cars, RBY *Ramta*, BRDM-1/-2 recce veh; M-2/-3, 4,000 M-113, BTR-40/-50P(OT-62)/-60P/-152 APC; 130mm, 60 M-107 175mm SP guns; 30 M-101 105mm, 30 122mm towed, 500 155mm *Sherman*, Soltam M-68/-71, 120 M-109 155mm, 48 M-110 203mm SP how; 122mm, 135mm, 240mm, 290mm MRL; *Lance* SSM; 900 81mm, 120mm, and 160mm mor (some SP); *Ze'ev (Wolf)* RL; 106mm RCL; *TOW*, *Cobra*, *Dragon*, *Picket* ATGW; 2 btys with 24 *Vulcan/Chaparral* 20mm gun/msl systems, 900 20mm, 30mm, and 40mm AA guns; *Redeye* SAM.
(On order: 325 M-60 med tks; 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 submarines.
2 *Aliya* corvettes with 4 *Gabriel* SSM, 1 hel.
22 FAC(M): 10 *Reshef* with *Gabriel* and *Harpoon* SSM, 12 *Saar* 2/3 with 6–8 *Gabriel*.
40 coastal patrol craft⟨: 32 *Dabur*, 2 *Dvora*, 6 *Hawk*.
3 ex-US LSM, 6 LCT.
4 *Seascan* 1124N MR ac.
Naval cdo: 300.
(On order: 2 *Saar* 5, 3 *Reshef* (FAC(M)), *Aliya* corvettes, 2 *Flagstaff* II hydrofoils with *Harpoon* SSM, 3 *Seascan* MR ac.)

Bases: Haifa, Ashdod, Sharm-el-Sheikh, Eilat.

Air Force: 28,000 (7,000 conscripts, mostly in AD), 37,000 on mobilization; 602 combat ac (incl perhaps 150 in store), 32 armed hel.
13 FGA/interceptor sqns: 1 with 25 F/TF-15, 5 with 138 F-4E, 3 with 27 *Mirage* IIICJ/BJ, 3 with 85 *Kfir*-C2; 1 with 53 F-16A/B.
6 FGA sqns with 246 A-4E/H/M/N *Skyhawk* (most in store)
1 recce sqn with 14 RF-4E, 2 OV-1E; 4 E-2C AEW; 2 RU-21J, 2 C-130, 4 Boeing 707 ECM ac.
Tpts incl 4 Boeing 707, 22 C-130E/H, 21 C-47, 2 KC-130H (tankers), 6 *Arava*, 8 *Islander*.
Liaison: 15 Do-27, 11 Do-28D, 18 Cessna U-206, 23 Cessna 185, 3 *Westwind*.
Trainers incl 28 TA-4H, 50 *Kfir* (incl TC-2), 85 *Magister*, 12 *Queen Air*, 36 *Super Cub*.
Hel incl 10 *Super Frelon*, 33 CH-53D, 12 AH-1G/S, 29 Bell 206, 24 Bell 212, 25 UH-1D, 20 Hughes 500MD hel.
15 SAM bns with *Improved HAWK*.
AAM: *Sidewinder*, AIM-7E/F *Sparrow*, *Shafrir*.
ASM: *Luz*, *Maverick*, *Shrike*, *Walleye*, *Bullpup*.
(On order: 15 F-15, 22 F-16A fighters; 6 AH-1G/S gunships, 10 Hughes 500MD hel; 600 *Maverick* ASM; 600 *Sidewinder* AAM.)

RESERVES (all services): 504,000.

Para-Military Forces: 4,500 Border Guards, BTR-152 APC. *Coastguard:* 3 ex-US PBR; 3 patrol craft⟨.

JORDAN

Population: 3,320,000.
Military service: selective conscription.
Total armed forces: 67,500 (20,000 conscripts).
Estimated GNP 1980: $2.69 bn.
Defence expenditure 1981: 134 m dinars ($420 m).
$1 = 0.319 dinars (1981), 0.307 dinars (1980).

Army: 60,000.
2 armd divs
2 mech inf divs } 4 armd, 6 mech bdes.
1 indep tk bde.
4 SP arty regts.
2 AA bdes, incl 6 SAM btys with 48 *Improved HAWK* SAM.
3 AB/special forces bns.
250 M-47/-48, 75 M-60, *Chieftain*, 191 *Centurion* med tks; 140 *Ferret* scout cars; 820 M-113, 32 *Saracen* APC; 17 M-59 155mm guns; 36 M-102 105mm, 38 M-114 towed, 23 M-44, 80 M-109 155mm SP, 22 M-115 towed, 27 M-110 SP 203mm guns/how; 400 81mm, 107mm, and 120mm mor; 315 106mm and 120mm RCL; 330 *TOW*, 310 *Dragon* ATGW; 100 M-163 *Vulcan* 20mm, 200 M-42 40mm SP guns; *Redeye*, *Improved HAWK* SAM.
(On order: 278 *Khalid (Chieftain)*, 75 M-60A3 med tks; 78 M-113 APC.)

Navy: 300.
6 patrol craft⟨.

Base: Aqaba.

Air Force: 7,200; 84 combat aircraft.
1 FGA sqn with 28 F-5E, 4 F-5F.
3 interceptor sqns with 28 F-5E, 4 F-5F.
1 OCU with 15 F-5A, 5 F-5B.
1 tpt wing: 4 C-130B/H, 2 *Sabreliner* 75A, 8 C-212A *Aviocar*.
1 hel sqn: 15 *Alouette* III, 4 S-76, 4 Hughes 500D.
Trainers: 14 T-37C, 19 *Bulldog*, 1 *Dove*, 1 Boeing 727.
AAM: *Sidewinder*.
(On order: 36 *Mirage* F-1, 20 F-5E/F fighters; 5 *Bulldog* trg ac; 4 Hughes 500D, 24 AH-1Q *Cobra* hel with *TOW*.)

RESERVES: 35,000 (all services).

Para-Military Forces: 11,000. 3,500 Mobile Police Force, 7,500 Civil Militia.

KUWAIT

Population: 1,460,000.
Military service: 18 months.
Total armed forces: 12,400.
Estimated GNP 1979: $23.5 bn.
Defence expenditure 1980: 303 m dinars ($1.1 bn).
$1 = 0.276 dinars (1980), 0.277 dinars (1979).

Army: 10,000.
2 armd bdes.
3 mech inf bns.
1 SSM bn.
70 Vickers Mk 1, 10 *Centurion*, 160 *Chieftain* med tks; 100 *Saladin* armd, 80 *Ferret* scout cars; 100 M-113, 130 *Saracen* APC; 10 25-pdr guns; 80 AMX Mk F-3 155mm SP how; 4 *FROG*-7 SSM; 81mm mor; *HOT*, *TOW*, *Vigilant*, *Harpon* ATGW; SA-6/-7 SAM.
(On order: *Scorpion* lt tks, 172 M-113 APC, 6 M-113 SP *TOW* veh, *TOW* ATGW.)

Navy: 500 (coastguard).
57 coastal patrol craft⟨ (15 armed).
3 88ft landing craft.
(On order: 8 Lürssen TNC-45 FAC.)

Air Force: 1,900[5]; 50 combat aircraft.
2 FB sqns with 30 A-4KU.
1 interceptor sqn with 18 *Mirage* F-1C, 2 F-1B.
Tpts: 2 DC-9, 1 L-100-20, 1 Boeing 737-200.
3 hel sqns with 24 SA-342K *Gazelle*, 10 *Puma*.
Trainers incl 2 *Hunter* T-67, 6 TA-4KU.
AAM: R-550 *Magic*, *Sidewinder*. ASM: *Super* 530, SS-11/-12.
SAM: 6 *Improved HAWK* launchers (50 msls).
(On order: 60 *Improved HAWK* msls.)

Para-Military Forces: 18,000 Police.

LEBANON

Population: 3,090,000.
Military service: voluntary.
Total armed forces: 23,750.
Estimated GNP 1977: $2.9 bn.
Defence expenditure 1981: £L 1.0 bn ($253 m).[6]
$1 = £L 3.96 (1981), £L 3.03 (1977).

Army: 22,250.[7]
1 mech inf bde (1 armd recce, 3 inf bns).
(5 inf bdes forming.)
1 armd recce bn.

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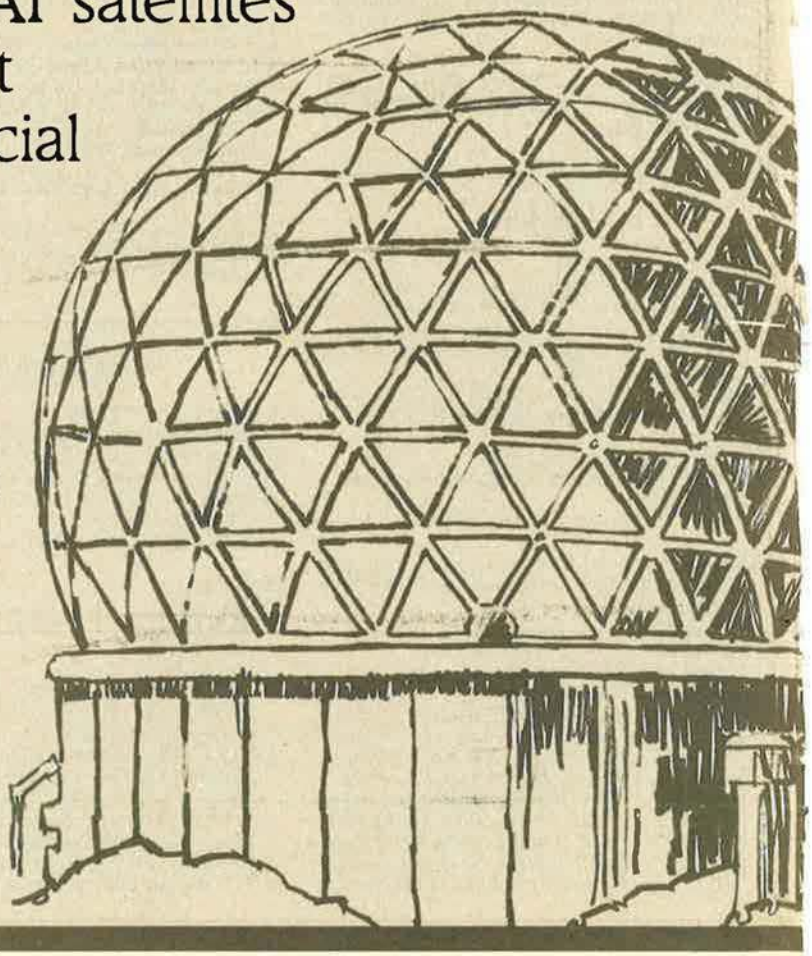

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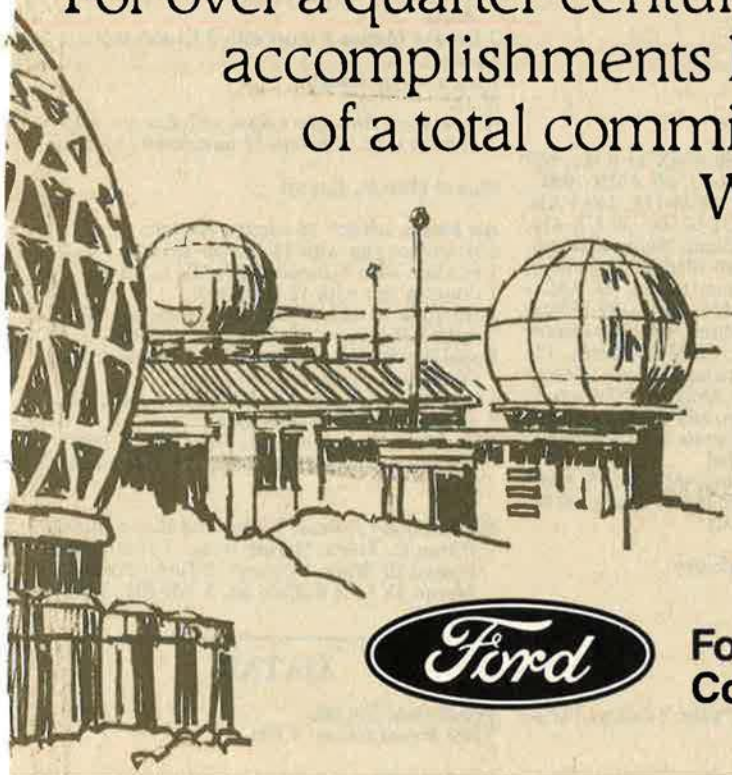

Ford

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9 inf bns.
1 arty bn.
100 *Saladin* armd cars; 80 M-113, *Saracen* APC; 10 122mm, 18 155mm guns; 200 81mm, 83mm, 88mm RL; 106mm RCL; *ENTAC*, 18 *Milan*, *TOW* ATGW; 20mm, ZU-23 23mm, 30mm towed, M-42 40mm SP AA guns.
(On order: 100 AMX-13 lt tks; 228 M-113A2 APC; 18 155mm guns; 400 RPG RL.)

Navy: 250.
12 patrol craft: 1 large, 11 coastal (6 *Aztec*, 3 *Byblos*, 2 *Tracker*(). 1 LCU.

Air Force: 1,250; 4 armed hel.
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.)

RESERVES: 11 *Hunter* F-70, 2 T-66, 9 *Mirage* IIIEL, 1 IIIBL ac, R-530 AAM, 5 *Alouette* hel; none serviceable.

Para-Military Forces: Internal Security Force: 7,500, 30 *Commando* APC.

LIBYA

Population: 3,125,000.
Military service: conscription.
Total armed forces: 55,000.
Estimated GNP 1979: $20.0 bn.
Defence expenditure 1978: 130 m Libyan dinars ($448 m).
$1 = 0.296 dinars (1979), 0.290 dinars (1978).

Army: 45,000.
12 tk bns.
24 mech inf bns.
1 National Guard bn.
2 arty, 2 AA arty bns.
1 special forces gp.
1 SSM bn.
2,600 T-54/-55/-62/-72, 100 OF-40 *(Lion)* med tks; 200 BRDM-2, 100 *Saladin*, 300 EE-9 *Cascavel* armd, 140 *Ferret* scout cars; 250 BMP MICV, 900 BTR-40/-50/-60, OT-62/-64, 100 *Urutu*, Fiat 6614, 100 M-113A1 APC; 130mm guns; some 600 M-101 105mm, 122mm, M-1974 SP, 152mm, M-109 155mm SP how; 250 B-11 107mm, BM-21/RM-70 122mm and M-51 130mm MRL; 106mm RCL; 450 81mm, 120mm, 160mm, and 240mm mor; 3,000 *Vigilant*, *Milan*, and *Sagger* ATGW; 48 *FROG-7*, 70 *Scud-B*, 12 SS-12 *Scaleboard* SSM; 450 23mm, ZSU-23-4 SP, 30mm, L40/70, 57mm AA guns; SA-7/-9 SAM.
(On order: 100 *Lion (Leopard I)* med tks; Fiat 6616 armd cars; 100 *Urutu* APC.)

Navy: 5,000.
4 ex-Sov F-class submarines.
1 Vosper Mk 7 frigate (under refit) with 4 *Otomat* SSM, 2 triple *Seacat* SAM (being replaced by *Aspide* SAM.)
4 *Wadi M'ragh* corvettes with quad *Otomat* SSM.
1 Vosper 440-ton corvette.
16 FAC(M): 2 *La Combattante* with 4 *Otomat* SSM, 11 ex-Sov *Osa*-II with 4 *Styx* SSM, 3 *Susa* with 8 SS-12 SSM.
4 *Garian*, 6 Thornycroft large patrol craft.
3 ex-Sov *Natya* minesweepers.
1 LSD (log spt/HQ), 4 PS-700 LST, 3 *Polnocny* LCT.
2 Thornycroft repair ships.
(On order: 1 *Wadi M'ragh* corvette with *Otomat* SSM; 8 *La Combattante* II, 14 SAR 33 FAC(M); 14 C-107 LCT.)

Bases: Tarabulus, Benghazi, Darnah, Tubruq, Bandiyah.

Air Force: 5,000; some 408 combat ac, 26 armed hel.[8]
1 bbr sqn with 9 Tu-22 *Blinder* A.
3 interceptor sqns and 1 OCU with 16 *Mirage* F-1ED, 6 F-1BD, 50 MiG-23 *Flogger* E, 45 MiG-25 *Foxbat* A, 80 MiG-21.
5 FGA sqns and OCU with 31 *Mirage* 5D/DE, 13 5DD, 16 *Mirage* F-1AD, 50 MiG-23BM *Flogger* F, 14 MiG-23U, 5 MiG-25U, some 30 Su-22 *Fitter* C/F.
1 COIN sqn with 30 J-1 *Jastreb*.
1 recce sqn with 7 *Mirage* 5DR, 6 MiG-25R (Soviet crews).
1 army observation sqn with 10 Cessna O-1.
2 tpt sqns with 7 C-130H, 1 Boeing 707, 2 G-222, 2 *Mystère-Falcon*, 2 C-140 *Jetstar*, 2 CL-44, 5 Il-76, 1 *Corvette* 200, 2 *King Air*.
4 hel sqns with 10 *Alouette* III, 9 AB-47, 5 AB-206, 1 AS-61A, 2 AB-212, 4 *Super Frelon* (SAR), 20 CH-47C, 20 Mi-2, 2 Mi-8, 26 Mi-24.
2 trg sqns with 61 *Galeb*.
Trainers incl 2 Tu-22 *Blinder* D, 33 L-39, 12 *Magister*, 120 SF-260WL.
AAM: AA-2 *Atoll*, R-550 *Magic*.
ASM: *Swatter* ATGW.
3 SAM bdes with 30 *Crotale* (60 systems), 300 SA-2/-3/-6 SAM.
(On order: 18 G-222, 10 *Twin Otter* tpts; 70 SF-260 trainers; *Gazelle*, 2 A-109 hel; Super 530 AAM.)

Forces Abroad: Chad (3,500).

Para-Military Forces: Pan-African Legion (5,000); Muslim Youth. Militia cav div forming.

MOROCCO

Population: 21,580,000.
Military service: 18 months.
Total armed forces: 120,000.
Estimated GNP 1979: $15.2 bn.
Defence expenditure 1981: 4.7 bn dirham ($1.2 bn).
$1 = 4.72 dirham (1981), 3.95 dirham (1979).

Army: 107,000.
7 armd groups.
12 mech inf regts.
1 light security bde.
1 para bde.
1 AA bde.
9 arty groups.
2 Royal Guard bns.
9 camel corps bns.
2 desert cav bns.
1 mountain bn.
3 cdo bns.
8 engr bns.
4 armd car sqns.
150 M-48, 30 T-54 med, 80 AMX-13 lt tks, 650 armd cars, incl 36 EBR-75, 30 AMX-10RC, 100 AML-90 and M-8; 364 M-113, 240 VAB, 40 M-3 half-track, 70 OT-62/-64, 30 UR-416, *Ratel*, M-3 APC; M-116 75mm, 76mm, 40 85mm, 40 SU-100 100mm SP, 40 105mm, 12 130mm, 152mm, 20 M-114 155mm towed, 24 AMX-105, 105mm, 36 AMX-155, 36 M-109 155mm SP how; 360 81mm, 70 82mm, 320 120mm mor; 36 BM-21 122mm MRL; 20 M-56 90mm, 121 *Kuerassier* 105mm SP ATK guns; 75mm, 106mm RCL; *Strim*-89, *ENTAC*, *Dragon*, *TOW* ATGW; 100 20mm, 37mm, 57mm, and 100mm AA guns; SA-7, 10 *Chaparral*, *Crotale* SAM; 4 *Alouette* II, 3 *Gazelle*, 6 A-109 hel.
(On order: 108 M-60 med tks, AML-90, 170 AMX 10RC, *Eland* armd cars; 160 VAB APC; 40 M-163 *Vulcan* 20mm SP AA.)

Navy: 5,000 (600 naval infantry).
2 PR-72 FAC(G).
3 large patrol craft.
17 coastal patrol craft.
1 minesweeper.
4 landing ships (3 *Batral*).
1 naval inf bn.
(On order: 1 *Descubierta* frigate; 4 *Lazaga* FAC(M) with *Exocet*.)

Bases: Casablanca, Safi, Agadir, Kenitra, Tangier.

Air Force: 8,000; 75 combat aircraft.[9]
4 FGA sqns, 1 with 12 F-5A, 2 F-5B, 1 RF-5A; 3 with 28 *Mirage* F-1CH.
1 COIN/recce sqn with 22 *Magister*, 10 OV-10.
1 tpt sqn with 10 C-130H, 1 *Gulfstream*, 5 *King Air*, 3 Do-28D, 8 *Broussard*.
2 hel sqns with 34 AB-205A, 5 AB-206, 13 AB-212, 33 *Puma*, 4 HH-43B SAR, 11 CH-47C.
Trainers: 11 T-34C, 11 AS-201/18 *Bravo*, 28 SF-260M, 7 *AlphaJet*.
AAM: *Sidewinder*, R-550 *Magic*.
(On order: 20 F-5E fighters; 17 *AlphaJet* trg ac; 7 Do-28D, 7 C-130H tpts; 24 *Gazelle*, 19 AB-206 hel; *Maverick* ASM.)

Forces Abroad: Equatorial Guinea: 400.

Para-Military Forces: 30,000, incl 11,000 *Sureté Nationale* with 2 *Rallye* ac; 5 *Alouette* II/III, 3 *Lama*, 6 *Gazelle*, 6 *Puma* hel.

OMAN

Population: 930,000.
Military service: voluntary.
Total armed forces: 14,500.[10]
Estimated GNP 1978: $2.6 bn.
Defence expenditure 1980: 304 rial omani ($879 m).
$1 = 0.346 rial (1980), 0.345 rial (1978).

Army: 11,500.
2 bde HQ.
1 Royal Guard bde.
3 arty regts (2 lt, 1 med).
1 sigs regt.
1 armd car regt (2 armd car, 1 tk sqns).
8 inf bns.
1 special force.
1 engr sqn.
1 para sqn.
6 M-60A1, 12 *Chieftain* (on lease) med tks; 36 *Saladin* armd cars; 25 25-pdr, 36 105mm, 12 130mm guns; 12 155mm SP how; 81mm, 4.2-in, 120mm mor; *TOW* ATGW; 4 ZU-23-2 AA guns.

Navy: 1,000.
3 corvettes (1 Royal Yacht, 2 ex-Neth *Wildervank*).
2 Brooke Marine FAC(M) with 2 *Exocet* SSM.
4 FAC(G).
1 log spt ship (amph).
5 LCU.
(On order: 3 *Province* FAC(M) with *Exocet*, 4 25-metre FAC(P), 3 *Skima*-12 hovercraft, 1 LCM.)

Bases: Muscat, Raysut.

Air Force: 2,000;[10] 38 combat aircraft.
1 FGA/recce sqn with 12 *Hunter* FGA-6, 4 T-7.
1 FGA sqn with 8 *Jaguar* S(O) Mk 1, 2 T-2.
1 COIN/trg sqn with 12 BAC-167.
3 tpt sqns: 1 with 3 BAC-111, 1 *Falcon* 10; 2 with 7 *Defender*, 15 *Skyvan*, 1 C-130H.
Royal flt with 1 *Gulfstream*, 1 VC-10 tpts, 2 AS-202 *Bravo* trainers; 4 AB-212 hel.
1 hel sqn with 16 AB-205, 2 AB-206, 5 AB-214B.
2 AD sqns with 28 *Rapier* SAM.
(On order: 12 *Jaguar* FGA; 1 C-130H, 2 DHC-5D tpts; 28 *Blindfire* radar; 250 *Sidewinder* AAM.)

Para-Military Forces: 3,300 tribal Home Guard *(Firqats)*. Police Marine Wing: 5 75-ft patrol boats; Air Wing: 1 *Learjet*, 2 *Turbo-Porter*, 2 *Merlin* IVA, 2 *Buffalo* ac, 5 AB-205, 3 AB-206 hel.

QATAR

Population: 230,000.
Total armed forces: 9,700.

Estimated GNP 1979: $5 bn.
Defence expenditure 1980: 2.2 bn ryal ($59.5 m).
$1 = 3.70 ryal (1980), 3.87 ryal (1979).

Army: 9,000.
1 tk bn.
1 Guards inf bn.
3 inf bns.
1 arty bn.
24 AMX-30 med tks; 10 *Ferret* scout cars; 30 AMX-10P MICV, 25 *Saracen* APC; 8 25-pdr guns, 6 155mm how; 81mm mor.
(On order: *HAWK* SAM.)

Navy: 400, incl Marine Police.
6 Vosper Thornycroft large patrol craft.
29 coastal patrol craft((2 75-ft, 2 45-ft, 25 *Spear*).
2 *Interceptor* fast assault/SAR craft.
(On order: 3 *La Combattante* FAC(M) with *Exocet* SSM; 3 *Exocet* coast defence systems.)

Base: Doha.

Air Force: 300; 9 combat aircraft.
3 *Mirage* F-1, 2 *Hunter* FGA-6, 1 T-79, 3 *Alpha-Jet*.
2 *Whirlwind*, 4 *Commando*, 2 *Gazelle*, 3 *Lynx* hel.
SAM: *Tigercat*.
(On order: 11 *Mirage* F-1, 3 *AlphaJet* fighter/trg ac; *Puma* hel.)

SAUDI ARABIA

Population: 10,395,000.
Military service: voluntary.
Total armed forces: 51,700.
Estimated GNP 1979: $94.6 bn.
Defence expenditure 1981–2: 92.5 bn riyals ($27.7 bn).
$1 = 3.34 riyals (1981), 3.77 riyals (1979).

Army: 35,000.
2 armd bdes.
2 mech bdes.
2 inf bdes.
1 Royal Guard Regt (3 bns).
4 arty bns.
2 para bns.
18 AA arty btys.
16 SAM btys with *Improved HAWK* (Air Force assigned).
480 AMX-30, 150 M-60A1 med tks; 250 AML-60/-90 armd, *Ferret*, 100 *Fox* scout cars; 250 AMX-10P, 1,000 M-113, Panhard M-3 APC; 54 Model 56 105mm pack, M-101 105mm, M-114 towed and GCT 155mm SP how; 81mm, M-30 107mm mor; 75mm RCL; *Vigilant*, SS-11, *TOW*, *Dragon* ATGW; M-163 *Vulcan* 20mm, AMX-30 30mm, 46 35mm, M-42 40mm SP AA guns; *Redeye*, 6 *Shahine/Crotale*, *HAWK* SAM.
(On order: 170 AMX-30 med tks; 150 M-60A3 conversion kits; *Engesa* armd cars; 40 35mm SP AA guns; *Redeye*, 6 *Shahine/Crotale* SAM.)

Navy: 2,200.
3 PCG-1 corvettes with 8 *Harpoon* SSM.
1 large patrol craft (ex-US coastguard cutter).
5 PGG-1 FAC(M) with 2 twin *Harpoon* SSM.
3 *Jaguar* FAC(T).
53 coastal patrol craft(.
4 MSC-322 coastal minesweepers.
4 ex-US LCU. 8 ex-US LCM-6.
(On order: 4 frigates with *Otomat* SSM, *Crotale* SAM; 1 PCG-1 corvette with 8 *Harpoon;* 4 PGG-1 FAC(M) with 2 twin *Harpoon* SSM; 2 log spt ships; 2 *Atlantic* II MR ac; 24 AS-365N *Dauphine* 2 hel (4 SAR, 20 with AS-15TT ASM).)

Bases: Jiddah, Al Qatif/Jubail, Ras Tanura, Damman, Yanbo, Ras al Mishab.

Air Force: 14,500; 139 combat aircraft.
3 FGA sqns with 65 F-5E.
1 interceptor sqn with 15 *Lightning* F-53, 2 T-55.
3 OCU with 24 F-5F, 16 F-5B, 17 *Lightning* F-53/T-55.
2 tpt sqns with 34 C-130E, 25 C-130H, 8 KC-130H, 2 *Jetstar*, CASA C-212.
2 hel sqns with 12 AB-206, 12 AB-205, 10 AB-212.
Other ac incl 1 Boeing 707, 2 *Falcon* 20 tpts, 2 *Alouette* III, 1 AB-206, 1 Bell 212, 2 AS-61A, 6 KV-107 hel.
Trainers: 39 BAC-167, 12 Cessna 172G/H/L.
2 AD btys: 1 with *HAWK;* 1 with 6 *Shahine/Crotale* (18 msls).
AAM: *Red Top*, *Firestreak*, *Sidewinder*, R-530, R-550 *Magic*.
ASM: *Maverick*.
(On order: 47 F-15 fighters; 15 TF-15 trainers; 1 Boeing 747, 20 CASA C-212-200 tpts; 660 *Sidewinder* AAM; 916 *Maverick* ASM.)

Para-Military Forces:
National Guard (30,000): bde HQ; 4 all-arms, 16 regular inf, 24 irregular inf bns, 1 ceremonial car 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* APC.)
Counter-terrorist unit (Ministry of Interior): hel; 6,500 Frontier Force and Coastguard; 90 small patrol boats, 8 SRN-6 hovercraft. (On order: MM-40 *Exocet* SSM.)
General Civil Defence Administration Units.

SUDAN

Population: 19,310,000.
Military service: conscription.
Total armed forces: 71,000.
Estimated GDP 1979: $5.6 bn.
Defence expenditure 1980: £S 122.7 m ($245 m).
$1 = £S 0.50 (1980), £S 0.40 (1979).

Army: 68,000 (incl AD).
2 armd bdes.
9 inf bdes.
1 para bde.
3 arty regts.
1 engr regt.
Air Defence (3,000).
3 AA arty regts.
1 SAM regt with SA-2.
70 T-54, 60 T-55, 17 M-47, 50 M-60A1 med, 55 M-41, 30 Ch Type-62 lt tks; 50 *Saladin* armd, 20 BTR-40, 60 *Ferret* scout cars; 100 BTR-50/-152, 60 OT-64, 49 *Saracen*, 45 V-150 *Commando*, 50 AMX-10P APC; 55 25-pdr, 40 100mm guns; 20 M-101 105mm, 18 122mm, 11 155mm F-3 SP how; 30 120mm mor; 30 85mm ATK guns; 80 37mm, 80 40mm, 100mm AA guns; 20 SA-2, SA-7 SAM.
(On order: 80 M-113 APC; 8 M-163 *Vulcan* 20mm SP AA guns.)

Navy: 1,500.
6 large patrol craft: 2 ex-Yug *Kraljevica*, 4 PBR.
6 ex-Yug '101' FAC(G).
3 70-ton coastal patrol craft.
2 ex-Yug DTK-221 LCT, 1 DTM-231 LCU(.

Base: Port Sudan.

Air Force: 1,500; 44 combat aircraft.
2 FGA/interceptor sqns with 24 *Mirage* 50S, 8 MiG-21.
1 FGA sqn with 6 Ch F-5 (MiG-17PF), 6 F-6 (MiG-19).
1 tpt sqn with 6 C-130H, 1 *Mystère-Falcon*, 4 DHC-5D, 8 *Turbo-Porter*, 6 EMB-110P2.
1 hel sqn with 15 Mi-8, *Puma*, 10 Bo-105.
Trainers incl 5 BAC-145, 5 *Jet Provost* Mk 55 (some in storage), 2 MiG-15U, 2 MiG-21U, 2 Ch FT-5, 2 FT-6.
AAM: AA-2 *Atoll*.
(On order: 6 Ch F-6 fighters; 2 C-130 tpts.)

Para-Military Forces: 3,500: 500 National Guard, 500 Republican Guard, 2,500 Border Guard.

SYRIA

Population: 9,150,000.
Military service: 30 months.
Total armed forces: 222,500.
Estimated GNP 1979: $9.2 bn.
Defence expenditure 1981: £Syr 9.378 bn ($2.39 bn).
$1 = £Syr 3.93 (1979, 1981).

Army: 170,000, incl 120,000 conscripts.
4 armd divs (each 2 armd, 1 mech bdes) (1 is Presidential Guard).
2 mech divs (each 1 armd, 2 mech bdes).
2 indep armd bdes.
4 indep mech bdes.
2 arty bdes.
5 cdo regts.
1 para regt.
2 SSM regts: 1 with *Scud*, 1 with *FROG*.
32 SAM btys with SA-2/-3/-6.
2,200 T-54/-55, 1,100 T-62, 400 T-72 med tks; BRDM recce vehs; BMP MICV; 1,600 BTR-40/-50/-60/-152, OT-64 APC; 2,300 122mm incl ISU-122 SP, 130mm, 152mm, 180mm guns; 122mm, 152mm how; 122mm, 140mm, 240mm MRL; 15 *FROG*-7, 9 *Scud* SSM; 82mm, 120mm, 160mm, 240mm mor; 57mm, 85mm, 100mm ATK guns; 1,300 *Snapper*, *Sagger*, *Swatter*, *Milan* ATGW; 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-7 SAM; 40 *Gazelle* hel.
(On order: SP arty; *FROG* SSM; *HOT* ATGW; SA-6/-8 SAM; *Gazelle* hel.)

Forces Abroad: Lebanon (Arab Deterrent Force): 25,000; 2 armd, 2 mech bdes, cdo bns.

RESERVES: 100,000.

Navy: 2,500.
2 ex-Sov *Petya* I frigates.
18 ex-Sov FAC(M) with *Styx* SSM: 6 *Osa*-I, 6 *Osa*-II; 6 *Komar*((may be phasing out).
8 ex-Sov P-4 FAC(T)<.
1 ex-Fr CH large patrol craft.
3 ex-Sov minesweepers: 1 T-43 ocean, 2 *Vanya* coastal.
(On order: FAC(M).)

Bases: Latakia, Tartus, Minet el-Baida.

RESERVES: 2,500.

Air Force: 50,000 (incl AD Command); 448 combat ac,[11] some 16 armed hel.
11 FGA sqns: 4 with 85 MiG-17; 1 with 16 Su-7; 2 with 26 Su-20; 4, 64 MiG-23BM *Flogger* F.
12 interceptor sqns: 1 with 25 MiG-25 *Foxbat* A; 11 with 230 MiG-21PF/MF.
1 EW sqn with 2 Tu-126 *(Moss)*.
2 tpt wings with 2 An-12, 3 An-24, 4 An-26, 2 *Mystère* 20F.
Trainers incl 30 L-39, 60 L-29, 10 MiG-15UTI, 32 MBB-223 *Flamingo*.
Hel incl 10 Mi-2, 8 Mi-4, 72 Mi-8, 12 Mi-24, 4 Ka-25 ASW, 40 *Gazelle*.
AAM: AA-2 *Atoll*. ASM: AT-2 *Swatter* ATGW.
(On order: MiG-23 fighters; 2 Tu-126 recce ac; 18 AB-212, 21 *Super Frelon* hel; AAM.)

AIR DEFENCE COMMAND[12]: (20,000).

50 SAM btys with SA-2/-3; 25 with SA-6; AA arty, and radar.

Para-Military Forces: 9,800: 8,000 Gendarmerie, 1,800 Desert Guard (Frontier Force). Palestine Liberation Army Brigade of 6,000 with Syrian officers (nominally under PLO); 50 T-34 med tks; 105mm how; BM-21 122mm MRL; *FROG*-3 SSM, AT-3 *Sagger* ATGW; SAM. Workers Militia.

TUNISIA

Population: 6,670,000.
Military service: 12 months selective.
Total armed forces: 28,600.
Estimated GNP 1979: $7.0 bn.
Defence expenditure 1981: 104.4 m dinars ($262 m).
$1 = 0.399 dinars (1981), 0.41 dinars (1979).

Army: 24,000.
2 armd regts.
1 armd recce regt.
2 combined arms regts.
1 Sahara regt.
2 fd, 1 AA arty regts.
2 para-cdo regts.
1 engr regt.
Aviation wing.
10 M-48, 2 M-60A1 med, 40 AMX-13, 20 M-41 lt tks; 20 *Saladin*, 15 EBR-75, 10 AML armd cars; 30 M-113A1 APC; 6 25-pdr, 40 105mm, 10 155mm how; 60mm, 81mm, 82mm, 107mm mor; 54 *Kuerassier* 105mm SP ATK guns; SS-11 ATGW; 45 37mm and 40mm AA guns; 328 MIM-72 *Chaparral* SAM, 1 Hughes 500MD, 18 AB-205, 6 UH-1N hel.
(On order: 30 M-113A1 APC; 19 M-109A2 155mm SP how; *STRIM*-89 RL; 1,200 *TOW* ATGW; 26 M-163A1 20mm *Vulcan* SP AA guns; RBS-70, 300 MIM-72F *Chaparral* SAM; 8 Bell 205 hel.)

Navy: 2,600 (500 conscripts).
1 ex-US *Savage* frigate.
4 large patrol craft: 1 ex-Fr *Le Fougeux*, 3 P-48 with 8 SS-12 SSM.
2 Vosper Thornycroft 103-ft FAC(P).
2 ex-Ch *Shanghai*-II FAC(G).
2 ex-US *Adjutant* coastal minesweepers.
10 coastal patrol boats(.
(On order: 3 *Lürssen* 57-metre, 2 23-metre FAC.)

Bases: Tunis, Susa.

Air Force: 2,000 (500 conscripts); 11 combat ac.
1 COIN sqn with 7 MB-326K, 4 MB-326L.
Trainers: 26 SF-260, 3 MB-326B, 12 T-6, 12 Saab *Safir*.
Liaison ac: 4 S-208A.
Hel: 7 *Alouette* II, 5 *Alouette* III, 4 UH-1H, 1 *Puma*.
(On order: 1 C-130H tpt.)

Para-Military Forces: 8,500. Gendarmerie (5,000): (3 bns), 110 Fiat 6614 APC. National Guard (3,500).

UNITED ARAB EMIRATES (UAE)

Population: 950,000.
Military service: voluntary.
Total armed forces: 42,500.[13]
Estimated GNP 1979: $21.0 bn.
Defence expenditure 1979: 2.88 bn dirhams. ($750 m).
$1 = 3.84 dirhams (1979).

Army: 40,000.
1 Royal Guard 'bde'.
5 armd/armd car bns.
9 inf bns.
1 arty bde (3 bns).
1 AD bde (3 bns).
50 AMX-30, 25 OF-40 med, 60 *Scorpion* lt tks; 6 *Shorland*, 90 AML-90 armd cars; 30 AMX VCI, 300 Panhard M-3 APC; 40 105mm guns; 20 AMX 155mm SP how; 81mm mor; 84mm, 120mm RCL; *Harpon*, *Vigilant* ATGW; *Rapier*, *Crotale*, RBS-70 SAM.
(In store: 70 *Saladin* armd, 60 *Ferret* scout cars; 12 *Saracen* APC.)
(On order: 5 OF-40 med, 20 *Scorpion* lt tks; *Cascavel* armd cars.)

Navy: 1,000.
2 *Jaguar* II (TNC-45) FAC(M) with 2 twin MM-40 *Exocet* SSM.
6 Vosper Thornycroft large patrol craft.
3 Keith Nelson coastal patrol craft(.
(On order: 4 *Jaguar* II FAC(M) with *Exocet*.)

Base: Abu Dhabi.

Air Force: 1,500: 51 combat aircraft.
2 interceptor sqns with 25 *Mirage* 5AD, 3 5RAD, 2 5DAD.
1 FGA sqn with 10 *Hunter* FGA-76, 2 T-77.
1 COIN sqn with 8 MB-326KD/LD, 1 SF-260WD.
Tpts incl 2 C-130H, 1 L-100-30, 1 Boeing 720-023B, 1 G-222, 4 *Islander*, 3 DHC-4, 4 DHC-5D, 1 Cessna 182.
Hel incl 4 AB-205, 6 AB-206, 3 AB-212, 7 *Alouette* III, 9 *Puma*, 13 *Gazelle*.
AAM: R-550 *Magic*. ASM: AS-11/-12.
(On order: 1 G-222, 4 C-212 *Aviocar* tpt ac; *Lynx* hel.)

Para-Military Forces: Coastguard: 19 coastal patrol boats.

YEMEN ARAB REPUBLIC (NORTH)

Population: 5,365,000.
Military service: 3 years.
Total armed forces: 32,100.
Estimated GNP 1979: $3.8 bn.
Defence expenditure 1981: 970.2 m riyals ($212 m).
$1 = 4.57 riyals (1981), 4.56 riyals (1979).

Army: 30,000 (20,000 conscripts).
3 armd bdes.[14]
1 mech, 8 inf bdes (1 reserve).[14]
1 para bde.[14]
1 cdo bde.[14]
7 arty bns.[14]
3 AA arty bns.[14]
2 AD bns.[14]
150 T-34, 500 T-54/-55, 64 M-60 med tks; 50 *Saladin* armd, *Ferret* scout cars; 12 M-106 mor-armed, 90 M-113, 350 BTR-40/-60/-152, *Walid* APC; 250 76mm, 105mm, and 122mm guns; 50 SU-100 SP guns; 200 82mm and 120mm mor; 65 BM-21 122mm MRL; 75mm, 82mm RCL; *LAW* RL; 20 *Vigilant*, *TOW* ATGW; M-167 20mm *Vulcan*, ZU-23 23mm, 37mm, 57mm, 85mm towed, 24 ZSU-23-4, 72 M-163 *Vulcan* 20mm SP AA guns; SA-6/-9 SAM.
(On order: 75 BTR APC; 155mm how; *Dragon* ATGW.)

Navy: 600.
3 ex-Sov P4 FAC(T)(.
8 patrol craft(: 3 ex-US *Broadsword*, 5 ex-Sov (2 *Zhuk*, 3 *Poluchat*). 2 LCM.

Base: Hodeida.

Air Force: 1,500; 65 combat ac, some armed hel.[15]
5 fighter sqns: 2 with 21 MiG-21; 1 with 12 MiG-17F; 1 with 12 F-5E; 1 with 20 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: 1 Mi-4, 12 Mi-8, some Mi-24, 6 AB-206, 6 AB-212, 2 *Alouette*.
1 AD regt with 12 SA-2 SAM.
AAM: AA-2 *Atoll*.
(On order: 19 MiG-21.)

Para-Military Forces: 20,000 tribal levies.

YEMEN: PEOPLE'S DEMOCRATIC REPUBLIC (SOUTH)

Population: 1,955,000.
Military service: 2 years.
Total armed forces: 24,300 (16,000 conscripts).
Estimated GNP 1978: $500 m.
Defence expenditure 1980: 43.9 m dinars ($127 m).
$1 = 0.345 dinars (1980), 0.34 dinars (1978).

Army: 22,000 (to be increased).
1 armd bde (trg).
11 inf bdes.[14]
1 arty bde (3 bns).[14]
1 marine bde.[14]
1 SSM regt with *FROG*.
Some T-34, 375 T-54/-55/-62 med tks; 10 *Saladin* armd, 10 *Ferret* scout cars; BMP MICV, 200 BTR-40/-60/-152 APC; 185 85mm, 100mm, 130mm guns, 105mm pack, 122mm how; BM-21 122mm MRL; 120mm, 160mm mor; some *FROG*-7 SSM; 140 ZU-23-2 23mm, 37mm, 57mm, 85mm towed and ZSU-23-4 SP AA guns; SA-7 SAM.

Navy: 1,000.
1 ex-Sov corvette (converted T-58 minesweeper).
5 ex-Sov *Osa* FAC(M) with 4 *Styx* SSM.
2 ex-Sov SO-1 large patrol craft.
4 FAC(T): 2 *Mol*, 2 P-6(.
2 ex-Sov *Zhuk* FAC(P)(.
5 coastal patrol craft((with Public Security Force): 1 *Tracker* 2, 3 *Spear*, 1 *Interceptor*.
1 *Ropucha* LST; 4 *Polnocny* LCT; 3 ex-Sov T-4 LCA.

Bases: Aden, Mukalla, Riyan, Al-Aned.

Air Force: 1,300; 118 combat ac, 6 armed hel.[16]
1 lt bbr sqn with 8 Il-28.
5 FGA sqns: 2 with 37 MiG-17F; 1 with 10 MiG-21; 1 with 12 Su-20/-22; 1 with 15 MiG-23BM *Flogger* F.
3 interceptor sqns with 36 MiG-21F.
1 tpt sqn with 4 Il-14, 3 An-24.
1 hel sqn with some Mi-4, 8 Mi-8, 6 Mi-24.
1 SAM regt with SA-2.
Trainers: 3 MiG-15UTI.
AAM: AA-2 *Atoll*.

Forces Abroad: Ethiopia 1,000; one MiG-17 sqn.

Para-Military Forces: Popular Militia. Public Security Force: 15,000 (to be increased).

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[1] Spares for Soviet equipment are scarce; active holdings being reduced to ⅓ of listed total; replacement or reconstruction using Western material planned.

[2] Losses and low serviceability make eqpt estimates tentative only.

[3] Losses (and in Iran's case low serviceability) make eqpt estimates tentative only.

[4] Rapid inflation makes expenditure and GNP figures in local currency and dollar terms unreliable.

[5] Excluding expatriate personnel.

[6] Plus £L 3 bn ($955 m) spread over 10 years to rebuild the armed forces.

[7] 1,500 serve with UNIFIL.

[8] Some may be in storage. Soviet, Pakistani, and Palestinian pilots also fly Libyan aircraft.

[9] 2 MiG-15, 12 MiG-17 FGA in storage.

[10] Excluding expatriate personnel.

[11] Some aircraft believed to be in storage.

[12] Under Army Command, with Army and Air Force manpower.

[13] 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 May 1976.

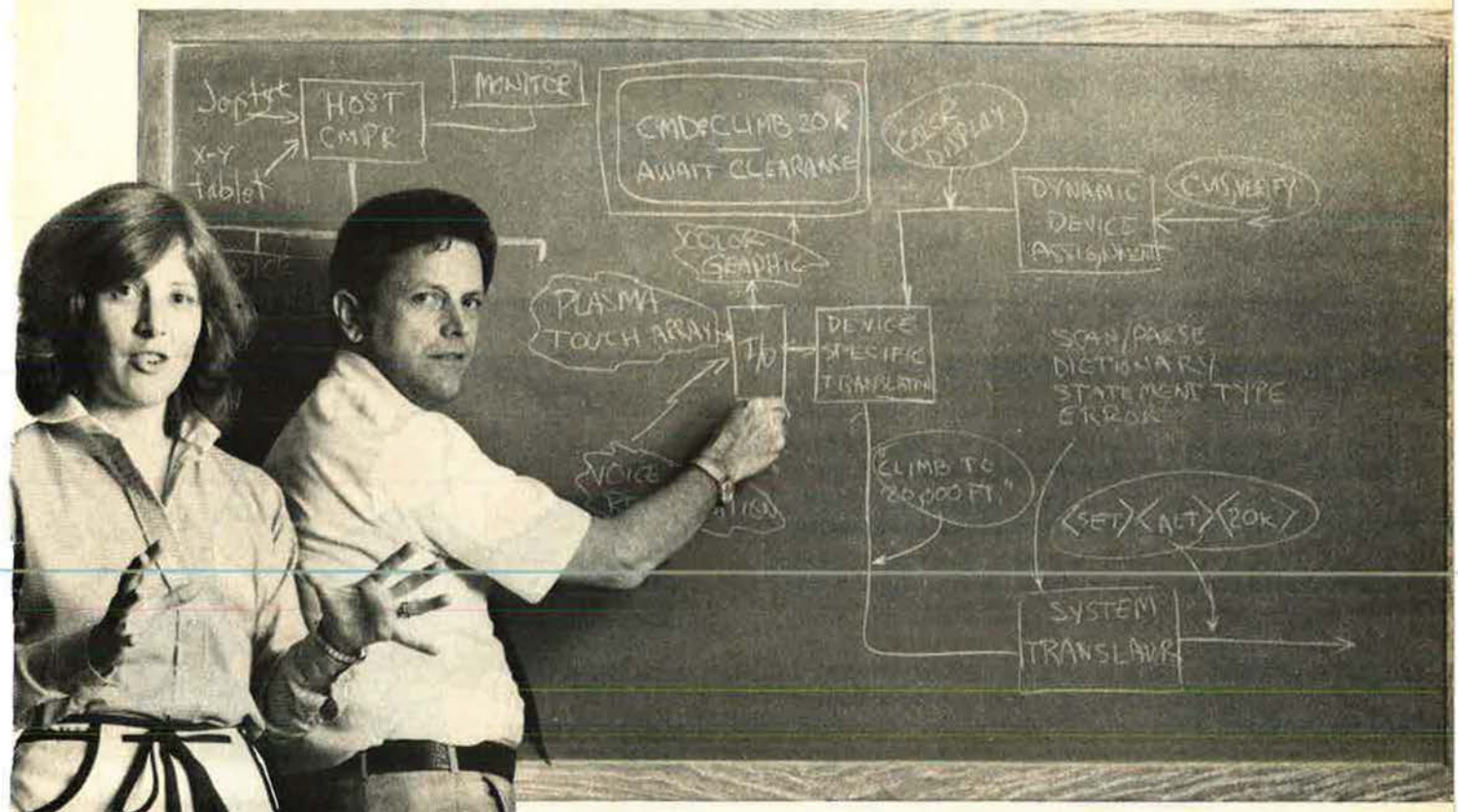
[14] Most units are cadre only.

[15] Some aircraft are believed to be in storage.

[16] Some ac believed to be in storage, and some are believed flown by Soviet and Cuban crews.

Man/machine interface technology on the move.

Rita Knox and Ken Kendall are making machines understand people.



Modern man's ever-increasing involvement with computers has created a complex problem: how to expand the machine's ability to comprehend and communicate in ways that are more compatible with man's behavior patterns.

And that's the problem being tackled at Lockheed Electronics by Dr. Rita Knox and Senior Staff Engineer Ken Kendall.

"We're using sophisticated technology to tailor machine capabilities to human capabilities," Dr. Knox says.

"For one thing, we're implementing designs that will let man use fairly natural language to communicate with the machine and, at the same time, will 'teach' the machine how to monitor, evaluate, and improve human performance.

"Also, we now have advanced input/output devices like voice recognizers and synthesizers, color graphics systems, and interactive flat panels. With these, and with what we know about the human sensory system and human information processing, we can choose devices, encode data, and format displays to optimize the information flow between man and computer."

Prime applications of the work by Knox and Kendall include weapons control consoles, air traffic control centers, flight crew stations, and interactive training devices.

Soon, people will be able to act more like people in dealing with machines, because the machines will "know" more about what people are like.

Lockheed Electronics

Sub-Saharan Africa

MULTILATERAL AGREEMENTS

The Organization of African Unity (OAU), constituted in May 1963, includes all internationally recognized independent African states except South Africa. It has a Defence Commission—responsible for defence and security co-operation and the defence of the sovereignty, territorial integrity, and independence of its members—which had rarely met. In July 1978 the OAU agreed that this be reactivated to consider the establishment of an African Intervention Force. In 1979 the Force was approved in principle, and planning for its formation, funding, and equipping ordered. Little progress has been reported.

BILATERAL 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 have been negotiated with Somalia and Kenya to allow limited US access to naval and air facilities.

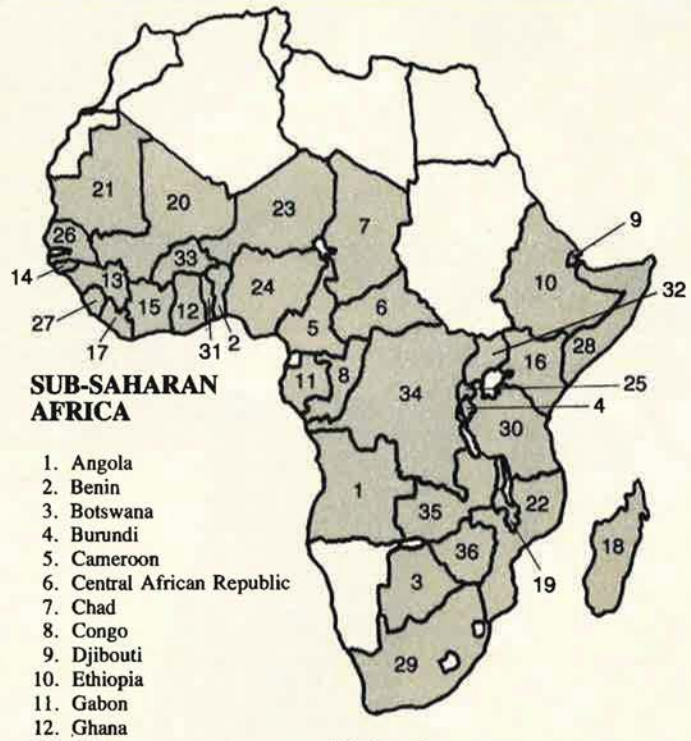
The Soviet Union's 1974 Treaty of Friendship and Co-operation with Somalia was abrogated in November 1977. She has others with Angola (October 1976), Mozambique (March 1977), and Ethiopia (November 1978, ratified April 1979). Relations with the Congo Republic are close but no such agreement is known to exist. Military aid has been given to Angola, Ethiopia, Guinea, Guinea-Bissau, Mali, Mozambique, Nigeria, Somalia, and Uganda. The Soviet Navy can no longer use facilities in Somalia and has transferred its operations to Dahlak Island, Ethiopia. Guinea was used as a Soviet staging and maritime reconnaissance base until 1977.

China has military assistance agreements with Cameroon, Equatorial Guinea, Guinea, Mali, and Tanzania, and has given aid to Mozambique and Zaire.

Britain maintains overflying, training, and defence agreements with Kenya, is helping Zimbabwe form and train her forces, and is discussing similar arrangements with Uganda.

France signed defence and/or military co-operation agreements with Benin, the Cameroons (February 1974), the Central African Republic, Chad (status obscure), Congo, Gabon (1974), Ivory Coast, Madagascar, Mali (since terminated), Mauritania, Niger, Senegal (March 1974), Togo, Upper Volta, and Zaire. The agreement with the Central African Republic was terminated briefly (May–September 1979) before the change of government there. France concluded an agreement with Djibouti which permits her to station forces.

Belgium has a military co-operation agreement with Zaire, and France has assisted in training Zairean forces.



SUB-SAHARAN AFRICA

1. Angola
2. Benin
3. Botswana
4. Burundi
5. Cameroon
6. Central African Republic
7. Chad
8. Congo
9. Djibouti
10. Ethiopia
11. Gabon
12. Ghana
13. Guinea
14. Guinea-Bissau
15. Ivory Coast
16. Kenya
17. Liberia
18. Madagascar
19. Malawi
20. Mali
21. Mauritania
22. Mozambique
23. Niger
24. Nigeria
25. Rwanda
26. Senegal
27. Sierra Leone
28. Somali Democratic Republic
29. South Africa
30. Tanzania
31. Togo
32. Uganda
33. Upper Volta
34. Zaire
35. Zambia
36. Zimbabwe

Spain maintains close links with Equatorial Guinea.

Cuba has given military aid at various times to the Congo, Guinea, Somalia, Ethiopia, and Algeria. She has some 20,000 men in Angola, training the Angolan armed forces and assisting with internal security, and some 16–17,000 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, and between Mozambique and East Germany and Bulgaria. Hungary signed a Friendship Treaty with Ethiopia and with Mozambique in September 1980.

ARRANGEMENTS WITHIN THE REGION

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 16 ECOWAS members (Benin, Cape Verde, 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.

Kenya and Ethiopia signed a Treaty of Friendship and Co-operation in January 1979.

Prior to the 1980 Rhodesian elections, South Africa gave aid and deployed troops to Rhodesia. These arrangements have now ceased.

Egypt and Morocco have given military assistance to Zaire. Libya has supported guerrillas and secessionists in the civil war in Chad and has intervened in Tunisia. Tanzania deployed some 10,000 troops in Uganda under a 2-year military agreement signed in December 1979; only some 1,000 police now remain.

ANGOLA

Population: 6,850,000.
Military service: 2 years.
Total armed forces: 33,000.[1]
Estimated GNP 1978: $2.66 bn.

Army: 30,000.
2 mot inf bdes (each of 1 tk, 2 inf bns).
17 inf bdes.
4 AA arty bdes.
85 T-34, 150 T-54 med, some 50 PT-76 lt tks; 200 BRDM-2, AML armd cars; 150 BTR-50/60/-152, OT-62, some M-3 APC; 120 guns/how, incl 76mm, 105mm, M-1974 SP, 122mm, 130mm; 500 82mm and 120mm mor; 100 BM-21 122mm MRL; ZIS-3 76mm ATK guns; 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; SA-6/-7 SAM.[2]

Navy: 1,500.
4 ex-Sov *Shershen* FAC(T).
5 ex-Port *Argos* large patrol craft.
9 coastal patrol craft(: 1 ex-Sov *Zhuk*, 2 *Poluchat*, 6 ex-Port (1 *Jupiter*, 5 *Bellatrix*).
4 LCT: 3 ex-Sov *Polnocny*, 1 ex-Port *Alfange*.
5 ex-Sov T-4 LCM.

Bases: Luanda, Lobito, Mocamedes.

Air Force: 1,500; 41 combat aircraft.[2]
2 FGA sqns with 20 MiG-21MF, 18 MiG-17F, 2 G-91R4 fighters.
MR ac: 1 F-27MPA.
2 tpt sqns: 7 *Noratlas*, 2 L-100-20, 1 C-130H, 3 C-47, 6 An-2, 10 An-26, 2 *Turbo-Porter*, 8 *Islander*, 10 Do-27, 1F-27-400M. 1 FH-227.
2 hel sqns: 17 Mi-8, 20 *Alouette* III.
Trainers incl 3 MiG-15UTI, 6 Yak-11.
AAM: AA-2 *Atoll*.

Para-Military Forces: 'Organization of Popular Defence'; 500,000.

[1]See p. 95 for all footnotes.

ETHIOPIA

Population: 29,965,000.
Military service: conscription, term unknown.
Total armed forces: 230,000.[3]
Estimated GNP 1979: $3.0 bn.
Defence expenditure 1980: 1.1 bn birr ($385 m).
$1 = 2.86 birr (1980), 2.09 birr (1979).

Army: 225,000.[4]
11 inf and 3 mot inf divs with some 20 tk bns.
2 mountain divs each of 6 bdes.
1 lt div.
4 para/cdo bdes.
30 arty bns.
2 engr bns.
15 AD bns.
40 M-47, 150 T-34, 600 T-54/-55 med tks; 40 M-41 lt tks; BRDM-2 scout cars; 40 BMP-1 MICV, about 70 M-113, 500 BTR-40/-60/-152 APC; some 700 guns/how, incl 75mm, 52 105mm, 150 122mm, 130mm, 152mm, 12 155mm towed, 12 M-109 155mm SP; 60mm, 81mm, 82mm, 120mm, 280 M-2/-30 4.2in (107mm), 120mm mor; BM-21 122mm MRL; *Sagger* ATGW; ZU-23 23mm, 37mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-2/-3/-7 SAM.[5]

Navy: 1,500.
8 large patrol craft: 1 ex-Yug *Kraljevica*, 3 ex-US PGM, 4 105-ft *Swift*.
1 ex-Sov *Osa*-II FAC(M) with *Styx* SSM.
(Non-operational: 1 ex-US *Barnegat* frigate, 1 ex-Neth *Wildervank* patrol ship, 3 *Osa* II FAC(M), 2 ex-*Mol* FAC(T), 4 *Sewart* 15-ton patrol craft, 4 LCM, 2 LCVP.)

Bases: Massawa, Assab.

Air Force: 3,500; 100 + combat aircraft.
6 FGA sqns: 1 with 7 F-5A/E, 1 with 17 MiG-17, 3 with 50 MiG-21, 1 with 20 MiG-23.
1 COIN sqn with 6 T-28A.

Ghana Air Force Skyvan light transport was manufactured in the United Kingdom by Short Brothers Ltd.

A Buccaneer S-50 light bomber of the South African Air Force on low-level mission.

1 tpt sqn with 14 An-12, 4 An-22, 3 C-47, 2 C-54, 6 C-119G, 2 *Dove*, 1 Il-14, 1 DHC-3, 3 DHC-6, 2 Do-28.
Trainers incl MiG-21U, 20 *Safir*, 11 T-33A, 2 F-5B, T-28.
Hel incl 6 AB-204, 3 *Alouette* III, 20 Mi-8, Mi-24, 6 UH-1H.

RESERVES (all services): 20,000.

Para-Military Forces: 169,000. 9,000 mobile emergency police force; 150,000 People's Militia, in 12 divs with mor, ATK guns; 10,000 in People's Protection bdes.

GHANA

Population: 12,530,000.
Military service: voluntary.
Total armed forces: 15,300.
Estimated GDP 1979: $10.1 bn.
Defence expenditure 1981: 384 m cedi ($140 m).
$1 = 2.75 cedi (1981), 0.364 cedi (1979).

Army: 12,700.
2 bdes (6 inf bns and spt units).
1 recce bn.
1 mor bn.
1 fd engr bn.
1 sigs bn.
1 AB bn.
100 Mowag *Piranha* armd cars; 81mm, 20 Tampella 120mm mor; 50 *Carl Gustav* 84mm RCL.

Forces Abroad: Lebanon (UNIFIL): 1 bn (865).

Navy: 1,200.
2 *Kromantse* ASW corvettes.
4 FAC(G): 2 FPB-57, 2 TNC-45.
2 *Sahene*, 2 ex-Br *Ford* patrol craft.
4 *Spear* II coastal patrol craft.

Bases: Secondi, Tema.

Air Force: 1,400; 12 combat aircraft.
1 COIN sqn with 6 MB-326F, 6 MB-326KB.
2 tpt sqns with 8 *Islander;* 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*.

Para-Military Forces: 5,000; 3 Border Guard bns.

KENYA

Population: 17,090,000.
Military service: voluntary.
Total armed forces: 14,750.
Estimated GDP 1979: $6.3 bn.
Defence expenditure 1979: 1.4 bn shillings ($218 m).
$1 = 7.49 shillings (1979).

Army: 12,000.
2 bde HQ.
1 armd bn.
1 armd car bn.
6 inf bns.
2 arty bns.
1 air cav bn.
2 engr bns.
1 tpt bn.
36 Vickers Mk 3 med tks; 3 *Saladin*, *Fox*, 30 AML-60/-90 armd cars; 50 UR-416, 4 Panhard M-3 APC; 12 lt, 16 pack 105mm guns; 20 81mm, 10 120mm mor; 50 *Carl Gustav* 84mm, *Wombat* 120mm RCL; *Milan*, 8 *Swingfire* ATGW; 15 Hughes 500MD *Scout*, 2 Hughes 500MD/*TOW* hel.
(On order: 36 Vickers Mk 3 med tks; *Rapier* SAM; 13 Hughes 500MD *Defender* hel with *TOW* ATGW.)

Navy: 650.
4 Brooke Marine FAC(M) with *Gabriel* SSM (1 37.5-metre, 3 32.6-metre). 3 Vosper 31-metre large patrol craft.
(On order: 4 patrol craft.)

Base: Mombasa.

Air Force: 2,100; 29 combat aircraft.
1 FGA sqn with 10 F-5E, 2 F-5F.
1 COIN sqn with 5 BAC-167 *Strikemaster*, 12 *Hawk* T-52.
2 lt tpt sqns: 1 with 6 DHC-4 *Caribou;* 1 with 3 DHC-5D *Buffalo*, 6 Do-28D.
1 trg sqn with 14 *Bulldog* 103.
Other ac incl 1 *Turbo Commander*, 1 *Navajo*.
Hel: 10 *Puma*, 2 Bell 47G.
AAM: *Sidewinder*.
(On order: 2 F-5F ac.)

Para-Military Forces: 1,800 Police (General Service Unit); Police Air Wing, 8 Cessna lt ac.

MADAGASCAR

Estimated population: 8,775,000.
Military service: 18 months.
Total armed forces: 19,550.
Estimated GDP 1979: $2,800 m.
Defence expenditure 1979: $101.9 m.
$1 = 214.4 francs (1979).

Army: 18,000.
2 all-arms bns.
1 engr regt.
1 sigs regt.
1 service regt.
7 construction regts.
8 M-8 armd, M-3A1, 10 *Ferret* scout cars; M-3A1 half-track APC; 12 76mm ZIS-3 guns; 81mm mor; 106mm RCL; 502 ZPU-4 14.5mm AA guns.

Navy: 650 (incl 450 marines).
1 Type-48 large patrol craft.
1 *Batram* landing craft with 8 SS-12 SSM.
5 LCM: 2 ex-N. Korean *Nampo*, 3 ex-US.
1 marine coy.

Air Force: 900; 12 combat ac.
1 FGA sqn with 4 MiG-17, 8 MiG-21FL.
1 tpt sqn with 2 Yak-40, 1 C-53D, 5 C-47, 1 *Defender*, 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: 8,000 Gendarmerie, incl maritime police with 5 patrol craft.

MOZAMBIQUE

Population: 10,610,000.
Military service: 2 years (incl women).
Total armed forces: 26,700.[6]
Estimated GNP 1978: $1.7 bn.
Defence expenditure 1981: 5.6 bn metica ($198 m).
$1 = 28.30 metica (1981), 33.51 escudos (1978).

Army: 25,000.
7 bdes (each 3 inf, 1 armd, 1 arty bns, spt units).
300 T-34 med, some 50 PT-76 lt tks; 50 BRDM-1/-2 armd cars; 200 BTR-40/-152 APC; 300 76mm, 85mm, 100mm, 122mm, 130mm guns; 30 M-101 105mm, 152mm how; BM-21 122mm MRL; 325 60mm, 82mm, 120mm mor; 75mm, 82mm RCL; *Sagger* ATGW; 350 20mm, ZU-23, 23mm, 37mm, 57mm AA guns; 30 SA-3/-7 SAM.

Navy: 700.
8 coastal patrol craft(: 3 ex-Sov *Zhuk;* 5 ex-Port (1 *Antares,* 2 *Jupiter,* 2 *Bellatrix*).
3 landing craft (2().
(On order: 2 patrol craft.)

Bases: Maputo, Beira, Nacala, Pemba, Metangula.

Air Force: 1,000; 35 combat aircraft.
2 sqns with 35 MiG-17/-21.
1 tpt sqn with 2 An-26, 6 *Noratlas,* 4 Cessna 182.
1 hel sqn with 4 *Alouette* II/III, 10 Mi-8.
Trg ac: 5 Cessna 152, 7 Zlin.

Para-Military Forces: 2,000: 2 Border Guard bdes.

NIGERIA

Population: 79,675,000.
Military service: voluntary.
Total armed forces: 156,000.
Estimated GNP 1979: $46.5 bn.
Defence expenditure 1980: 987 m naira ($1.7 bn).
$1 = 0.58 naira (1980), 0.64 naira (1979).

Army: 140,000.
4 inf divs.
1 Guards bde.
4 arty bdes.
4 engr bdes.
4 recce regts.
65 T-55 med, 50 *Scorpion* lt tks, 20 *Saladin,* 54 AML-60 armd, 55 *Fox* scout cars; 8 *Saracen,* 6 M-3 VPC, 4 AMX VTT APC; 76mm, 200 122mm, 130mm guns; 200 M-56 105mm pack how; 200 81mm mor; 20mm, 40mm towed, 30 ZSU-23-4 SP AA guns.

Forces Abroad: Lebanon (UNIFIL): 1 bn (700).

Navy: 6,000.
1 *Nigeria*-class ASW frigate (trg).
4 *Hippo*-class corvettes (2 Vosper Thornycroft Mk 9 with 2 triple *Seacat* SAM; 2 Mk 3).
4 FAC(M): 3 Lürssen Type-57 with 4 *Otomat* SSM, 1 *La Combattante* with 4 *Exocet.*
8 large patrol craft (4 Brooke Marine, 4 Abeking & Rasmussen).
2 RoRo 1300 (*Crocodile*-class) LST.
6 coastal patrol boats.
(On order: 1 *Meko* 360 frigate; 2 *La Combattante* III FAC(M) with *Exocet* SSM; *Seacat* SAM; 2 LCT; 15 coastal patrol boats.)

Bases: Apapa (Lagos), Calabar.

RESERVES: 2,000.

Air Force: 10,000; 18 combat aircraft.[7]
3 FGA/interceptor sqns: 1 with 6 MiG-17; 2 with 12 MiG-21MF.
2 tpt sqns with 6 C-130H, 1 F-27, 1 F-28, 1 *Gulfstream* II.
1 SAR sqn with 20 Bo-105C/D hel.
3 service sqns with 37 *Bulldog,* 14 Do-28, 3 *Navajo.*
Hel incl: 15 *Puma,* 3 *Whirlwind,* 10 *Alouette* II (in storage).
Trg ac incl: 4 MiG-15UTI, 2 MiG-21U, 20 L-29.
AAM: AA-2 *Atoll.*
(On order: 12 *AlphaJet* FGA ac, 6 CH-47C hel.)

Para-Military Forces: Coastguard (forming).

SOMALI DEMOCRATIC REPUBLIC

Population: 5,910,000.
Military service: voluntary.
Total armed forces: 62,550.
Estimated GNP 1978: $425 m.
Defence expenditure 1979: 598 m shillings ($95 m).
$1 = 6.295 shillings (1978, 1979).

Army: 60,000.
3 corps, 7 div HQ.
3 tk/mech bdes.
20 inf bdes.
1 cdo bde.
1 SAM bde.
13 fd, 10 AA arty bns.
150 T-34/-54/-55, 40 *Centurion* med tks; 50 BTR-40/-50/-60, 150 BTR-152, 200 Fiat 6614/6616 APC/AFV; about 150 76mm, 85mm, 100mm, 60 122mm guns/how; 81mm, 120mm mor; 100mm ATK guns; 106mm RCL; 100 *Milan* ATGW; 250 14.5mm, ZU-23 23mm, 37mm, 57mm, and 100mm towed, 20 ZSU-23-4 SP AA guns; 30 SA-2/-3 SAM.[8]
(On order: 12 M-167 *Vulcan* 20mm AA guns.)

Navy: 550.[8]
2 ex-Sov *Osa*-II FAC(M) with *Styx* SSM.
8 ex-Sov FAC(T): 4 *Mol,* 4 P-6(.
5 ex-Sov *Poluchat* large patrol craft.
1 ex-Sov *Polnocny* LCT, 4 ex-Sov T-4 LCM(.

Bases: Berbera, Mogadishu, Kismayu.

Air Force: 2,000; 35 combat aircraft.[8]
1 lt bbr sqn with 3 Il-28.
2 FGA sqns with 9 MiG-17.
2 fighter sqns with 7 MiG-21MF, 10 ex-Ch F-6.
1 COIN sqn with 6 SF-260W.
1 tpt sqn with 3 An-2, 3 An-24/-26, 3 C-47, 4 G-222, 1 C-45.
1 hel sqn with 4 Mi-4, 8 Mi-8, 1 AB-204.
Trainers incl 6 P-148, 20 Yak-11, 2 MiG-15UTI.
AAM: AA-2 *Atoll.*
(On order: 4 AB-212 hel.)

Para-Military Forces: 29,500: 8,000 Police, 2 Do-28 ac; 1,500 border guards; 20,000 People's Militia.

SOUTH AFRICA

Population: 29,030,000.
Military service: 24 months.
Total armed forces: 92,700 (66,100 conscripts; total mobilizable strength 404,500).
Estimated GNP 1979: $54.3 bn.
Defence expenditure 1980: 2.07 bn rand ($2.56 bn).
$1 = 0.81 rand (1980), 1.85 rand (1979).

Army: 76,000 (10,000 White, 4,000 Black and Coloured regulars, 2,000 women, 60,000 conscripts); 9 territorial commands.
1 corps, 2 div HQ (1 armd, 1 inf).
1 armd bde (2 tk, 2 APC-borne inf bns).[9]
1 mech bde (1 tk, 3 APC-borne inf bns).[9]
4 mot bdes (each 3 inf bns, 1 armd car bn).[9]
1 para bde (3 para bns).[9]
1 special recce unit (cdo).
9 fd, 4 med, 7 lt AA arty regts.[9]
1 AD missile regt (2 *Crotale* btys, 3 *Tigercat* btys).
15 fd engr sqns.[9]
3 sigs regts, 3 sigs sqns.
Some 250 *Centurion/Olifant,* 40 *Sherman,* 20 *Comet* med tks; 1,400 AML *Eland* Mk IV armd cars; 230 scout cars incl *Ferret;* 1,200 *Ratel,* 250 *Saracen* APC, 500 lt APC, incl *Buffalo, Hippo, Rhino;* 65 25-pdr, 75 5.5-in and G-5 155mm towed, 50 *Sexton* 25-pdr, 15 M-7 105mm SP guns; 40 155mm towed, 50 M-109A1 155mm SP how; 127mm MRL; 81mm, 200 120mm mor; 900 6-pdr (57mm) and 17-pdr (76mm). 90mm ATK guns; M-67 90mm, 106mm RCL; SS-11, 120 *ENTAC, Milan* ATGW; 20mm, 55 K-63 twin 35mm, 25 L/70 40mm, 15 3.7-in AA guns; 24 *Cactus (Crotale),* 54 *Tigercat* SAM.

RESERVES: 130,000 Active Reserve (Citizen Force). Reservists serve 30 days per year for 8 years.

Navy: 6,400, incl 900 marines, 2,100 conscripts.
3 *Daphne* submarines.
3 *President* (ex-Br *Whitby*-class) ASW frigates (each with 1 *Wasp* hel).
7 *Minister (Reshef)* FAC(M) with 6 *Skerpioen (Gabriel)* SSM.
2 *Dabur* FAC(M) with single *Gabriel* SSM.
4 ex-Br *Ford,* 4 *Ton* large patrol craft.
4 ex-Br *Ton* minesweepers, 2 *Ton* minehunters.
1 fleet replenishment ship.
(On order: 7 *Minister* (FAC(M).)

MARINES: (900; 600 conscripts); 1 inf bn.

Bases: Simonstown, Durban.

RESERVES: 2,000 Citizen Force.

Air Force: 10,300 (4,000 conscripts); 239 combat aircraft (incl 96 with Citizen Force), at least 12 armed hel.
Strike Command:
2 lt bbr sqns: 1 with 6 *Canberra* B(I)12, 3 T-4; 1 with 6 *Buccaneer* S-50.
1 FGA sqn with 32 *Mirage* F-1AZ.
2 FGA/interceptor/recce sqns: 1 with 16 *Mirage* IIICZ, 8 RZ/R2Z, 3 BZ; 1 with 14 F-1CZ.
Maritime Command:
2 MR sqns: 1 with 7 *Shackleton* MR-3; 1 with 18 Piaggio P-166S.
1 ASW hel sqn with 11 *Wasp* HAS-1, 1 *Alouette* II (trg).
1 tpt sqn with 6 C-47B.
Transport Command:
3 tpt sqns: 1 with 7 C-130B, 9 Transall C-160Z; 1 with 5 DC-4, 18 C-47; 1 with 4 HS-125 *Mercurius,* 1 *Viscount* 781, 5 *Merlin* IVA.
4 hel sqns: 2 with 30 *Alouette* III, 1 with 40 *Puma;* 1 with 15 *Super Frelon.*
Other hel incl some 30 *Alouette* III, 13 *Puma.*
Light Aircraft Command (army assigned):
4 liaison sqns: 20 Cessna 185A/D/E, 20 AM-3C *Bosbok,* 30 C-4M *Kudu.*
Training Command:
5 training schools with 100 T-6G *Harvard;* 70 MB-326M/K *Impala* I/II; 29 *Mirage* III (16 EZ, 10 D2Z, 3 DZ); 12 C-47 ac; 20 *Alouette* III hel.
AAM: *Sidewinder,* R-530, R-550 *Magic,* V-3.
ASM: AS-20/-30.

RESERVES: 25,000 Active Citizen Force; 6 COIN/trg sqns with 96 *Impala* I/II, 10 T-6G. 15 L-100 *(Hercules)* in civil airline service.

South West Africa Territory Force (SWATF):
Formed 1 Aug 80 as a separate force under South African control. Conscription: 24 months (all race groups), selective. Four sectors (Northern, Eastern, Central, and Southern) comprising 26 Commando 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, support units) 1 inf bn Regulars; rest Citizen Force.

Para-military: Industrial Defence units.

Para-Military Forces: 90,000 Commandos: inf bn-type protective units in formations of 5+; 12 months initial, 19 days annual trg. 13 Air Commando sqns with private ac. 35,500 South African Police (19,500 White, 16,000 Non-white), 20,000 Police Reserves.

TANZANIA

Population: 19,120,000.
Military service: voluntary.
Total armed forces: 44,850.
Estimated GNP 1979: $3.9 bn.
Defence expenditure 1980–81: 1.48 bn shillings ($179 m).
$1 = 8.29 shillings (1980), 8.25 shillings (1979).

Army: 43,000.
2 div HQ.
9 inf bdes.
1 tk bn.
2 fd arty bns, 2 AA arty bns (6 btys).
2 mor bns.
1 SAM bn with 9 SA-3, SA-6.
2 ATK bns.
2 sig bns.
30 Type-59 med, 35 Type-60/63, 30 Type-62, 36 *Scorpion* lt tks; BRDM-2 scout cars; 50 BTR-40/-152, Type-56, 20 K-63 APC; 76mm, 122mm, D-30 130mm guns; 350 82mm, 120mm mor; 540 M-20 75mm RCL; 10 BM-21 122mm MRL; 280 ZPU-2/-4 14.5mm, 40 ZU-23, 120 37mm AA guns; SA-3/-6/-7 SAM.

Forces Abroad: Seychelles: 100.

Navy: 850.
10 FAC(G): 7 ex-Ch *Shanghai* II, 3 ex-GDR P-6(.
8 FAC(T)(: 4 ex-Ch *Huchwan* hydrofoils, 4 ex-Korean P-4.
13 coastal patrol craft(: 1 ex-Sov *Poluchat*, 2 ex-GDR *Schwalbe*, 2 ex-FRG 40 ton, 4 ex-Ch *Yulin;* 4 Vosper Thornycroft 75-ft in Zanzibar.
2 ex-Ch LCM.

Bases: Dar es Salaam, Zanzibar.

Air Force: 1,000; 24 combat aircraft.
3 fighter sqns with 11 MiG-21/F-7, 10 MiG-19/F-6, 3 MiG-17/F-4.
1 tpt sqn: 1 An-2, 3 HS-748, 4 DHC-5D, 1 F-28.
Trainers: 2 MiG-15UTI, 6 *Cherokee*, 6 Cessna 310, 2 404.
Hel: 2 Bell 47G, 5 AB-205, 6 AB-206, 2 CH-47C.

Para-Military Forces: 1,400 Police Field Force, Police Marine Unit; 35,000 Citizen's Militia.

ZAIRE

Population: 29,770,000.
Military service: voluntary.
Total armed forces: 22,100.
Estimated GNP 1978: $2.3 bn.
Defence expenditure 1979: 92m zaires ($50.5 m).
$1 = 1.73 zaires (1979), 1.75 zaires (1978).

Army: 18,500.
1 inf 'div' (4 bdes, 1 inf bn, 1 armd sqn; bde str).
1 indep armd bde.
1 para bde (3 para bns).
1 special force bde.
1 Presidential Guard unit.
1 spt bn.
50 ex-Ch Type-62 lt tks; 95 AML-60, 40 AML-90 armd cars; 9 M-113, K-63, 60 M-3, M-3 half-track APC; 75mm pack, 122mm, 130mm guns/how; 82mm, 4.2-in, 120mm mor; 107mm RCL; 57mm ATK guns; 57mm, 75mm, 106mm RCL; 37mm, 40mm AA guns.
(On order: 120mm mor.)

Navy: 1,500, incl marines.
4 ex-Ch *Shanghai* II patrol boats.
36 patrol craft(: 4 *Huchwan*, 10 *Sewart*, 3 N. Korean P-4, 8 ex-US, 11 others.

MARINES: (600).

Bases: Matadi, Kalemie, Kinshasa, Banana.

Air Force: 2,100; 29 combat aircraft.
1 fighter sqn with 10 *Mirage* 5M/5DM.
2 COIN sqns with 6 MB-326K, 6 AT-6G.
1 liaison sqn with 20 Reims Cessna FTB-337.
1 tpt wing with 6 C-130H, 2 DC-6, 2 DHC-4A, 3 *Buffalo*, 8 C-47, 4 C-54, 2 MU-2, 1 *Falcon*-20.
1 hel sqn: 5 *Alouette* III, 5 *Puma*, 1 *Super Frelon*.
Trg ac incl 15 Cessna 310, 12 Cessna 150, 13 MB-326GB, 12 SF-260MC.

ARMED FORCES OF O

Country	Estimated population (000)	Estimated GNP 1979 ($m)	Defence expenditure 1980 ($m)	Total armed forces	Army: Manpower and formations	Army: Equipment	Navy: Manpower and equipment	Air Force: Manpower and equipment	Para-military forces
Benin	3,570	1,140 (1980)	n.a.	3,100	**3,000** 2 inf bns 1 engr bn 1 service bn 1 armd sqn 1 arty bty 1 para/cdo coy	7 M-8 armd cars; M-101 105mm how; 60mm, 81mm mor	**40** 7 patrol boats: 2 P-6, 5 *Zhuk* (	**60** 2 C-47, 2 An-26, 1 F-27, 3 An-2, 1 Aero *Commander*, 1 *Corvette* 200, 2 *Broussard* tpts; 1 Cessna 337 lt ac; 1 Bell 47, 1 *Alouette* II hel	**1,100**
Botswana	805	401 (1978)	22	2,000*	**1,950*** 1 inf gp	*Shorland* armd cars; 81mm mor; 84mm *Carl Gustav* RCL	—	**50*** 5 *Defender* COIN; 2 *Skyvan* tpts; 2 Cessna 152, 6 *Bulldog* lt ac	**1,260**
Burundi	4,490	614	35.5	6,000*	2 inf bns 1 para bn 1 cdo bn 1 armd car coy	12 AML-60/-90 armd cars; 20 BTR APC; 15 75mm RCL; 18 82mm mor; 15 ZPU-4 14.5mm AA	1 patrol boat ((2 in reserve)	3 DC-3 tpts; 3 *Alouette* III hel	**1,500**
Cameroun	8,770	4,900 (1980)	92	7,250	**6,600** 4 inf bns 1 engr bn 1 armd car sqn 1 para coy Spt units	M-8 armd, *Ferret* scout cars; 18 *Commando* APC; M-3 half-track; 75mm pack, M-101 105mm how; 60mm, 20 81mm mor; 13 57mm ATK guns; 89mm ACL-STRIM ATK RL; 40 106mm RCL	**300** 2 *Shanghai*-II FAC(G); 1 PR-48, 3 coast patrol craft (; 1 LCM, 5 LCVP	**350** 5 *Magister* COIN; 2 C-130H, 4 C-47, 2 HS-748, 1 DHC-4, 2 Do-28, 7 *Broussard*, 1 *Queen Air*, 1 Boeing 727-20 tpts; 1 *Puma*, 1 *Lama*, 3 *Alouette* II/III, 1 Mi-4 hel	**5,000**
Central African Republic	2,410	535 (GDP 1978)	12.8	2,385	**2,000** 1 inf bn 1 engr coy 1 sigs coy 1 tpt coy	4 BRDM-2, 10 *Ferret* scout cars; 81mm mor; 10 106mm RCL	**85** 9 river patrol craft (	**300** 10 AL-60, 2 *Rallye Guerrier*, 1 DC-4, 4 DC-3/C-47, 1 *Caravelle*, 1 *Falcon* 20, 1 *Corvette*, 6 *Broussard* tpts; 1 *Alouette* II, 4 H-34 hel	**3,000**
Chad†	4,740	924 (GDP 1978)	22.2	3,200	**3,000** 3 inf bns (incl 5 para coys) 1 recce coy	AML-60/-90 armd cars; 90mm, 122mm guns; 81mm, 120mm mor	—	**200** 10 AL-60, 3 C-54, 9 C-47, 1 *Noratlas*, 1 *Caravelle*, 2 PC-6, 3 *Broussard* tpts; 4 Cessna 337 lt ac; 11 *Alouette* II/III, 4 *Puma* hel	**6,000**
Congo	1,585	805 (GDP)	78.2	9,525	**9,000** 1 armd bn 1 inf bn 1 arty gp 1 engr bn 1 para/cdo bn	15 Ch T-59 med, 14 Ch T-62, 3 PT-76 lt tks; AML, M-8, 15 BRDM -1 scout cars; M-3, 20 BTR-50, 2 BTR-60, 44 BTR-152 APC; 6 75mm, 10 100mm, 8 122mm how; 82mm, 10 120mm mor; 13 57mm, 76mm, 100mm ATK guns; 57mm RCL; 28 37mm AA guns	**200** 1 *Shershen* FAC(T); 3 *Shanghai* FAC(G); 4 river patrol craft (	**325** 9 MiG-15, 1 MiG-17 FGA; 1 F-28, 4 An-24, 4 II-14, 3 C-47, 1 *Frégate*, 3 *Broussard*, 1 *Corvette* 200 tpts; 1 *Puma*, 4 *Alouette* II/III hel	**3,900**
Djibouti	3,180	335 (1976)	n.a.	2,400*	1 inf regt 1 para coy (forming) 1 Gendarmerie bn	12 BRDM-2, 12 BTR-60 APC; 81mm mor	1 coastal patrol boat(	1 *Rallye* 235; 1 Boeing 737, 1 *Mystère* 20, 2 *Noratlas* tpts; 1 Cessna 206G lt ac; 1 *Alouette* II hel	
Gabon	653	3,010 (GDP 1978)	30.9 (1981)	1,950	**1,500** 1 all-arms bn 8 inf coys 1 engr coy 1 para coy 1 service coy	16 *Cascavel*, 15 AML-90 armd cars; 6 *Commando*, 12 VXB-170 APC; 81mm mor; 106mm RCL; 10 37mm, 240mm AA	**150** 1 FAC(M) with SS-12 SSM; 1 FAC(G); 3 patrol craft (2 (), 1 LCM	**300** 5 *Mirage* 5G/DG FGA; 1 EMB-111 P1 MR ac; 1 C-130H, 2 L-100-20/-30, 3 C-47, 3 *Noratlas*, 1 *Falcon*, 1 YS-11A, 4 *Broussard* tpts; 1 Reims 337 lt ac; 4 *Puma*, 3 *Alouette* III hel	**2,800**
Guinea	5,580	1,200 (1978)	n.a.	9,900	**8,500** 1 armd bn 5 inf bns 1 arty bn 1 engr bn 1 cdo bn 1 special force bn	30 T-34/-54 med, 20 PT-76 lt tks; 25 BRDM-1 armd cars; 40 BTR-40/-152 APC; 76mm, 85mm, 105mm, 122mm guns/how; 57-mm ATK guns; 37mm, 57mm, 100mm AA guns	**600** 6 *Shanghai*-II FAC(G); 3 *Shershen*, 4 P-6 FAC(T)(; 3 *Poluchat*, 2 MO-6, 5 coastal patrol craft (; 1 T-58 minesweeper; 2 LCU	**800** 8 MiG-17 FGA; 4 II-14, 4 An-14, 1 II-18 tpts; 1 Reims F-337 lt ac; 2 MiG-15UTI, 7 Yak -11, 3 L-29 trg ac; 1 Bell 47G, 1 *Puma*, 1 *Gazelle* hel	**9,200**
Guinea-Bissau	810	174 (GDP 1978)	n.a	6,250*	**6,000** 4 inf bns 1 engr unit 1 tk sqn	T-34 med tks; BTR-40/-152 APC; 85, 105 and 122mm guns; 120mm mor; 23/57mm AA guns; SA-7 SAM	**250** 1 ex-Sov *Shershen*, 1 P-6 FAC(T); 2 *Polnchat*; 2 other coast patrol craft (; 2 T-4 LCVP, LCU	2 Do-27 tpts, 1 Cessna 337 lt ac; 2 *Alouette* III, 1 Mi-8 hel	**5,000**

* All services form part of the Army
† Rapid inflation makes GNP figure unreliable
§ Serviceability doubtful

(On order: 4 F-27-500 ac.)

Para-Military Forces: 35,000: 35 Gendarmerie bns.

ZAMBIA

Population: 6,020,000.
Military service: voluntary.
Total armed forces: 15,500.
Estimated GNP 1979: $2.8 bn.

Defence expenditure 1979: 488.8 m kwacha ($387.9 m).
$1 = 1.26 kwacha (1979).

Army: 14,000.
1 armd regt.
1 armd recce bn.
5 inf bns.
1 arty bn, 2 AA arty btys.
1 engr, 1 sig sqns.
60 T-54/-55 med tks; 50 BRDM-1/-2, 28 *Ferret* scout cars; 18 105mm how; 30+ BM-21 122mm MRL; 24 20mm AA guns; SA-7 SAM.
(On order: armd cars, APC.)

Air Force: 1,500; 49 combat aircraft.
3 FGA sqns: 1 with 12 MiG-19/F-6; 1 with 6 *Jastreb;* 1 with 16 MiG-21 (forming).
1 COIN/trg sqn with 15 MB-326GB.
2 tpt sqns: 1 with 2 Yak-40, 2 DC-6, 5 DHC-4, 7 DHC-5D, 10 C-47, 1 HS-748; 1 with 4 DHC-2, 10 Do-28.
1 liaison sqn with 20 Saab *Safari.*
Trainers incl 2 MiG-21UTI, 8 SF-260MZ, 12 BT-6, 2 *Galeb.*
1 hel sqn with 12 AB-205A, 5 AB-206, 1 AB-212, 17 Bell 47G, 6 Mi-8.
1 SAM unit with 12 *Rapier,* 3 *Tigercat,* SA-3 *Goa.*

Para-Military Forces: 1,200; Police Mobile Unit (PMU), 1 bn of 4 coys (700); Police Para-Military Unit (PPMU), 1 bn of 3 coys (500), 2 hel.

ZIMBABWE

Population: 7,670,000.
Military service: selective.
Total armed forces: 34,000.[10]
Estimated GNP 1978: $US 3.3 bn.
Defence expenditure 1980–81: $Z 308 m ($US 444 m).
$US 1 = $Z 0.694 (1980), $R 0.768 (1978).

Army: 33,000.
4 bde HQ.
1 armd car regt.
30 inf bns.
1 arty regt.
2 cdo, 2 para bns.
5 engr, 5 sigs sqns.
4 service field coys.
10 T-34, 10 T-54 med tks; 40 AML-90 *Eland* armd, 15 *Ferret* scout cars; BTR-152, UR-416, *Buffalo, Hippo, Hyena, Leopard* APC; 12 25-pdr, 6 5.5-in guns/how; 81mm mor; 106mm RCL; 20mm, 23mm AA guns.

Air Force: 1,000; some 39 combat aircraft.
1 lt bbr sqn with 5 *Canberra* B-2, 2 T-4.
2 FGA sqns: 1 with 9 *Hunter* FGA-9, 1 T-7; 1 with 5 *Vampire* FB-9.
1 COIN/recce sqn with 17 Cessna 337 (O-2) *Lynx.*
1 trg/recce/liaison sqn with 13 SF-260W/C *Genet,* 6 AL-60FS *Trojan,* 1 *Jet Provost,* 8 Cessna 185.
1 tpt sqn with 11 C-47, 4 *Islander,* 17 R-337 *Lynx,* 1 Cessna 402.
2 hel sqns with 30 *Alouette* II/III, 8 Bell/AB 205A.
(On order: 8 *Hawk* fighter/trg ac.)

RESERVES: 16,000 ex-guerrillas.

Para-Military Forces: Zimbabwe Republic Police Force: 10,000 active, 30,000 reservists, being reorganized. Border Guard (forming).

ER AFRICAN STATES

Country	Estimated population (000)	Estimated GNP 1979 ($m)	Defence expenditure 1980 ($m)	Total armed forces	Army		Navy	Air Force	Para-military forces
					Manpower and formations	Equipment	Manpower and equipment	Manpower and equipment	
Ivory Coast	**8,290**	**9,100** (GDP)	**244.6**	**6,550**	**5,700** 3 inf bns 1 marine inf bn 1 armd sqn 1 arty bty 1 AA arty bty 1 engr coy 1 para coy	5 AMX-13 lt tks; 16 AML-60/-90 armd cars; 13 VAB, 30 M-3 APC; 4 105mm how; 81mm, 120mm mor; 6 *VADAR* 20mm SP AA guns, 10 40mm towed; 10 landing craft	**500** 4 Fr patrol boats (2 with SS-12 SSM); 4 river patrol craft (; 4 amph boats (3 (; 1 trg vessel	**350** 6 *AlphaJet* FGA; 2 C-130H, 3 F-27, 2 F-28, 6 F-33C, 2 Reims F-337, 1 Cessna 421, 1 *King Air,* 2 RC-150, 1 *Falcon,* 1 *Gulfstream* tpts; 3 *Puma,* 3 *Alouette* II/III, 4 *Dauphin* hel	**3,000**
Liberia	**1,910**	**810** (GDP 1978)	**21.4** (1981)	**5,400**	**4,900** 5 inf bns 1 Guard bn 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; 106mm RCL	**250** 3 50-ton patrol craft, 2 38-ton, 1 11-ton *Swift*	**250** 2 C-47 tpts; 14 Cessna lt ac (2 172, 1 185, 1 207, 10 337)	**1,750**
Malawi	**6,220**	**870** (GDP)	**61.7**	**5,000***	**3** inf bns 1 spt bn (incl 1 recce sqn)	22 *Fox* scout cars; 9 105mm guns; 81mm mor; 3.5-in RL; *Blowpipe* SAM	1 *Spear*-class, 3 lake patrol boats (	4 Do-28 tpts, 3 *Puma,* 1 *Alouette* III hel	**600**
Mali	**6,825**	**840** (GDP 1978)	**33.4**	**4,950***	**4,600** 4 inf bns 1 arty bn 1 engr bn 1 para bn 1 special force bn 1 tk coy 1 SAM bty	37 T-34 med, 12 Type 62 lt tks; 20 BRDM-2 armd cars; 30 BTR-40, 10 BTR-152 APC; 85mm, 100mm guns; 81mm, 120mm mor; 37mm, 57mm AA guns; SA-3 SAM	**50** 3 river patrol craft (	**300** 5 MiG-17 FGA; 2 C-47, 2 An-2, 1 *Cureuil*-200 tpts; 1 MiG-15UTI; 6 Yak-11/-18 trg ac; 2 Mi-4 hel	**5,000**
Mauritania	**1,530**	**619** (GDP)	**29**	**7,970**	**7,500** 1 inf bn 1 arty bn 3 armd recce sqns 1 AA bty 1 engr coy 1 para coy	15 EBR-75 hy, 20 AML-60/-90 armd cars; 40 M-3 half-track, M-3 APC; 81mm, 120mm mor; 57mm, 75mm, 106mm RCL	**320** 8 patrol craft: 2 ex-Sov *Mirny,* 2 *Barcelo,* 2 large, 2 (	**150** 7 *Defender,* 4 Cessna 337 COIN; 2 Piper *Cheyenne* MR; 1 C-54, 2 C-47, 2 DHC-5D, 1 *Caravelle,* 2 *Skyvan,* 2 *Broussard,* 2 *Islander* tpts	**1,500**
Niger	**5,665**	**2,100** (GDP)	**17.9**	**2,220**	**2,150** 2 armd recce sqns 4 inf coys 1 engr coy 1 para coy 1 log/spt coy	10 M-8, 18 AML-60, 12 AML-90 armd cars; 14 M-3 APC; 60mm, 81mm mor; 57mm, 75mm RCL	—	**70** 2 DC-6B, 1 C-54B, 2 C-47, 2 C-130H, 1 Boeing 737, 4 *Noratlas,* 3 Do-28D, 1 *Flamant,* 1 Aero *Commander* tpts; 2 Cessna 337 lt ac	**2,060**
Rwanda	**5,280**	**959** (GDP)	**22.3**	**5,150***	**5,000** 1 cdo bn 1 recce sqn 8 inf coys 1 engr coy	12 AML-60/-90 armd cars; 6 57mm ATK guns; 8 81mm mor	—	**150** 2 C-47, 1 *Islander,* 2 *Defender* (COIN) tpts; 3 AM-3C liaison, 1 *Magister* trg ac; 2 *Alouette* III hel	**1,200**
Senegal	**5,835**	**2,500** (GDP)	**70.7**	**9,560**	**8,500** 5 inf bns 1 engr bn 1 trg bn 1 recce sqn 1 arty bty 2 para coys 3 construction coys	10 M-8, 40 AML-60/-90 armd cars; 12 Panhard M-3 APC; M-116 75mm pack, 6 M-101 105mm how; 8 81mm mor; *Milan* ATGW; 40mm AA guns	**760** 1 PR-72, 3 P-48 large, 13 coastal patrol craft (; 1 LCT, 2 LCM	**300** 1 EMB-111 MR; 1 Boeing 727-200, 5 C-47, 6 F-27-400M, 1 *Caravelle,* 2 *Broussard* tpts; 1 Cessna 337 lt ac; 2 *Magister* trg ac; 1 *Gazelle,* 6 *Puma* hel	**2,300**
Sierra Leone	**3,460**	**835** (GDP)	**11.3** (1979)	**2,680***	**2,500** 2 inf bns 1 engr sqn	60mm, 81mm mor	**150** (Coastguard) 1 *Shanghai*-II FAC(G)	**30** 1 Bo-105 hel	**800**
Togo	**2,700**	**960** (GDP)	**27.8** (1979)	**3,510***	**3,400** 1 mot inf bn 2 inf bns 2 para bns 1 cdo bn 1 arty bty 1 engr coy	10 M-8/-20, AML-60/-90 armd cars; 5 M-3, 30 UR-416 APC; 4 HM-2 105mm guns	**100** 2 coastal patrol craft (	**100** 6 EMB-326GB COIN; 2 C-47, 2 DHC-5D, 1 F-28 tpts; 5 *Magister* trg, 2 lt ac; 1 *Puma* hel	**1,500**
Uganda	**13,210**	**931** (GDP 1978)	**n.a.**	**7,500**	6 inf bns (3 more forming)	10 T-34/-54/-55, M-4 med tks; 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§	—	—	**2,500** (Police)
Upper Volta	**6,975**	**869**	**33**	**3,775***	**3,700** 3 inf regts 1 recce sqn 1 arty bty 1 para coy	15 AML-60/-90, 10 M-8 armd cars, 30 *Ferret* scout cars; M-101 105mm how; 60mm, 81mm mor; 75mm RCL	—	**75** 2 C-47, 2 Nord 262, 2 HS-748, 1 Aero *Commander,* 3 *Broussard,* 1 *Super Skymaster* tpts	**900**

[1] Some 19,000 Cubans and 2,500 East Germans operate ac and hy eqpt. There are also Portuguese and some 200 Soviet advisers and technicians.

[2] Eqpt totals uncertain.

[3] Some 11,000 Cubans and about 1,300 Warsaw Pact technicians and advisers operate ac and hy eqpt. Some South Yemeni troops may also serve.

[4] Incorporating 150,000 People's Militia.

[5] War situation makes eqpt data suspect.

[6] Chinese, Cuban, East German, Romanian, and Soviet advisers are reported with Mozambique's forces.

[7] There are additional unserviceable AFV and aircraft.

[8] Spares are short and not all equipment is serviceable. Combat losses make equipment data suspect.

[9] Cadre formations completing the 2 divs when brought to full strength on mobilization of Citizen Force (15 armd, 15 inf, 2 para bns, 15 field arty, 10 AA regts).

[10] Zimbabwe African National Liberation Army (ZANLA) and Zimbabwe People's Revolutionary Army (ZIPRA) personnel amalgamating with Regular Army. Peak total of 50,000 may subsequently be reduced to about 30,000.

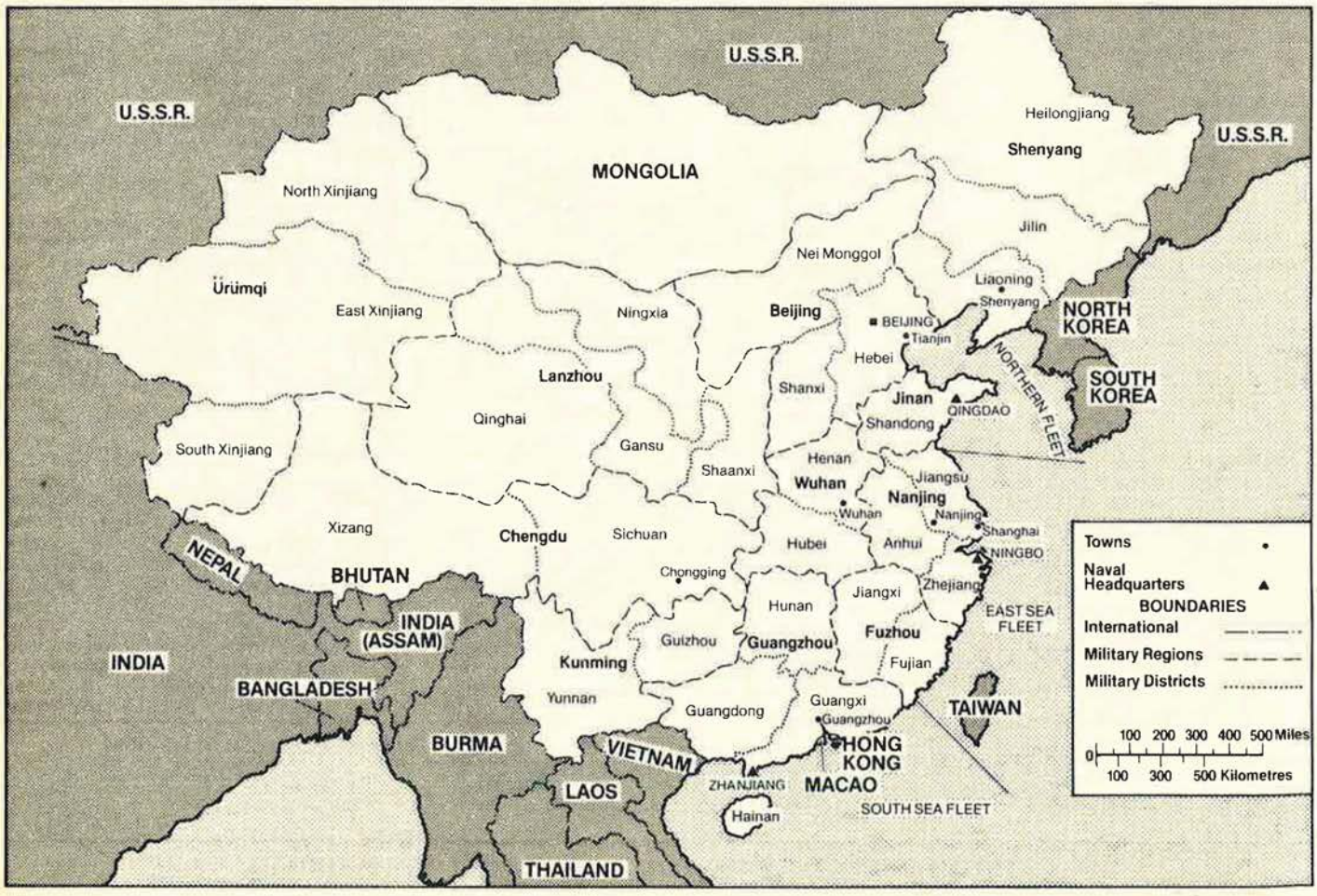
THE MILITARY BALANCE 1981/82

China

Chinese defence policy has for many years maintained a balance, at times uneasy, between the two concepts of nuclear deterrence and People's War. The former aims to deter strategic attack, the latter, by mass mobilization of the population, to deter or repel conventional land invasion. Mao's death in September 1976 and the subsequent attacks on the 'Gang of Four' removed the strongest, but not the only, supporters of the strategic concept that mass manpower was the primary deterrent. There are indications of an effort to develop more modern general-purpose forces in order to meet more limited military contingencies than the extremes of nuclear deterrence or mass war.

The conventional arms inventory of the People's Liberation Army (PLA) generally falls behind that of nations with advanced technology. However, as one of the Four Modernizations, China's defence is due for gradual updating. This will involve, in many cases, the replacement of Soviet or Soviet-designed equipment. Indigenous designs and Western technology and equipment will be more widely used. In June 1981 the United States agreed in principle to sell arms to China, in addition to

CHINESE MILITARY REGIONS AND DISTRICTS



the logistic and dual-use equipment and technology agreed under the Carter Administration. This has added to China's potential sources of supply. But the current phase of economic readjustment has meant a 20% cut in the defence budget—and possibly in manpower also—and the process of modernization is likely to be quite slow *(see the note on defence expenditure which follows the country entry)*.

NUCLEAR WEAPONS

The research programme continues, and one nuclear test was recorded in 1980. The total then was at least 26 since testing started in 1964. A nuclear force capable of reaching large parts of the Soviet Union and Asia is operational. The stockpile of weapons, both fission and fusion, is believed to amount to several hundreds and probably will continue to grow. Fighter aircraft could be used for tactical delivery, and for longer ranges there is the B-6/Tu-16 medium bomber, with a radius of action up to 3,000 km. MRBM with a range of some 1,800 km are operational, but may be replaced by IRBM, also operational now, with a range of about 2,500 km. The missile forces are controlled by the Second Artillery, the missile arm of the PLA.

A multi-stage ICBM with a limited range of 6,000–7,000 km was first tested in 1976, and some have been deployed. An ICBM thought to have a range of some 13,000 km has also been under development, and there are suggestions that its deployment may now be beginning. A successful full-range test took place in May 1980. The missile has been successfully used (and thus tested) as a launcher for satellites. China has also one G-class submarine with missile launching tubes, but does not appear to have missiles for it. All the present missiles are liquid-fuelled. Solid propellants are being developed and are reported to have powered the 1980 ICBM test vehicle.

CONVENTIONAL FORCES

The PLA embraces all arms and services, including naval and air elements. China is organized in 11 Military Regions (MR) with 29 Military Districts (MD) and divided into Main and Local Forces. Main Force (MF) divisions, which comprise the field army, are commanded by the Ministry of National Defence, although some reports suggest that 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. Local Forces (LF), which include Border Defence and Internal Defence units, are predominantly infantry, are less well equipped, and are intended to defend their own Provinces together with para-military units. Command of them may be vested in the MR.

Artillery, Engineer, Railway, and Production and Construction Corps units are controlled directly by the Ministry of National Defence. Infantry units account for most of the ground-force manpower and 118 of the some 185 MF divisions; there are only 11 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, and the equipment for both arms is also steadily being modernized. The PLA, essentially a defensive force, lacks facilities and logistic support for protracted large-scale operations outside China.

Major weapons systems produced include F-7/-8 and A-5 fighters, SA-2 type SAM, Type-59 medium, Types-60/63 amphibious and Type-62 light tanks and K-63 APC. Two *Han*-class nuclear attack submarines are in service, and R- and W-class medium-range diesel submarines are being built, together with SSM destroyers, frigates, and fast patrol boats. Britain has sold aircraft engines, artillery, and fire-control equipment and radar, and the United States has sold computers and radars and is contemplating the sale of a much wider range of defensive and non-combat military equipment.

BILATERAL AGREEMENTS

In 1950 China signed a 30-year Treaty of Alliance and Friendship with the Soviet Union which contained mutual defence obligations. This expired on 10 April 1980 and has not been renewed. There is a mutual defence agreement with North Korea, dating from 1961, and an agreement to provide free military aid. There are non-aggression pacts with Afghanistan, Burma, and Kampuchea. Chinese military equipment and logistic support have been offered to a number of countries. Major recipients of arms have included Albania, Egypt, Pakistan, and Tanzania.

CHINA

Population: 1,024,890,000.
Military Service:[1] selective. Army 3 years, Air and Army technicians 4 years, Navy 5 years. (Technicians may volunteer for 15 years.)
Total regular forces: 4,750,000 (incl railway, construction corps troops).
GNP and defence expenditure: see p. 98.

Strategic Forces:
OFFENSIVE:
(a) *Second Artillery* (under Army control):
ICBM: 4 CSS-3 (range 3,200–3,800 nm/6,000–7,000 km), 1–3 MT.
(Deployment may now have started of CSS-4 ICBM, estimated range 7,000 nm/13,000 km, 5–10 MT warhead.)
IRBM: 65–85 CSS-2 (range 2,500 km), 1–3 MT.
MRBM: Some 50 CSS-1 *Tong Feng (East Wind)* (range 1,800 km), 15 KT.
(b) *Aircraft* (under Air Force control):
3 regts with 90 B(Hong)-6 med bbrs.

DEFENSIVE:
(a) Ballistic missile EW phased-array radar complex.
(b) Air Force AD system, capable of limited defence of key urban and industrial areas, military installations and weapon complexes, with up to 4,000 naval and air force fighters, about 85 CSA-1 (SA-2) SAM units and over 15,000 AA guns.
(c) A civil defence shelter and evacuation system exists in Beijing and other key cities.

Army: 3,900,000.
Main Forces (Field Army):
Some 40 armies (45,000 men), each normally of 3 divs, 1 arty regt and spt tps (some have 1 indep tk regt, some have 2 arty regts), comprising:
11 armd divs.
118 inf divs.
Some 40 field arty divs.
Some arty, anti-tank, AA regts.
Some 35 recce, engr, sigs, chemical bns (some organized into regts) (Army tps).
12 railway divs
Construction engr divs (being returned to civilian control)
150 indep engr regts
} under central control.

Local Forces (29 provinces, 2–3 divs each):
85 inf divs.

[1]See p. 98 for all footnotes.

While most PRC aircraft are based on Soviet designs, the A-5 fighter at right is a Chinese design.

130 indep regts (incl Border Guard).
11,000 Sov IS-2 hy, T-34, T-54, domestic Type-59 and modified Type-59/T-69 med, 600 Types-60/-63 (PT-76) amph and Type-62 lt tks; 4,000 K-63, Types-55/-56 (BTR-40/-152) APC; 18,000 85mm, 152mm guns/how, ISU-152 SP guns; Type-54 and ISU-122 SP, 122mm, 152mm, K-63 122mm SP how; 3,900 Type-63-1 107mm, 132mm, 140mm MRL; *FROG*-type SSM; 20,000 82mm, Type-55 120mm and Type-56 160mm mor; 40mm, 57mm, 90mm RL; 6,000 57mm, 75mm, 82mm RCL; 57mm, Type-54 76mm ATK guns; *HOT*, AT-3 *Sagger*/*Sagger*-type ATGW; 9,000 37mm, 57mm, 85mm, 100mm AA guns.

DEPLOYMENT:
China is divided into 11 Military Regions (MR), in turn divided into 29 Military Districts (MD), as the accompanying map shows. Main Force (MF) divs are administered by MR, but may still be controlled centrally. Main Force divs may be front line (full strength) or second line (with many at reduced strength but with front line eqpt). Local Force (LF) divs have fewer men and less modern eqpt.
Deployment of MF and LF divs,* excluding arty and engrs, may be as follows:
North-east: Shenyang MR (Heilongjiang, Jilin, Liaoning MD): 3 armd, 18 inf; 17 LF.[2]
North: Beijing MR (Hebei, Nei Monggol, Shanxi MD); 5 armd, 28 inf; 12 LF.
North-west: Lanzhou MR (Gansu, Ningxia, Qinghai, Shaanxi MD): 1 armd, 8 inf; 4 LF.[2]
West: Ürümqi MR (East, North and South Xinjiang MD): 6 inf; 8 LF.[2]
South-west: Chengdu MR (Sichuan, Xizang MD): 9 inf; 6 LF.[2]
South: Kunming MR (Guizhou, Yunnan MD): 6 inf; 5 LF. Guangzhou MR (Guangdong, Guanxi, Hainan independent sub-MD, Hunan MD): 12 inf; 11 LF.[2]
Centre: Wuhan MR (Henan, Hubei MD): 11 inf, 3 AB (Air Force); 7 LF.
East: Jinan MR (Shandong MD): 1 armd, 8 inf; 3 LF. Nanjing MR (Anhui, Jiangsu, Zhejiang MD): 1 armd, 6 inf; 6 LF. Fuzhou MR (Fujian, Jiangxi MD): 6 inf; 6 LF.

Navy: 360,000 incl 38,000 Naval Air Force and 38,000 Coast Defence Forces: 32 major surface combat ships, 104 attack subs.[1]
1 G-class submarine with SLBM tubes.[3]
2 *Han* SSN.
102 subs (80 R-, 20 W-class, 2 *Ming*).[4]
15 destroyers: 11 *Lüda* (*Kotlin*-type) with 2 triple CSS-N-2 SSM (more building); 4 *Anshan* (ex-Sov *Gordy*) with 2 twin CSS-N-2.
17 frigates: 12 msl (5 *Jianghu* with 2 twin CSS-N-2, 3 *Jiangdong* with 2 twin SAM, 4 *Chendu* (ex-Sov *Riga*) with 1 twin CSS-N-2); 5 *Jiangnan* (*Riga*-type).
9 patrol escorts (7 ex-Japanese, 1 ex-Br, 1 ex-Aus).
195 FAC(M) with CSS-N-2: 2 *Haidau* (6 msls), 100 *Hola*/*Osa* (4 msls), 92 *Hoku*/*Komar*(and 1 *Homa* hydrofoil((2 msls).
46 large patrol craft: 26 *Hainan*, 20 *Kronshtadt*.
345 FAC(G): 15 *Shanghai* I, 295 *Shanghai* II/III/IV/V, 3 *Haikou*, 30 *Swatow*(, 2 *Shandong* hydrofoils(.
230 FAC(T)(: 70 P-6, 135 *Huchwan* hydrofoils, 25 P-4 (40 more in reserve).
About 100 coastal and river patrol craft(.
20 T-43-class ocean minesweepers.
15 ex-US 511-1152 LST, 17 LSM, 4 inf landing ships, some 320 LCU, 150 LCM.
Coastal Defence Forces (38,000): indep arty regts deployed near naval bases, offshore islands, and other vulnerable points; 85mm, 100mm, 130mm guns.

DEPLOYMENT AND BASES (see map, p. 96).
North Sea Fleet: about 500 vessels (over half (); incl 2 sub sqns, deployed from the Yalu River to south of Lianyungang, Qingdao (HQ), Lüda, Lüshun, Huludao, Weihai, Chengshan.
East Sea Fleet: about 750 vessels (about 400 (); deployed from south of Lianyungang to Dongshan with air, AD, and coastal missile units, Ningbo (HQ), Zhoushan, Taohua Dao, Haimen, Wenzhou, Fuzhou.
South Sea Fleet: about 600 vessels (perhaps half() incl 25 submarines, 4 destroyers, 1 frigate, 200 FAC; deployed from Dongshan to the Vietnamese frontier with 1 sub sqn. Zhanjiang (HQ), Shantou, Guangzhou, Haikou, Yulin, Beihai.
Some 800 ocean-going vessels and several thousand junks could augment the existing sealift capacity.

NAVAL AIR FORCE (38,000): about 800 shore-based combat aircraft, organized in 3 bbr and 6 fighter divs. Incl about 100 B(Hong)-5 torpedo-carrying and 50 Il-28 lt bbrs; some 600 fighters, incl F(Jian)-5/-6/-7 interceptors; F-6 recce and 10 ex-Sov Be-6 MR ac; 40 H(Zhi)-5 hel; some 60 lt tpt ac. Naval fighters are integrated into the AD system.

Air Force: 490,000, incl strategic forces and 220,000 AD personnel; some 5,300 combat ac.[1]
11 Military Air Regions, HQ Beijing; combat elements in Armies of air divs, each with 3 regts of 3 sqns of 3 flts.
Med bbrs: 100 B(Hong)-6/Tu-16 *Badger*, a few ex-Sov Tu-4 *Bull*.
Lt bbrs: about 450 B-5/Il-28 *Beagle*, some 100 ex-Sov Tu-2.
FGA: about 500 F(Jian)-4 and A(Qiang)-5.
Fighters: some 4,000, incl 300 F-5, about 3,000 F-6, 250 F-7, 50 F-8.
Recce: Some 130 F-6, B-5.
Tpts: Some 550 fixed-wing, incl some 300 Y(Yun)-5/An-2, Y-8 (An-12), about 100 ex-Sov (Li-2, 50 Il-14/-18, some An-12/-24/-26), 18 *Trident*, C-46. (These could be supplemented by about 500 ac from the Civil Aviation Administration, with about 150 large tpts incl the Y-10.)
Hel: 350: incl H(Zhi)-5/-6, 13 *Super Frelon*.
Trainers: incl BT-5, MiG-15, FT-4/-5, TF-6.
AAM: AA-2 *Atoll*/*Atoll*-type.
Airborne tps: 3 divs: 82mm, 120mm mor; 82mm RCL, 37mm AA guns.
AA arty divs: 85mm, 100mm guns.

Para-Military Forces: Some 12,000,000.
Militia. The Basic Militia: some 4.3 million; men ages 16–40, women 16–35, who have had, or will have, military service, grouped in the Armed Militia; organized into about 75 cadre divisions and 2,000 regts. The Ordinary Militia up to 6 million, (ages 17–48), including the Urban Militia, receive some basic training but are generally unarmed. Some play a local AD role.
Border security forces comprise 'Armed Border Security' forces (Militia) and 'Border Police' (Public Security Bureau): small arms only.

[1] The People's Liberation Army is one service; naval and air components are listed separately for purposes of comparison.
[2] There are 2–3 divs worth of border tps in each of these MR.
[3] China is not known to have any missiles for this sub, which may be fitted with six tubes.
[4] Incl training vessels.

GROSS NATIONAL PRODUCT AND DEFENCE EXPENDITURE

GROSS NATIONAL PRODUCT

There are no official Chinese figures equivalent to Western data for GNP or National Income. An official 1980 figure for the total value of industrial and agricultural output, only in 1970 prices, is 661,900 m yuan. A GNP figure would include the service sector. Western estimates have varied greatly, and it is difficult to choose from a range of figures, variously defined and calculated. The CIA has estimated GNP for 1977 to be $373 bn, while a recent British estimate for 1980 is $628 bn.

DEFENCE EXPENDITURE

The official Chinese defence expenditure figure, released in 1981 for the first time, at 20,170 bn yuan ($12.5 bn) was 20.7% of planned government expenditure. It was subsequently variously reported to have been cut to 16.5 bn yuan ($10.2 bn) and then only to 17.4 bn yuan ($10.8 bn). This figure is not comparable to Western defence estimates, since it excludes a number of items, notably pay and allowances for the troops. Chinese pricing practices are not known in detail, but they are certainly different from those in the West. The official budget figure, in that it excludes a number of items normally included in defence budgets in Western countries, does not therefore provide an accurate indication of defence costs.

Other Asian Countries and Australasia

BILATERAL AGREEMENTS

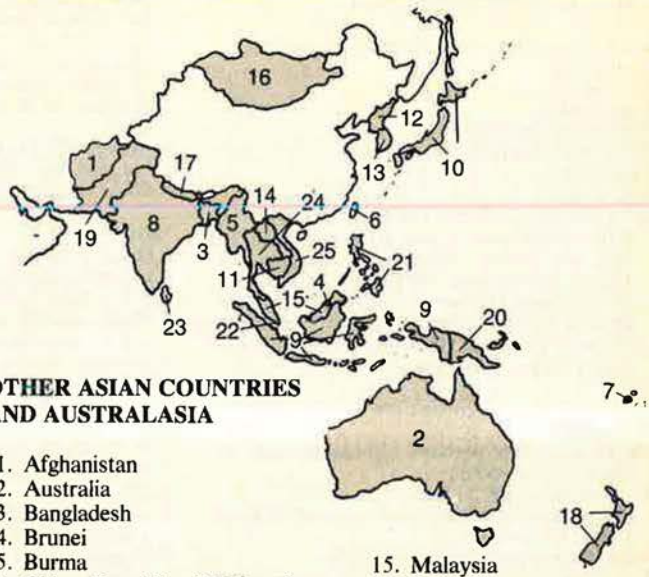
The United States has mutual co-operation and security treaties with Japan (1960), the Republic of Korea (1954), and the Philippines (1951); military co-operation agreements with Australia (1951, 1963, 1974, and 1980); and a military aid agreement with Thailand. That with Taiwan lapsed on 1 January 1980, although some arms supply and production arrangements continue. Under several other arrangements in the region the United States also provides military aid on either grant or credit basis to Indonesia, South Korea, Malaysia, the Philippines, and Thailand, and she sells military equipment to many countries. There are major bases in Japan, South Korea, and the Philippines, and air (B-52) and naval refueling facilities in north and west Australia.

In 1965 Britain purchased the Chagos Archipelago, which includes Diego Garcia, from Mauritius for $3m and established it as the British Indian Ocean territory. A joint US/UK base was constructed on Diego Garcia, and a small British naval contingent was deployed there. Treaties in 1972 and 1976 gave the US a 50-year tenure and provided for the development of the US naval communications facility on the island into a major US naval and air support facility.

The Soviet Union has Treaties of Friendship, Co-operation, and Mutual Assistance with Afghanistan (1978), India (1971), Mongolia (1966), the Democratic People's Republic of Korea (1961), and Vietnam (1978). Military assistance agreements exist with Sri Lanka. The Soviet Union concluded a stationing of forces agreement with Afghanistan in April 1980. Bulgaria has Friendship Treaties with Cambodia (1960), Laos (1979), Mongolia (1967), and Vietnam (1979), as have Czechoslovakia with Laos and Vietnam (1980), and East Germany with Vietnam (1977), and Kampuchea (1980).

Australia has supplied defence equipment to Singapore and Indonesia and has a defence/aid agreement with Malaysia.

In July 1977 Vietnam and Laos signed a series of agreements which contained military provisions and a border pact, and may have provided for 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.



OTHER ASIAN COUNTRIES AND AUSTRALASIA

1. Afghanistan
2. Australia
3. Bangladesh
4. Brunei
5. Burma
6. China: Republic of (Taiwan)
7. Fiji
8. India
9. Indonesia
10. Japan
11. Kampuchea (Cambodia)
12. Korea: Democratic People's Republic (North)
13. Korea: Republic of (South)
14. Laos
15. Malaysia
16. Mongolia
17. Nepal
18. New Zealand
19. Pakistan
20. Papua New Guinea
21. Philippines
22. Singapore
23. Sri Lanka
24. Thailand
25. Vietnam

MULTILATERAL AGREEMENTS

Australia, New Zealand, and the United States are members of a tripartite treaty known as ANZUS, which was signed in 1951 and is of indefinite duration. Under this Treaty each agrees to 'act to meet the common danger' in the event of attack on either metropolitan or island territory of any one of them, or on armed forces, public vessels, or aircraft in the Pacific.

The Manila Pact, signed on 8 September 1954 by Australia, France, New Zealand, Pakistan, the Philippines, Thailand, the United Kingdom, 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.

Five-Power Defence Arrangements, relating to the defence of Malaysia and Singapore and involving Australia, Malaysia, New Zealand, Singapore, and Britain, came into effect on 1 November 1971. These stated that, in the event of any externally organized or supported armed attack or threat of attack against Malaysia or Singapore, the five governments would consult together for the purpose of deciding what measures should be taken, jointly or separately. Britain withdrew her forces in March 1976, but New Zealand troops remain in Singapore, as do Australian air forces in Malaysia.

AFGHANISTAN

Population: 15,360,000.
Military service: conscription; 2 years, may be extended to 30 months.
Total armed forces: 43,000.[1]
Estimated GNP 1979: $3.4 bn.
Defence expenditure 1978–79: 2.87 bn afghanis ($63.8 m).
$1 = 45 afghanis (1978, 1979).

Army: 35,000 (perhaps 26,000 conscripts).[1]
3 corps HQ.
11 inf divs.
3 armd bdes.
2 mountain inf bdes.
1 arty bde, 3 arty regts.
3 cdo regts.
1 para regt.
200 T-34, 900 T-54/-55, 100 T-62 med, 60 PT-76 lt tks; BMP-1 MICV, 800 BTR-40/-50/-60/-152 APC; 900 76mm, 100mm guns; 122mm and 152mm how; 82mm, 100 120mm, 160mm mor; 50 BM-13-16 132mm MRL; 82mm RCL; 76mm, 100mm ATK guns; *Snapper* ATGW; 350 23mm, 37mm, 57mm, and 100mm towed, 20 ZSU-23-4 SP AA guns; SA-7 SAM.

RESERVES: 150,000 (obligation to age 40).

Air Force: 8,000; perhaps 120 combat aircraft, some 15 armed hel.[1]
3 lt bbr sqns with 20 Il-28.
7 FGA sqns: 2 with MiG-19, 4 with 45 MiG-17, 1 with 15 Su-7BM.
3 interceptor sqns with 20 MiG-21.
2 tpt sqns with some 10 An-2, 10 An-26, 2 An-24, 1 Il-18D.
4 hel sqns with up to 5 Mi-4, 22 Mi-8, 15 Mi-24.
Trainers incl MiG-15/-17UTI/-21U, Il-28U, Yak-18, L-39C.
AAM: AA-2 *Atoll*.
1 AD div: 1 SAM bde (3 bns with 120 SA-2), 115 SA-3; 1 AA bde (2 bns with 37mm, 85mm, 100mm guns); 1 radar bde (3 bns).

RESERVES: 12,000.

Para-Military Forces: 30,000 Gendarmerie. Border forces; Ministry of Interior. *Khad* (secret police), 'Defence of the Revolution' Forces; Pioneers; Afghan Communist Party Guards, Khalqi Youth Militia (at least one bn), Pashtun tribal militia (border guard).

AUSTRALIA

Population: 14,760,000.
Military service: voluntary.
Total armed forces: 72,591.
Estimated GDP 1979: $US 133.7 bn.
Defence expenditure 1980–81: $A 3.54 bn ($US 3.90 bn).
$US 1 = $A 0.913 (1980), $A 0.907 (1979).

Army: 32,850.
1 inf div HQ, 3 task force HQ.
1 armd regt.
1 recce regt.
1 APC regt (+ 1 cav sqn).
6 inf bns.
4 arty regts (1 med, 2 fd, 1 AD).
3 fd engr, 1 construction, 1 fd survey regts.
2 sigs regts.
1 Special Air Service regt.
1 aviation regt.
2 tpt, 1 air tpt spt regts.
73 *Leopard* 1A3 med tks; 791 M-113 APC, incl 63 recce AFV with 76mm gun (48 with *Scorpion*, 15 with *Saladin* turret); 34 5.5-in guns; 247 105mm how; 51 M-40 106mm RCL; *Redeye*, 20 *Rapier* SAM launchers; 16 *Porter*, 11 *Nomad* ac; 48 Bell 206B-1 hel; 37 watercraft, 77 LARC-5 amph veh.
(On order: 36 M-198 155mm how.)

RESERVES: 27,235 (with trg obligations) in combat, spt, log, and trg units (to rise to 30,000), 30 *Leopard* med tks in storage.

Navy: 17,300 (incl Fleet Air Arm).
6 *Oxley* (*Oberon*) submarines.
1 aircraft carrier (capacity 8 A-4G, 6 S-2G ac, 6 *Sea King* hel).
3 *Perth* (ex-US *Adams*) ASW destroyers with *Tartar* SAM, *Ikara* ASW msls.
1 modified *Daring* destroyer (trg).
2 *Adelaide* (FFG-7) frigates with *Standard* SAM, *Harpoon* SSM.
6 *River* frigates with *Seacat* SAM/SSM, *Ikara* ASW.
2 PCF-420, 12 *Attack* large patrol boats.
3 modified Br *Ton* coastal MCM.
5 LCT.
1 amph hy tpt ship, 1 trg ship (ex-ocean ferry), 1 fleet oiler, 1 destroyer tender.
(On order: 2 FFG-7 frigates, 1 *Durance*-type replenishment ship, 18 PCF-420 large patrol craft, *Harpoon* SSM.)

FLEET AIR ARM: 20 combat ac, 6 armed hel.
1 attack sqn with 4 A-4G *Skyhawk*.
1 ASW sqn with 7 S-2G *Tracker*.
1 composite sqn with 7 S-2G, 2 HS-748 (ECM).
1 ASW hel sqn with 6 *Sea King* Mk 50.
1 utility/SAR hel sqn with 10 *Wessex* 31B, 4 Bell UH-1B, 3 Bell 206B.
1 trg sqn with 8 MB-326H, 2 TA-4G, 4 A-4G.
In storage: 5 S-2G ac, 9 *Wessex* 31B hel.

Bases: Sydney, Melbourne, Jervis Bay, Brisbane, Cairns, Darwin, Cockburn Sound.

RESERVES: 3,600 (with trg obligations).

Air Force: 22,441; 125 combat aircraft.
2 FGA/recce sqns with 20 F-111C, 4 RF-111C.
3 interceptor/FGA sqns with 48 *Mirage* IIIO.
1 recce/trg sqn with 13 *Canberra* B-20/T-21.
2 MR sqns: 1 with 10 P-3B *Orion*, 1 with 10 P-3C.
1 OCU with 14 *Mirage* IIIO/D.
1 Forward Air Controller flt with 6 CA-25.
5 tpt sqns: 2 with 24 C-130E/H, 2 Boeing 707-320C; 2 with 18 DHC-4 (C-7A); 1 with 2 BAC-111, 2 HS-748, 3 *Mystère* 20.
1 hel tpt sqn with 6 CH-47 *Chinook*.
3 utility hel sqns with 45 UH-1B/H *Iroquois*.
Trainers incl 70 MB-326H, 8 HS-748T2, 49 CT-4 *Airtrainer*.
AAM: *Sidewinder*, R-530.
(26 *Mirage* IIIO/D FGA, 6 *Chinook* hel in reserve.)
(On order: 4 F-111A FGA ac, *Harpoon* ASM.)

RESERVES: 600 (with trg obligations) in 5 Auxiliary sqns.

Forces Abroad: Egypt: (UNTSO): 10, *India/Kashmir.* (UNMOGIP): 6, *Malaysia/Singapore:* 2 sqns with *Mirage* IIIO, 1 flt with DHC-4, UH-1H hel.

Para-Military Forces: Bureau of Customs. (On order: 10 *Searchmaster* MR ac.)

BANGLADESH

Population: 92,900,000.
Military service: voluntary.
Total armed forces: 77,000.
Estimated GDP 1979: $9.5 bn.
Defence expenditure 1980: 2.52 bn taka ($158 m).
$1 = 15.94 taka (1980), 15.3 taka (1979).

Army: 70,000.
5 inf div HQ.
12 inf bdes (27 inf bns).
2 armd regts.
12 arty regts.
6 engr bns.
30 T-54/-55 med, 6 M-24 *Chaffee* lt tks; 30 model 56 pack, M-101 105mm, 5 25-pdr guns/how; 81mm, 50 120mm mor; 57mm (6-pdr) ATK guns; 106mm RCL.[2]
(On order: 36 Ch tks.)

Navy: 4,000.[2]
2 ex-Br frigates (1 Type 61, 1 Type 41).
4 ex-Ch *Shanghai* II FAC(G).
5 large patrol craft (2 ex-Yug *Kraljevica*, 2 ex-Ind *Akshay*, 1 ex-Br *Town*-class).
5 *Pabna* river patrol boats(.
1 trg ship.

Bases: Chittagong (HQ), Dacca, Khulna, Chalna.

Air Force: 3,000; 19 combat aircraft.[2]
2 FGA sqns with 16 Ch F-6.
1 interceptor sqn with 3 MiG-21MF.
1 tpt sqn with 1 An-24, 3 An-26.
1 hel sqn with 4 *Alouette* III, 6 Bell 212, Mi-8.
Trainers incl 2 MiG-21U, 8 *Magister*, 12 Ch BT-6.
AAM: AA-2 *Atoll*.
(On order: 12 F-6 FGA.)

Para-Military Forces: 66,000. 30,000 Bangladesh Rifles, 36,000 Armed Police Reserve.

BURMA

Population: 35,260,000.
Military service: voluntary.
Total armed forces: 179,000.
Estimated GNP 1980: $5.06 bn.
Defence expenditure 1980: 1.35 bn kyat ($200 m).
$1 = 6.73 kyat (official) (1980).

Army: 163,000.
6 lt inf divs.
2 armd bns.

[1] See p. 106 for all footnotes.

85 indep inf bns.
3 arty bns.
1 AA bty.
25 *Comet* med tks; 40 Humber armd, 45 *Ferret* scout cars; 50 25-pdr, 5.5-in guns/how; 120 76mm, 80 M-101 105mm how; 120mm mor; 50 6- and 17-pdr ATK guns; 10 40mm, 3.7-in AA guns.[2]

Navy: 7,000 (800 marines).[2]
2 ex-Br frigates (1 *River*, 1 *Algerine*).
4 corvettes: 2 ex-US (1 PCE-827, 1 *Admirable*), 2 *Nawarat*.
1 *Osprey*-class large patrol craft.
36 gunboats (15().
35 river patrol craft(.
1 ex-US LCU.
8 ex-US LCM.
(On order: 2 *Osprey* large, 6 *Carpentaria* coastal patrol boats.)

Bases: Bassein, Mergui, Moulmein, Seikyi, Sinmalaik, Sittwo.

Air Force: 9,000; 17 combat aircraft.[2]
2 COIN sqns with 6 AT-33, 11 SF-260MB.
Tpts incl 1 F-27, 4 FH-227, 7 Pilatus PC-6/-6A, 6 Cessna 180.
Hel incl 10 KB-47G, 2 KV-107/II, 7 HH-43B, 10 *Alouette* III, 14 UH-1.
Trainers incl 20 PC-7 *Turbo-Trainer*, 10 T-37C.
(On order: 9 SF-260MB, 6 Cessna 180, 12 PC-7.)

Para-Military Forces: 73,000 38,000 People's Police Force, 35,000 People's Militia.

CHINA: REPUBLIC OF (TAIWAN)

Population: 18,165,000.
Military service: 2 years.
Total armed forces: 451,000.
Estimated GNP 1980: $US 27.8 bn.
Defence expenditure 1977–78: $NT 63.47 bn ($US 1.75 bn).
$US1 = $NT 36 (1980), $NT 37.97 (1978).

Army: 310,000.
2 army, 6 corps HQ.
2 armd divs.
12 hy inf divs.
6 lt inf divs.
2 AB bdes.
2 armd cav regts.
4 special forces gps.
1 SSM bn with *Honest John*.
4 SAM bns: 2 with *Nike Hercules*, 2 with *HAWK*.
6 army aviation sqns.
200 M-47/-48 med, 625 M-41 lt tks; M-3 half-track, 1,100 M-113 APC; 300 M-59 155mm guns/how; 350 M-116 75mm pack, 550 M-101 105mm, 90 M-114 155mm, 10 M-115 203mm towed, 225 M-108 105mm, M-109 155mm, M-110 203mm SP how; 81mm mor; *Kung Feng* 126mm MRL; *Honest John, Hsiung Feng* SSM; 150 M-18 76mm SP ATK guns; 500 106mm RCL; *Kun Wu* ATGW; 300 40mm AA guns (some M-42 SP); 80 *Nike Hercules, HAWK*, 20 *Chaparral* SAM; 118 UH-1H, 2 KH-4, 7 CH-34 hel.
(On order: 75 M-48 med tks; 125 M-109 155mm, 75 M-110A 203mm SP how; 1,000 *TOW, Kun Wu* ATGW; 370 *Improved HAWK* SAM.)

DEPLOYMENT: *Quemoy:* 60,000; *Matsu:* 20,000.

RESERVES: 1,000,000.

Navy: 35,000.
2 ex-US *Guppy*-II submarines.
22 ex-US destroyers: 10 *Gearing* with 1 hel (1 with *Gabriel* SSM, 7 with *ASROC*), 8 *Sumner* (3 with *Gabriel*), 4 *Fletcher* with *Chaparral* SAM.
11 ex-US APD-37/-38 frigates.
3 ex-US *Auk* corvettes.
6 FAC(M) with *Hsiung Feng* (*Gabriel*-type) SSM: 4 *Lung Chiang* (4 msls), 2 *Tzu Chiang* (2 msls).
6 FAC(T): 4 ex-US 71 ft/79 ft, 2 Japanese built.
14 ex-US *Adjutant* and 268-class coastal minesweepers, 7 MCM boats.
2 LSD, 22 LST, 4 LSM, 22 LCU.
(On order: 2 *Zwaardvis* subs, 2 *Gearing* destroyers, *Tzu Chiang* FAC(M), *Harpoon, Gabriel* SSM, *ASROC* ASW, 284 *Improved Sea Chaparral* SAM.)

RESERVES: 45,000.

Bases: Tsoying, Makung (Pescadores), Keelung.

Marines: 39,000.
2 divs.
M-47 med tks; LVT-4 APC; 105mm, 155mm how; 106mm RCL.

RESERVES: 35,000.

Air Force: 67,000; 386 combat ac, 12 armed hel.
5 combat wings.
13 FGA sqns: 9 with 252 F-5A/E/F; 2 with 42 F-100/A/D, 2 with 40 F-104G/D.
1 interceptor sqn with 21 F-104A.
1 recce sqn with 4 RF-104G.
1 MR sqn with 9 S-2A, 18 S-2E.
1 ASW hel sqn with 12 Hughes *Defender* 500MD.
1 SAR sqn with 8 HU-16B ac, 10 UH-1H hel.
6 tpt sqns with 30 C-46, 50 C-47, 1 C-118B, 40 C-119, 10 C-123, 1 Boeing 720B.
Trainers incl 55 PL-1B *Chien Shou*, 50 T-CH-1, 32 T-33, 30 T-38, F-5B/F, 3 TF-104G, 6 F-104D, F-100F.
6 hel sqns with 95 UH-1H, 7 UH-19, 10 Bell 47G.
AAM: *Sidewinder, Shafrir*.
ASM: *Bullpup*.
(On order: F-5E/F fighters, YAT-3 trg ac, *Shafrir* AAM, *Maverick* ASM.)

RESERVES: 90,000.

Para-Military Forces: 100,000 militia. Police use Hughes 300C/D hel.

INDIA

Population: 683,900,000.
Military service: voluntary.
Total armed forces: 1,104,000.
Estimated GNP 1980: $116 bn.
Defence expenditure 1981–2: 42 bn rupees ($5.12 bn).
$1 = 8.21 rupees (1981), 8.17 rupees (1980).

Army: 944,000.
2 armd divs.
18 inf divs.
10 mountain divs.
6 indep armd bdes.
1 indep inf bde.
2 para bdes.
1 cdo bde.
17 indep arty bdes, incl about 20 AA regts.
950 T-54/-55, 170 T-72, 1,000 *Vijayanta* med, AMX-13 lt tks; 700 BTR-50/-60/-152, OT-62A/-64A APC; 76mm, 25-pdr, 300 100mm, 550 130mm, 5.5-in, S-23 180mm guns; 75mm pack, 75/24 mountain, 105mm (incl pack, *Abbot* SP), M-115 203mm how; 500 120mm, 160mm mor; M-18 57mm, *Carl Gustav* 84mm, 106mm RCL; SS-11, *Harpon, ENTAC* ATGW; 57mm ATK guns; 40mm, 3.7-in towed, ZSU-23-4 SP AA guns; SA-6, 40 *Tigercat* SAM.
(On order: 600 T-72 med tks, 230 M-198 155mm how, 60 *TOW* ATGW launchers, 3,700 msls.)

RESERVES: 200,000. Territorial Army 40,000.

Navy: 47,000, incl naval air force.
8 ex-Sov F-class submarines.
1 ex-Br *Majestic*-class aircraft carrier (capacity 18 *Sea Hawk*, 4 *Alizé;* converting to *Sea Harrier*).
1 ex-Br *Fiji*-class cruiser (trg).
2 ex-Sov *Kashin*-class destroyers with 4 *Styx* SSM; SA-N-1 SAM, 1 hel.
24 frigates: 6 *Leander* with *Seacat* SAM, 1 hel: 2 ex-Br *Whitby* with *Styx* SSM; 12 ex-Sov *Petya* II; 4 trg (3 ex-Br *Leopard*, 1 *Black Swan*).
3 ex-Sov *Nanuchka* corvettes with *Styx* SSM, SA-N-4 SAM.
16 ex-Sov *Osa*-I/II FAC(M) with *Styx* SSM.
1 *Abhay*, 3 SDB-2 large patrol craft.
6 ex-Sov *Natya* ocean, 4 ex-Br *Ton* coastal, 4 ex-Br *Ham* inshore minesweepers.
1 ex-Br, 6 ex-Sov *Polnocny* LCT, 6 LCU.
(On order: 4 SSK-1500 submarines, 2 *Kashin*-type destroyers, 5 *Godevari* (modified *Leander*) frigates, 4 *Nanuchka* corvettes, 6 *Polnocny* LCT.)

Bases: Western Fleet: Bombay, Goa, Cochin. Eastern Fleet: Vishakapatnam, Calcutta, Port Blair.

NAVAL AIR FORCE: (2,000); 33 combat aircraft, 27 armed hel.
2 attack sqns with 20 *Sea Hawk* (10 in carrier).
1 ASW sqn with 5 *Alizé* 1050 (4 in carrier).
2 MR sqns with 5 *Super Constellation*, 3 Il-38 *May*.
5 ASW hel sqns with 11 *Sea King*, 5 Ka-25, 11 *Alouette* III.
1 SAR/liaison hel sqn with 10 *Alouette* III.
3 trg/comms sqns with 7 HJT-16 *Kiran*, 4 *Vampire* T-55, 10 *Islander*, 1 *Devon*, 2 *Seahawk* ac; 4 Hughes 300 hel.
(On order: 8 *Sea Harrier* FGA, 3 Il-38 MR, 6 *Islander* trg ac.)

Air Force: 113,000; some 614 combat aircraft.
4 lt bbr sqns with 50 *Canberra* B(I)58, B(I)12.
10 FGA sqns: 3 with 50 Su-7BM/KU; 3 with 48 *Hunter* F-56/-56A; 1 with 16 *Jaguar* GR-1, 2 T-2; 2 with 50 HF-24 *Marut;* 1 with 10 MiG-23BM (*Flogger* F) and MiG-23UM (*Flogger* C) forming, 2nd to form early 1982.
15 AD/FGA sqns with 300 MiG-21/FL/PFMA/MF/bis/U.
4 interceptor sqns with 80 *Ajeet* (*Gnat* Mk II).
1 recce sqn with 8 *Canberra* PR-57 (to be replaced by MiG-25).
4 hel sqns with some 100 *Cheetah (Lama)* (replacing 20 *Krishak* and 10 *Auster* ac).
3 trg and conversion sqns with *Canberra* T-4/T-13/T-67, *Hunter* F-56/T-66, MiG-21U.
10 tpt sqns: 2 with 31 C-119G, An-32; 2 with 30 An-12; 2 with 24 DHC-3, 3 with 36 C-47, An-32; 1 with 20 DHC-4.
1 comms sqn with 2 Tu-124, 16 HS-748M.
2 liaison flts with 16 HS-748, 4 C-47.
9 tpt hel sqns: 5 with 60 Mi-4, 4 with 52 Mi-8.
3 liaison hel sqns with 60 *Chetak* (*Alouette* III).
Trainers incl 65 HT-2, 170 *Kiran* I/IA, 15 *Marut* Mk 1T, 10 HPT-3 (replacing HT-2) 45 TS-4 *Iskra*, 27 HS-748 ac, *Chetak* hel.
AAM: AA-2 *Atoll*.
ASM: AS-30.
20 SAM sqns with 120 SA-2/-3.
(On order: 85 *Jaguar* (45 to be locally built[3]), 62 MiG-23BM, 13 MiG-23UM, MiG-21bis, 80 *Ajeet* (*Gnat* Mk 2) fighters; 8 MiG-25 recce; 40 An-32, 10 HS-748 tpts; 40 *Iskra*, 90 *Kiran* Mk 2 trg ac; Mi-8, 45 *Chetak* hel.)

Para-Military Forces: About 200,000 Border Security Force, 100,000 in other organizations. Coastguard: 2 ex-Br Type 14 frigates, 2 FAC(P), 5 *Poluchat* FAC(P), 4 *Alouette* III hel. (On order: 3 coastal patrol vessels.)

INDONESIA

Population: 154,360,000.
Military service: selective.

Eighty-six of the 100 F-15Js the Japanese Air Self-Defense Force plans to acquire are to be built in Japan.

Total armed forces: 273,000.
Estimated GDP 1979: $43.1 bn.
Defence expenditure 1981: 1,500 bn rupiahs ($2.39 bn).
$1 = 628.3 rupiahs (1981), 625 rupiahs (1979).

Army: 195,000.[4]
1 armd cav bde (1 tk bn, spt units).[5]
13 inf bdes (76 inf, 14 arty, 13 AA, 10 engr bns), 1 bde in KOSTRAD.
2 AB inf bdes (6 bns).[5]
4 fd arty regts, 4 AA arty regts.
1 engr regt.
Army Aviation:
1 composite sqn; 1 hel sqn.
25 M-3A3, 200 AMX-13, 75 PT-76 lt tks; 75 *Saladin* armd, 55 *Ferret* scout cars; 1,000 AMX-VCI MICV, *Saracen*, 60 V-150 *Commando*, 130 BTR-40/-152 APC; 50 76mm, 40 105mm (incl 105mm lt), 122mm guns/how; 81mm, 200 120mm mor; 106mm RCL; *ENTAC* ATGW; 20mm, 40mm, 200 57mm AA guns, 2 C-47, 2 Aero *Commander* 680, 1 DHC-2, 1 Beech 18, Cessna 185, 18 *Gelatik* ac; 16 Bell 205, 5 *Alouette* III, 16 Bo-105 hel, 20 small landing craft.
(On order: 40 AMX-10 PAC 90 AFV, AMX-10P APC.)

Navy: 52,000, incl Naval Air and Marines.[5]
4 subs: 2 Type 209, 2 ex-Sov W-class (1 trg).
10 frigates: 3 *Fatahilla* with 4 *Exocet* SSM, 4 ex-US *Jones*, 3 ex-Sov *Riga*.
16 large partrol craft: 5 ex-Sov *Kronshtadt*, 1 ex-US PC-461, 5 ex-Yug *Kraljevica*, 2 *Kelabang*, 2 *Attack*, 1 ex-US PGM-39.
4 PSSM Mk 5 FAC(M) with 4 *Exocet* SSM.
4 Lürssen TNC-45 FAC(T).
8 coastal patrol craft(: 2 *Spear*, 6 Aus *Carpentaria*.
4 ex-Sov T-43 ocean minesweepers.
1 comd/spt ship.
11 LST, 5 LCU, 38 LCM.
(In reserve: 1 *Pattimura* frigate; 1 *Kronshtadt*, 2 PC-461, 1 *Kelabang*, 2 PGM-39 patrol craft; 1 R-class coastal minesweeper; 1 comd/spt ship.)
(On order: 1 trg frigate, 2 LST.)

Bases: Gorontalo, Jakarta, Surabaya.

NAVAL AIR: (1,000); 24 combat aircraft.
3 MR sqns: 2 with 18 *Nomad*, 1 with 6 CASA C-212.
Other ac incl 5 HU-16, 6 C-47, 3 Aero *Commander*, ac; 4 Bell 47G, 6 *Alouette* II/III, 4 Bo-105 hel).
(On order: 3 Boeing 737 MR ac, 8 Bo-105 hel.)

MARINES: (12,000).
2 inf regts (6 bns); 1 close spt regt; 3 amph assault, 1 arty, 1 AA bns.
Lt tks, APC, 40mm AA.

Air Force: 26,000; 48 combat aircraft.[6]
1 FGA sqn with 14 A-4, 2 TA-4 *Skyhawk*.
1 interceptor sqn with 12 F-5E, 4 F-5F.
1 COIN sqn with 16 OV-10F.
2 tpt sqns: 1 with 18 C-130H-30/-130B (3 in civilian use), 1 L-100-30; 1 with 1 C-140 *Jetstar*, 12 C-47, 1 *Skyvan*, 8 F-27, 6 CASA C-212.
1 liaison sqn with 7 DHC-3, 12 Cessna 207/401/402 ac; 4 *Alouette* III hel.
1 hel sqn with 2 Bell 204B, 4 UH-34D, 1 S-61A, 16 *Puma*.
1 trg sqn: 4 T-6, 16 T-34C1, 8 *Hawk* T-53, 4 AS-202 *Bravo*.
(On order: 16 A-4E FGA; 10 CASA C-212, 3 Transall C-160 tpts; 4 *Hawk* T-53, 20 AS-202 trg ac; 2 *King Air* lt ac; 16 Bo-105, 6 *Puma* hel.)

Para-Military Forces: 12,000 Police mobile bde; about 70,000 Militia. Coastguard (getting patrol boats). Customs (getting 7 28-metre, 8 57-metre Lürssen patrol boats.)

JAPAN

Population: 117,400,000.
Military service: voluntary.
Total armed forces: 243,000 (to increase to 270,184).
Estimated GNP 1980: $975.7 bn.
Defence expenditure 1981: 2,400 bn yen ($11.5 bn).
$1 = 208.75 yen (1981), 248.85 yen (1980).

Army: 155,000.
1 armd div.
12 inf divs (7–9,000 men each).
1 AB bde.
2 composite bdes.
1 arty bde, 2 AD arty bdes.
1 sigs bde.
5 engr bdes.
8 SAM gps (each of 4 btys) with 192 *HAWK*.
Army Aviation:
1 hel wing and 34 sqns.
560 Type 61, 270 Type 74 med, 70 M-41 lt tks; 500 Type 60 and Type 73 APC; 900 75mm, 105mm, 155mm, and 203mm guns/how; 500 Type 74 105mm and Type 75 155mm SP how; Type 30 SSM; 1,800 81mm and 107mm mor (some SV and SX-60 SP); 8 Type 75 130mm MRL; 1,000 57mm, 75mm, *Carl Gustav* 84mm, 106mm RCL; Type 64, 8 KAM-9 ATGW; 200 35mm twin, 37mm, 40mm, 75mm, 90mm AA guns; *HAWK* SAM; some 300 ac and hel: 12 LM-1/-2, 12 LR-1 ac; 2 AH-1S, 54 KV-107, 58 UH-1H, 80 UH-1B, 33 TH-55J, 46 OH-6J/D, 3 H-13 hel.
(On order: 60 Type 74 med tks, 9 Type 73 APC, 34 Type 75 155mm, 7 203mm SP how; 17 Type 75 MRL; 8 Type 79, *MAT* ATGW; 219 84mm RCL; 10 *Tan*, 14 *Stinger*, 24 *Improved HAWK* SAM; 2 LR-1 ac; 8 OH-6D, 6 UH-1H hel.)

RESERVES: 41,000.

Navy: 44,000 (including naval air).
14 subs: 2 *Yushio*, 7 *Uzushio*, 5 *Oshio* (1 trg).
34 destroyers: 2 *Shirane* with *Sea Sparrow* SAM, *ASROC*, 3 S-61B ASW hel; 2 *Haruna* with *ASROC*, 3 ASW hel; 2 *Tachikaze* with *Tartar*, *Standard* SAM, *ASROC*; 1 *Amatsukaze* with *Standard* SAM, *ASROC*; 4 *Takatsuki* with *ASROC*, 2 hel; 6 *Yamagumo* with *ASROC*; 3 *Minegumo* (2 with 2 hel; 1 with *ASROC*, no hel); 2 *Akizuki*; 3 *Murasame*; 7 *Ayanami* (2 trg); 2 *Harukaze* (1 trials).
16 frigates: 1 *Ishikari* with 2 quad *Harpoon* SSM; 11 *Chikugo* with *ASROC*; 4 *Isuzu*.
7 large patrol craft: 5 *Mizutori*, 2 *Umitaka*.
5 FAC(T).
9 coastal patrol craft(.
3 MCM spt ships, 37 coastal minesweepers (9 *Hatsushima*, 19 *Takami*, 9 *Kasado*), 6 *Nanago* MCM boats.
2 trg ships (1 *Azuma*, 1 *Katori*).
6 LST (3 *Miura*, 3 *Atsumi*), 37 landing craft.
(On order: 3 submarines, 8 destroyers; 32 *Harpoon* SSM, *Tartar* SAM.)

Bases: Yokosuka, Kure, Sasebo, Maizuru, Ominato.

NAVAL AIR ARM: 12,000; some 120 combat aircraft, 76 armed hel.
5 air groups.
11 MR sqns with 68 P-2J, 5 P2V-7, 28 S-2F-1, 19 PS-1.
9 ASW hel sqns with 70 HSS-2/-2A/-2B.
1 MCM hel sqn with 6 KV-107.
1 tpt sqn with 4 YS-11M, 1 S2F-C, 1 S2F-U.
1 test sqn with P-2H/J, SH-3A/B, T-34, PS-1.
5 SAR flts with 6 US-1 ac; 2 S-62A hel.
5 trg sqns with 6 YS-11T, 5 TC-90, 8 T-34, 55 KM-2, P-2J, 23 *Queen Air*, 5 *King Air* ac; 4 OH-6J, 90 SH-3 hel.
2 SAR trg sqns with S-62A.

(On order: 8 P-3J, 6 C-130 minelayer, 13 *Sierra* 200 MR, 9 KM-2, 2 US-1, 7 TC-90 ac; 18 HSS-2, 1 S-61A hel.)

RESERVES: 600.

Air Force: 44,000: some 350 combat aircraft.
6 combat air wings; 1 composite air div, 1 recce sqn.
3 FGA sqns with 64 F-1, 6 T-33A.
10 interceptor sqns; 6 with 120 F-4EJ; 3 with 105 F-104J, 20 T-33A: 1 OCU with 17 F-104DJ.
Recce Air Group: HQ sqn; aerobatic team; 1 recce sqn with 14 RF-4EJ; ECM flt with 2 YS-11E.
3 tpt sqns with 30 C-1A, 10 YS-11.
1 SAR wing (9 dets) with 50 T-34A, MU-2 ac; KV-107, S-62 hel.
1 air test wing with F-4EJ, 2 F-15J, F-104J, T-1/-2/-3, T-33A, 1 C-1A.
1 weather group with 2 YS-11, MU-2J, T-33A.
5 trg wings: 9 with 50 T-1A/B, 54 T-2A, 30 T-3, 56 T-33A, 30 T-34A.
AAM: AAM-1, *Sparrow, Falcon, Sidewinder.*
4 SAM gps; 13 sqns with 208 *Nike-J.*
A Base Defence Ground Environment with 28 control and warning units.
(On order: 90 F-15J, 8 TF-15J, 11 F-1 fighters, 2 C-130 tpt, 20 T-2, 10 T-3 trg, 3 MU-2 SAR, 8 E-2C AEW ac; 6 KV-107 SAR hel; 2 *Tan* SAM launchers.)

KAMPUCHEA/CAMBODIA

Population: 5,560,000.
Military service: conscription, term unknown.
Total armed forces: some 20,000.

Armed Forces:
1 inf div.
Some indep units.
(On order: tks, arty, ships, ac, 2 Mi-8 hel—details unknown.)
The country is occupied by some 21 Vietnamese divs (200,000 men). Resistance Groups: Democratic Kampuchean Government *(Khmer Rouge):* perhaps 30,000; *Sereika:* some 3,000, small arms, incl mor.

KOREA: DEMOCRATIC PEOPLE'S REPUBLIC (NORTH)

Population: 19,940,000.
Military service: Army, Navy 5 years; Air Force 3–4 years.
Total armed forces: 782,000.
Estimated GNP 1979: $14.1 bn.
Defence expenditure 1981: 3.01 bn won ($1.47 bn).
$1 = 2.05 won.

Army: 700,000.
8 corps HQ.
2 tk divs.
3 mot inf divs.
35 inf divs.
3 AA arty divs.
5 armd bdes.
4 recce bdes.
4 inf bdes.
8 lt inf bdes.
26 special forces (incl 3 amph cdo) bdes.
2 indep tk regts.
5 indep inf regts.
100 arty bns.
82 rocket bns.
4 SSM bns with 36 *FROG.*
1 river crossing regt (3 bns).
3 amph bns (engrs).
5 AB bns.
300 T-34, 2,200 T-54/-55/-62 and Type-59 med, 100 PT-76, 50 Type-62 lt tks; BA-64 recce, 1,000 BTR-40/-50/-60/-152, BMP-1, K-63 APC; 4,100 76mm, 85mm, 100mm, 122mm, 130mm towed, SU-76, SU-100 SP guns; 122mm, 152mm how; 11,000 82mm, 120mm, and 160mm mor; 1,900 122mm, 140mm, 200mm, 240mm MRL; 1,500 82mm B-10 RCL; 45mm, 57mm, Type 52 75mm ATK guns; AT-3 *Sagger* ATGW; 9 *FROG-5,* 30 *FROG-7* SSM; 8,000 23mm, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4, ZSU-57-2 SP AA guns; SA-7 SAM.

RESERVES: 260,000, 23 divs.

Navy: 31,000.
19 submarines (4 ex-Sov W-, 15 ex-Ch R-class).
4 *Najin* frigates.
18 ex-Sov FAC(M): 8 *Osa-I,* 10 *Komar*(with *Styx* SSM.
33 large patrol craft: 3 ex-Sov (2 *Tral,* 1 *Artillerist),* 15 SO-1, 3 *Sariwan,* 6 ex-Ch *Hainan,* 6 *Taechong.*
141 FAC(G): 20 ex-Sov MO-IV(; 23 ex-Ch (15 *Shanghai* II, 8 *Swatow*(), 4 *Chodo,* 4 K-48, 60 *Chaho*(, 30 *Chong-Jin*(.
177 FAC(T): 78 ex-Sov (4 *Shershen,* 62 P-6(, 12 P-4(); 99((6 *Sinpo,* 15 *Iwon,* 6 *An Ju,* 72 *Ku Song/Sin Hung).*
30 coastal patrol craft((10 ex-Sov KM-4, 20 misc gunboats).
9 LCU, 15 LCM, 70 *Nampo* landing craft(.
Samlet coast defence msls; 2 sites.

RESERVES: 40,000.

Bases: Wonsan, Nampo.

Air Force: 51,000; 700 combat aircraft.
3 lt bbr sqns with 90 Il-28.
13 FGA sqns: 1 with 20 Su-7; 9 with 290 MiG-15/-17; 3 with 60 MiG-19.
12 interceptor sqns with 120 MiG-21, 120 MiG-19.
Tpts incl 180 An-2, 40 An-24, 10 Il-14/-18, 1 Tu-154.
Hel incl 20 Mi-4, 20 Mi-8.
Trainers incl 70 Yak-18, 100 MiG-15UTI/-19UTI/-21U, Il-28, 30 BT-6.
AAM; AA-2 *Atoll.*
4 SAM bdes (12 bns, 40 btys) with 250 SA-2 in 45 sites.

Para-Military Forces: 38,000 security forces and border guards; civilian militia with small arms, some AA arty.

KOREA: REPUBLIC OF (SOUTH)

Population: 38,800,000.
Military service: Army and Marines 30 months, Navy and Air Force 3 years.
Total armed forces: 601,600.
Estimated GNP 1980: $60.3 bn.
Defence expenditure 1981: 2,953 bn won ($4.4 bn).
$1 = 671.2 won (1981), 580.5 won (1980).

Army: 520,000.
5 corps HQ.
1 mech inf div.
20 inf divs.
2 armd bdes.
2 indep inf bdes.
7 special forces bdes.
2 AA arty bdes.
7 tk bns.
36 arty bns.
2 SSM bns with 12 *Honest John.*
2 SAM bdes: 3 *HAWK,* 2 *Nike Hercules* bns.
1 army aviation bde.
60 M-60, 800 M-47/-48 med tks; M-8 armd cars; 500 M-113/-577, 196 Fiat 6614 APC; 2,000 M-59 155mm, 12 M-107 175mm SP guns; M-101 towed, M-52 SP 105mm, M-114 towed, 76 M-109 155mm SP. M-115 and 16 M-110 SP 203mm how; M-10 126mm MRL; 5,300 81mm and 107mm mor; 12 *Honest John* SSM; 80 M-18 76mm, 100 M-36 90mm SP ATK guns; *LAW* RL; 57mm, 75mm, 106mm RCL; *TOW* ATGW; 66 *Vulcan* 20mm, 40 40mm AA guns; 80 *HAWK,* 45 *Nike Hercules* SAM; 14 O-2A ac; 20 UH-1B, 44 OH-6A, 5 KH-4, 66 Hughes 500MD *Defender* hel with *TOW.*
(On order: 1,000 M-551 *Sheridan* lt tks; 37 M-109 155mm SP how; *TOW* ATGW: *Stinger* SAM; 56 OH-6A hel.)

RESERVES: 1,100,000; 8 inf divs (cadre).

Navy: 49,000 incl marines (5,000 conscripts).
10 ex-US destroyers: 5 *Gearing* with 1 hel, 2 *Sumner,* 3 *Fletcher.*
7 ex-US frigates: 1 *Rudderow,* 6 *Lawrence/-Crossley.*
3 ex-US *Auk* corvettes.
8 FAC(M): 7 PSMM Mk 5, 1 ex-US *Asheville,* all with *Standard* SSM.
10 large patrol craft: 2 100-ft, 8 ex-US *Cape.*
28 coastal patrol craft(: 6 CPIC FAC(P); 13 Sewart (9 65-ft, 4 40-ft), 9 *Schoolboy* I/II.
8 MSC-268/-294 coastal minesweepers, 1 minesweeping boat(.
24 ex-US landing ships (8 LST, 12 LSM, 4 LCU).
(On order: 1 sub, 4 frigates, 120 *Harpoon* SSM.)

Bases: Chinhae, Cheju, Inchon, Mokpo, Mukho, Pohang, Pusan.

RESERVES: 25,000.

MARINES: (24,000).
1 div.
2 bdes.
LVTP-7 APC.

RESERVES: 60,000.

Air Force: 32,600; some 378 combat aircraft, 10 armed hel.
4 combat, 1 tpt wings.
12 FGA sqns: 10 with 228 F-5A/B/E, 2 with 40 F-86F.
3 AD sqns with 54 F-4D/E.
1 COIN sqn with 24 OV-10G, some A-37.
1 recce sqn with 12 RF-5A.
2 ASW sqns: 1 with 20 S-2A/F, 1 with 10 Hughes 500MD hel.
1 SAR hel sqn with 6 UH-19, 5 UH-1D, 2 Bell 212.
3 tpt sqns with 12 C-46, 10 C-54, 10 C-123, 2 HS-748, 6 C-130H, Aero *Commander.*
Trainers incl: 20 T-28D, 30 T-33A, 20 T-41D, 35 F-5B, 20 F-5F.
AAM: *Sidewinder, Sparrow.*
(On order: 36 F-16, 36 F-5E, 32 F-5F fighters; 6 CH-47C, 27 UH-1H hel; AIM-9L *Super Sidewinder* AAM; *Maverick* ASM.)

RESERVES: 55,000.

Para-Military Forces: A local defence militia, 2,800,000 Homeland Defence Reserve Force. Coastguard: 25 small craft, 9 Hughes 500D hel.

LAOS

Population: 3,520,000.
Military service: conscription, 18 months.
Total armed forces: 55,700.
Estimated GNP 1978: $260 m.
Defence expenditure 1979: 15.15 bn kip ($37.9 m).
$1 = 400 kip Pot Poi (1979).

Army: 46,000.
1 armd bn.
64 inf bns.
4 arty, 4 AA arty bns.

11 inf coys (provincial).
1 lt ac liaison flt.
10 M-24, 25 PT-76 lt tks; 25 M-8 armd cars; 8 BTR-40, M-113 APC; 80 M-116 75mm, 105mm, 155mm how; 81mm, 82mm, 107mm, 4.2-in mor; 107mm RCL; M-1939 37mm AA guns; 4 U-17A lt ac.[8]

Navy: 1,700.[8]
6 ex-Sov *Shmel* and 28 other river patrol craft (15 in reserve).
7 LCM (3 in reserve). 7 tpts((6 in reserve).

Air Force: 8,000; 34 combat aircraft.[8]
1 interceptor sqn with 10 MiG-21.
1 COIN sqn with 20 T-28A/D, 4 AC-47 gunships.
2 tpt sqns with 1 Yak-40, 10 C-47, 9 C-123, 6 An-24, 3 An-26, 1 Aero *Commander*, 1 DHC-2.
1 hel sqn with 8 UH-34, 10 Mi-8.
Trainers: 6 T-41D.
AAM: AA-2 *Atoll*.

MALAYSIA

Population: 14,350,000.
Military service: voluntary.
Total armed forces: 102,000.
Estimated GNP 1979: $19.6 bn.
Defence expenditure 1981: 5.13 bn ringgits ($2.25 bn.)
$1 = 2.28 ringgits (1981), 2.22 ringgits (1979).

Army: 90,000 (110,000 planned).
1 corps, 4 div HQ.
12 inf bdes, (one more to form) consisting of 34 inf bns, 3 recce, 4 arty, 1 APC regts, 2 AA arty btys, 1 special service unit, 5 engr, 5 sigs regts and administrative units.
140 Panhard M-3 armd, 60 *Ferret* scout cars; AT-105, 200 V-100/-150 *Commando*, Panhard M-3 APC; 12 5.5-in guns, 92 Model 56 105mm pack how; 81mm mor; M-20 89mm RL; 5 120mm RCL; SS-11 ATGW; 35 40mm AA guns.

RESERVES: Territorial Army 50,000.

Navy: 6,000 (being expanded).
2 frigates: 1 *Yarrow* with *Seacat* SAM, 1 Type-41.
8 FAC(M) with *Exocet* SSM: 4 *Spica*, 4 *Perdana*.
6 *Jerong* FAC(G).
22 large patrol craft: 4 *Kedah*, 4 *Sabah*, 14 *Kris*.
5 ex-Br *Ton* coastal minesweepers.
3 ex-US 511-1152 LST.
1 support ship.
(On order: 2 msl frigates, 6 FAC(P), 4 minehunters.)

Bases: Johore Straits, Labuan, Lumut Perak.

RESERVES: 1,000.

Air Force: 6,000 (being expanded); some 37 combat aircraft.
2 FGA sqns with 13 F-5E, 4F-5F, 2 F-5B.
2 COIN/trg sqns with 15 CL-41G *Tebuan* (to be replaced by A-4).
1 MR sqn with 3 PC-130H.
4 tpt/liaison sqns: 1 with 6 C-130H; 1 with 2 HS-125, 2 F-28, 12 Cessna 402B; 2 with 15 DHC-4A.
2 tpt hel sqns with 37 S-61A, 2 liaison sqns with 20 *Alouette* III.
2 trg sqns: 1 with 15 *Bulldog* 102 ac; 1 with 9 Bell 47, 4 UH-1H hel.
AAM: *Sidewinder*.
(On order: 88 A-4 FGA (some 60 to be operational, 20+ for spares), 2 RF-5E recce, 4 CASA NC-212 *Aviocar* ac; 10 Bo-105 hel, *Super Sidewinder* AAM.)

Para-Military Forces: 90,000. 19,000 Police Field Force; 21 bns (incl 2 Aboriginal), *Shorland* SB-301 APC, 40 patrol boats. Customs and Excise: (On order: 6 32-metre patrol craft). People's Volunteer Corps *(RELA)*, over 350,000.

MONGOLIA

Population: 1,700,000.
Military service: 2 years.
Total armed forces: 33,100.
Estimated GNP 1974: $2.8 bn.
Defence expenditure 1980: 426.1 m tugrik ($127 m).
$1 = 3.37 tugrik (1980), 4.00 tugrik (1974).

Army: 30,000.
2 inf bdes (may be expanding to a div).
130 T-54/-55/-62 med tks; 70 BTR-60, 50 BTR-152 APC; 76mm, 100mm, 130mm guns; 152mm how; 10 SU-100 SP guns; *Snapper* ATGW; 37mm, 57mm AA guns.

RESERVES: 30,000.

Air Force: 3,100 (1,000 conscripts)[9]; 12 combat aircraft.
1 fighter sqn with 12 MiG-21.
2 tpt sqns with 20 An-2, 6 Il-14, 4 An-24.
1 hel sqn with 10 Mi-4.
Trainers: Yak-11/-18, 3 PZL-104 utility.
1 SAM bn with 18 SA-2.

Para-Military Forces: Ministry of Public Security (36,000): Militia (Police), internal security troops, frontier guards.

NEPAL

Population: 14,309,000.
Military service: voluntary.
Total armed forces: 25,000.
Estimated GNP 1979: $1.76 bn.
Defence expenditure 1980: 264.6 m rupees ($22 m).
$1 = 12.00 rupees (1979, 1980).

Army: 25,000.
5 inf bdes (1 Palace Guard).
1 arty bn.
1 engr bn.
1 sigs bn.
1 para bn.
1 air sqn (1 comms flt, 1 Army flt).
AMX-13 lt tks; 4 3.7-in pack how; 4 4.2-in, 18 120mm mor, 2 40mm AA guns; 2 *Skyvan*, 1 HS-748, 1 *Turbo-Porter* tpt ac; 5 *Alouette* III, 2 *Puma* hel.

Forces Abroad: Lebanon (UNIFIL): 1 bn (599).

Para-Military Forces: 15,000 police force.

NEW ZEALAND

Population: 3,152,000.
Military service: voluntary, supplemented by Territorial Army service: 12 weeks basic, 20 days per year.
Total armed forces: 12,913.
Estimated GDP 1980: $US 17.38 bn.
Defence expenditure 1980: $NZ 442.8 m ($US 426 m).
$1 = $NZ 1.039 (1980).

Army: 5,675.
2 inf bns.
1 arty bty.
5 M-41 lt tks; 72 M-113 APC; 10 5.5-in guns; 44 105mm how; 23 106mm RCL.
(On order: 26 *Scorpion* lt tks.)

RESERVES: 1,412 Regular, 5,934 Territorial. 6 Territorial inf bns, 1 fd arty regt (3 btys), 2 APC sqns.

Navy: 2,843.
4 frigates: 2 *Leander* (with 1 *Wasp* hel, 5 quad *Seacat* SAM), 2 Type 12 (1 with quad *Seacat*; 1 trg).
4 *Lake*-class large patrol craft.

Base: Auckland.

RESERVES: 958 Regular, 280 Territorial.

Air Force: 4,395; 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*.
1 tpt hel sqn with 6 *Sioux*, 3 *Wasp*, 11 UH-1D/H.
1 comms sqn with 4 *Andover*, 3 Cessna 421C, 1 *Devon*.
Trainers: 3 F-27, 4 *Airtourer* ac; 3 *Sioux* hel.

RESERVES: 1,039 Regular, 158 Territorial.

Forces Abroad: Singapore: 1 inf bn with log support; 1 spt hel unit (3 UH-1).

PAKISTAN

Population: 88,950,000.
Military service: voluntary.
Total armed forces: 450,600.
Estimated GNP 1980: $30 bn.
Defence expenditure 1980: 15.29 bn rupees ($1.54 bn).
$1 = 9.91 rupees (1980).

Army: 420,000 (incl 29,000 *Azad Kashmir* tps).
7 corps HQ.
2 armd divs.
16 inf divs.
4 indep armd bdes.
4 indep inf bdes.
6 arty bdes.
2 AA arty bdes.
6 armd recce regts.
12 SAM btys with 24 *Crotale*.
1 Special Services Group.
M-4, 250 M-47/-48, 35 T-54/-55, 1,000 Type-59 med, 15 PT-76, Type-60/-63, 50 M-24 lt tks; 550 M-113, K-63 APC: some 1,000 25-pdr, 100mm, 130mm, 5.5-in, 155mm guns; 75mm pack, 105mm incl pack and 12 M-7 SP, 155mm towed and M-109 SP how; 270 107mm, 120mm mor; 57mm, 100mm towed, 8 M-36 90mm SP ATK guns; 75mm, 83mm, 3.5-in RL; 106mm RCL; *Cobra* ATGW; ZU-23 23mm, 37mm, 60 40mm, 57mm, 15 90mm, 3.7-in AA guns; 24 *Crotale* SAM.
5 army aviation sqns: 1 liaison sqn with 30 Saab *Supporter* lt ac; 4 hel sqns.
Indep army observation flts with 40 O-1E ac, 12 Mi-8, 35 *Puma*, 20 *Alouette* III, 15 Bell 47G hel.
(On order: *TAM* med tks; M-113 APC; 24 *TOW* ATGW launchers.)

RESERVES: 500,000.

Navy: 13,000; 5 combat ac, 6 armed hel.
6 submarines: 2 *Agosta*, 4 *Daphne*.
5 SX-404 midget submarines.
1 ex-Br *Dido* cruiser (cadet trg ship).
8 destroyers: 4 ex-US *Gearing* with *ASROC* ASW; 4 ex-Br (1 *Battle*, 1 CH, 2 CR).
6 large patrol craft: 1 *Town*, 5 ex-Ch *Hainan*.
12 ex-Ch *Shanghai*-II FAC(G).
4 ex-Ch *Huchwan* hydrofoil FAC(T).
19 coastal patrol craft: 1 *Spear*, 18 M-55 Type.
6 ex-US *Adjutant* and 268-class coastal MCM.
1 ex-US *Mission* underway replenishment tanker.

NAVAL AIR:
2 ASW/MR sqns with 3 *Atlantic*, 2 HU-16B with AM-39 ASM.

Thailand's Peacemaker can operate in remote areas.

2 ASW/SAR hel sqns with 6 *Sea King* ASW with AM-39, 4 *Alouette* III.
ASM: AM-39 *Exocet*.

Base: Karachi.

RESERVES: 5,000.

Air Force: 17,600; 220 combat aircraft.
1 lt bbr sqn with 11 B-57B *(Canberra)*.
3 FGA sqns: 1 with 17 *Mirage* IIIED; 2 with 38 *Mirage* 5PA/DP.
8 interceptor/FGA sqns with 144 MiG-19/F-6.
1 recce sqn with 10 *Mirage* IIIRP.
2 tpt sqns: 1 with 14 C-130B/E, 1 L-100; 1 with 1 *Falcon* 20, 1 F-27, 1 *Super King Air*, 1 *Bonanza*, 1 L-23 ac; 1 *Puma* hel.
1 SAR hel sqn with 10 HH-34B, 14 *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 3 *Mirage* IIIDP, 87 *Supporter*, 35 T-37C, 24 Shenyang FT-5 (MiG-17U).
AAM: *Sidewinder*, R-530, R-550 *Magic*.
(On order: 15 F-16, 32 *Mirage* 5, 18 *Mirage* III FGA; 30 *Supporter*, Reims FTB-337 trg ac.)

RESERVES: 8,000.

Para-Military Forces: 109,100: 22,000 National Guard, 65,000 Frontier Corps, 15,000 Pakistan Rangers, 2,000 Coastguard, 5,100 Frontier Constabulary.

PHILIPPINES

Population: 50,010,000.
Military service: selective.
Total armed forces: 112,800.
Estimated GNP 1980: $36 bn.
Defence expenditure 1981: 6.6 bn pesos ($863 m).
$1 = 7.65 pesos (1981), 7.38 pesos (1980).

Army: 70,000.
4 lt inf divs.
1 indep inf bde (being mechanized).
1 Special Services bde.
2 engr bdes.
1 lt armd regt.
4 arty regts.
1 AD bn with 27 *HAWK* SAM.
1 army air bde (3 bns) forming.
28 *Scorpion*, 7 M-41 lt tks; 80 M-113, 20 V-150 *Commando*, M-3 half-track, *Chaimite* APC; 120 105mm, 6 M-114 155mm how; 81mm, 40 107mm mor; M-20 75mm, M-67 90mm, M-40 106mm RCL; *HAWK* SAM; 60 UH-1H, 8 Hughes 500D, 6 Bo-105 hel.
(On order: 45 AFV, 95 105mm how; 10 Hughes 500D hel.)

RESERVES: 96,000, 6 divs.

Navy: 26,000 (6,800 marines, 250 naval engrs).
8 ex-US frigates: 1 *Savage*, 3 *Cannon*, 4 *Barnegat* (ex-seaplane tenders).
10 ex-US corvettes; 2 *Auk*, 7 PCE-827, 1 *Admirable*.
12 large patrol craft: 4 *Katapangan*, 5 PGM-39/-71, 3 ex-US PC-461.
59 coastal patrol craft⟨.
28 ex-US landing ships (21 LST, 4 LSM, 3 spt), 61 LCM, 7 LCVP, 3 LCU.
1 SAR sqn with 8 *Islander* ac, 3 Bo-105 hel.
2 marine bdes (each with 7 bns) with LVTP-4/-5/-7 APC; 105mm how.
(On order: 6 PSMM FAC(M), 12 LST.)

Base: Sangley Point.

RESERVES: 12,000.

Air Force: 16,800; 120 combat ac, 18 armed hel.
1 FGA sqn with 20 F-8H.
1 AD sqn with 19 F-5A, 3 F-5B.
1 fighter/trg sqn with 17 T-34A.
5 COIN sqns: 1 with 16 SF-260WP; 2 with 32 T-28D; 1 with 12 AC-47 ac; 1 with 18 UH-1D hel.
1 SAR/recce sqn with 8 HU-16B, 1 F-27 MR ac.
1 SAR hel sqn with 12 UH-1H.
1 Presidential tpt sqn with 1 Boeing 707, 1 BAC-111, 1 F-27, 4 YS-11 ac; 2 S-62A, 2 UH-1 hel.
5 tpt sqns with 4 C-130H, 4 L-100-20; 18 C-47; 9 F-27; 12 *Nomad;* 22 *Islander* ac; 18 UH-1H, 4 Bo-105 hel.
1 liaison sqn with O-1E, 7 Cessna U-17A/B, 8 *Beaver* (being withdrawn).
3 trg sqns with 10 T/RT-33A; 12 T-41D; 30 SF-260MP.
AAM: *Sidewinder*.
(On order: 18 OV-10 *Bronco* COIN, 11 F-5E fighters, 2 F-27 MR, T-160 *Cali (Super Pinto)* trg ac; 5 Bo-105 hel.)

RESERVES: 16,000. 14 F-8H fighters.

Para-Military Forces: 110,500; 43,500 Philippine Constabulary (1 bde, 12 bns), 65,000 Civil Home Defence Force, Coastguard: 2,000.

SINGAPORE

Population: 2,400,000.
Military service: 24–36 months.
Total armed forces: 42,000.
Estimated GNP 1980: $US 9.4 bn.
Defence expenditure 1980: $S 1.26 bn. ($US 574 m).
$US 1 = $S 2.196 (1980).

Army: 35,000.
1 div HQ.
1 armd bde (1 recce, 1 tk, 2 APC bns).
3 inf bdes (each 3 inf bns).
1 arty bde.
6 arty bns.
1 cdo bn.
6 engr bns.
3 sigs bns.
200 AMX-13 lt tks; 500 M-113, 250 V-150/-200 *Commando* APC; 30 155mm how; 81mm, 50 120mm mor, 89mm RL; 84mm *Carl Gustav*, 30 106mm RCL; 20mm AA guns.
(On order: 120 AMX-13 lt tks.)

RESERVES: 50,000; 16 inf, 4 arty, 1 engr, 1 sigs bns.

Navy: 3,000.
6 TNC-45 FAC(M) with *Gabriel* SSM.
6 Vosper FAC(G), 3 Type A, 3 Type B.
2 large patrol craft (trg ships).
2 ex-US *Redwing* coastal minesweepers.
6 ex-US 511-1152 LST (3 in reserve), 6 landing craft⟨.
(On order: 12 Swift *Warrior* coastal patrol boats.)

Base: Singapore.

Air Force: 4,000; 93 combat aircraft.
2 FGA sqns with 32 A-4S, 5 TA-4S *Skyhawk*.
2 FGA/recce sqns with 35 *Hunter* (16 FGA-74, 8 FR-74, 11 T-75).
1 AD sqn with 18 F-5E, 3 F-5F.
1 tpt/SAR sqn with 6 C-130B/H, 6 *Skyvan*.
1 hel sqn with 25 UH-1B/H, 3 AB-212.
3 trg sqns: 1 with 20 BAC-167, 5 *Jet Provost;* 1 with 6 SF-260W, 8 SF-260MS; 1 with 12 T-33A.
2 SAM sqns: 1 with 28 *Bloodhound* 2; 1 with 10 *Rapier*.
AAM: *Sidewinder*.
(On order: 6 F-5E fighters, 5 SF-260MS COIN/trg ac; *Improved Hawk* SAM; 200 MGM-65 *Maverick* ASM.)

Para-Military Forces: 7,500 police/marine police with 10 patrol craft; Gurkha guard units; some 30,000 Home Guard.

SRI LANKA

Population: 14,900,000.
Military service: voluntary.
Total armed forces: 14,840.
Estimated GNP 1979: $3.2 bn.
Defence expenditure 1980: 984.4 m rupees ($ 63 m).
$1 = 15.67 rupees (1980), 15.5 rupees (1979).

Army: 10,000.
4 inf bdes (each with 1 regular, 2 reserve bns).
2 recce regts (bns), 1 fd arty, 1 AA regts, 2 engr regts } (each with one regular and one reserve unit).
1 sigs bn.
Support services.
6 *Saladin*, 12 Daimler armd, 30 *Ferret* scout cars; 10 BTR-152 APC; 16 76mm, 12 85mm guns; 12 82mm, 8 4.2-in (107mm) mor; 24 40mm, 24 3.7-in (94mm) AA guns.

RESERVES: 10,500; 13 bns, plus supporting services and a Pioneer Corps.

Navy: 2,740.
8 FAC(G): 7 *Sooraya* (ex-Ch *Shanghai*-II), 1 ex-Sov *Mol*.
26 coastal patrol craft⟨.

Bases: Trincomalee, Karainagar, Colombo, Tangalla, Kalpitiya.

RESERVES: 550 Naval Volunteer Force.

Air Force: 2,100; 6 combat aircraft.
1 FGA sqn with 3 MiG-17F, 1 MiG-15UTI, 2 *Jet Provost* Mk 51.
1 tpt sqn with 1 CV-440, 1 HS-748, 2 DC-3, 2 Riley, 1 *Heron*, 3 Cessna 337, 1 421C.
1 hel sqn with 6 Bell 206, 2 Bell 47G, 2 SA-365.
Trainers incl 6 Cessna 150, 6 *Chipmunk*, 3 *Dove*.

RESERVES: 900; 3 sqns Air Force Regt, 1 sqn Airfield Construction Regt.

Para-Military Forces: 17,000 Police Force; 6,000 Volunteer Force.

THAILAND

Population: 48,890,000.
Military service: 2 years.
Total armed forces: 238,100.
Estimated GNP 1979: $27.3 bn.
Defence expenditure 1981: 26.2 bn baht ($1.28 bn).
$1 = 20.5 baht (1981), 20.42 baht (1979).

Army: 160,000.
1 cav div (2 cav, 3 inf, 1 arty regts).
6 inf divs (4 with 1 tk bn).
2 arty, 2 AA arty regts.
1 indep inf regt combat team.
11 engr regts.
8 indep inf bns.
1 AB, 3 special forces bns.
4 recce coys.
5 aviation liaison coys and some hel flts.
50 M-48A5 med, 200 M-41, 74 *Scorpion* lt tks; 32 *Shorland* Mk 3 recce, 300 M-113, M3A1 halftrack, 20 V-150 *Commando*, 20 *Saracen* APC; 419 M-116 75mm pack, M-101 105mm, 80 M-114 155mm how; 81mm mor; M-72 *LAW* RL; 57mm, M-20 75mm, 215 106mm RCL; *TOW, Dragon* ATGW; 80 40mm AA guns, incl M-42 SP; 89 O-1, 1 Beech 99 lt ac; 90 UH-1B/H, 4 CH-47A, 24 OH-13H, 16 FH-1100; Bell: 3 206, 2 212, 2 214B; 6 OH-23F, 28 KH-4 hel.
(On order: 100 M-48A5, 16 M-60A3 med, 70 *Scorpion* lt tks; 56 *Cascavel* armd cars; 40 M-113, 164 V-150 APC; 34 M-114 155mm how; 24 M-163A1 20mm *Vulcan* SP AA.)

RESERVES: 500,000.

Navy: 35,000, incl naval air and marines.
6 frigates: 1 *Yarrow*-type with *Seacat* SAM, 2 PF-103, 2 ex-US *Tacoma*, 1 *Cannon*.
6 FAC(M): 3 50-metre with *Exocet* SSM, 3 45-metre with *Gabriel* SSM.
21 ex-US large patrol craft: (10 PGM-71, 7 *Liulom*, 4 *Cape*).
23 coastal patrol craft(.
2 *Bangrachan* coastal minelayers.
1 MCM ship.
4 ex-US *Bluebird* coastal minesweepers, 10 minesweeping boats(.
5 LST, 3 LSM, 1 LSIL-351, 1 LCG, 6 LCU, 25 LCM (all ex-US), LCA, 8 LCVP.
3 trg ships: 2 ex-Br (1 *Algerine*, 1 *Flower*), 1 *Maeklong*.
(On order: 3 frigates, 3 450-ton FAC(G).)

NAVAL AIR: some 12 combat ac.
1 MR/ASW sqn with 10 S-2F MR.
1 MR/SAR sqn with 2 HU-16B, 2 CL-215, 10 C-47.
1 trg/SAR hel sqn with 8 Bell 212, 4 UH-1H.
1 observation sqn with 7 T-37B *Skymaster*, 7 U-17, 5 O-1G.

MARINES: (16,000).
1 div: 2 inf, 1 arty regt; 1 amph assault bn, 24 M-68 155mm guns/how, 40 LVTP-7 amph APC, support arms.

Bases: Bangkok, Sattahip, Songkla, Phangnga.

Air Force: 43,100; 179 combat aircraft.
1 FGA sqn with 14 F-5A/B.
2 AD sqns with 30 F-5E, 6 F-5F.
7 COIN sqns; 3 with 40 T-28D: 2 with 31 OV-10C; 1 with 16 A-37B; 1 with 31 AU-23A *Peacemaker*.
1 recce sqn with 4 FR-5A, 3 RT-33A, 4 T-33A.
3 tpt sqns, incl Royal flt: 1 with 5 C-47, 3 C-130H: 2 with 30 C-123B; 2 HS-748, 1 *Merlin* IVA.
1 liaison sqn with 5 U-10A, 6 CASA NC-212, 3 *Merlin* IVA.
2 hel sqns with 20 CH-34C, 18 S-58T, 49 UH-1H, 13 UH-19.
Trainers incl 10 *Chipmunk*, 16 T-33, 14 T-37B, 4 T-41A, 12 SF-260MT, 15 CT-4.
AAM: *Sidewinder*.
Airfield defence troops: 4 bns.
(On order: 8 F-5E fighters, 14 OV-10C COIN, 20 CASA NC-212 *Aviocar*, 14 UH-1H hel.)

Para-Military Forces: 37,000 Volunteer Defence Corps, 1,700 Marine Police, 500 Police Aviation, 1,500 Border Police, 3,800 Special Action Force; Village Scouts; National Defence Volunteers. 20 V-150 *Commando* APC, 1 coastguard cutter, 3 *Skyvan*, 4 *Turbo-Porter*, 3 DHC-4, 3 Do-28, 5 AU-23, 1 CT-4 ac; 15 Bell 205, 4 206, 10 204B hel.

VIETNAM

Population: 60,000,000.
Military service: 2 years minimum.
Total armed forces: 1,029,000.
Estimated GNP 1980: $9.5 bn.

Army: 1,000,000.
1 armd div.
50 inf divs.[10]
2 fd, 1 AA arty divs.
3 marine divs.
5 engr, 3 construction divs.
1 transport div.
5 indep fd, 4 indep AA arty bdes.
4 indep engr bdes.
5 indep armd regts.
25 SAM regts (10 with 180 SA-2, 10 with 180 SA-3, 5 with 45 SA-6).
1,500 T-34/-54/-55, Type-59, 400 M-48 med; T-10 hy; 450 PT-76 and Type-60/-63, 150 M-41 lt tks; M-8, M-20 armd cars; 1,500 BTR-40/-50/-60/-152, Type-56, K-63, 800 M-113, V-100 *Commando* APC; 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; 82mm, 107mm, 120mm, 160mm mor; 75mm, 82mm, 107mm RCL; *Sagger* ATGW; 4,000 23mm, 30mm, 37mm, 40mm, 57mm, 85mm, 100mm, and 130mm towed, Type-63 37mm, M-42 40mm, ZSU-23-4, ZSU-57-2 SP AA guns; SA-2/-3/-6/-7/-9 SAM.

Navy: 4,000.
3 frigates: 2 ex-Sov *Petya*, 1 ex-US *Barnegat*.
1 ex-US *Admirable* corvette.
8 ex-Sov *Osa*-II/*Komar*(FAC(M) with *Styx* SSM.
22 large patrol craft: 3 ex-Sov SO-1, 19 ex-US PGM-59/-71.
14 FAC(T)(: 6 ex-Sov P-4, 6 ex-Ch P-6, 2 *Shershen*.
22 ex-Ch FAC(G): 8 *Shanghai*, 14 *Swatow*(.
3 *Zhuk*, 3 *Point* coastal patrol craft(.
3 501-1152 LST, 5 LSM, 18 LCU (all ex-US).
Some 15 river patrol craft.
1 SAR hel sqn with 10 Mi-4.

Air Force: 25,000; 485 combat aircraft (many in store).
1 lt bbr sqn with 10 Il-28.
20 FGA sqns with 90 MiG-17/F-4, 60 MiG-19/F-6, 60 Su-7/-20, 25 F-5A, 60 A-37B.
12 interceptor sqns: 4 with 60 MiG-21bis; 8 with 120 MiG-21F/PF.
Tpts incl 35 An-2 and Li-2, An-12, 9 An-24, 12 Il-14, 4 Il-18, C-130.
Hel incl 20 Mi-4, 10 Mi-6, 60 Mi-8, 10 CH-47, 65 UH-1.
About 60 trainers incl Yak-11/-18, MiG-15UTI/-21U.
AAM: AA-2 *Atoll*.

Forces Abroad: Laos: 40,000 (3 inf divs and spt tps) (numbers fluctuate); *Kampuchea/Cambodia:* 200,000 (19 army, 2 marine divs plus spt tps, fighter ac incl MiG-21).

Para-Military Forces: 70,000 Frontier, Coast Security, and People's Armed Security Forces; Armed Militia of about 1,500,000.

[1] Actual strength suspect due to defections. The Soviet High Command in Afghanistan may now control the Afghan forces, and it is not possible to differentiate between Soviet and Afghan holdings of identical equipment.

Resistance to the Soviet presence involves many among the male population, and perhaps 20,000 intermittently active guerrillas supported by some eight exile political groups. Equipment: mainly small arms, some RPG-7, mor, and ATK mines.

[2] Spares are short; some equipment is unserviceable.

[3] Status of contract for further 60 unclear.

[4] Some armed forces elements are engaged in rural aid administrative duties.

[5] In KOSTRAD = Strategic Reserve Command.

[6] Some reserve Soviet equipment non-operational for lack of spares.

[7] It is uncertain whether this covers all defence expenditure, and there is no consensus on a suitable exchange rate for the dollar conversion.

[8] Equipment serviceability unknown.

[9] Excluding expatriate personnel.

[10] Inf divs, normally totalling 8–10,000 men, include 1 tk bn, 3 inf, 1 arty regts, and spt elements.

ARMED FORCES OF OTHER ASIAN COUNTRIES

Country	Estimated population (000)	Estimated GNP 1979 ($m)	Defence expenditure 1980 ($m)	Total armed forces	Army: Manpower and formations	Army: Equipment	Navy: Manpower and equipment	Air Force: Manpower and equipment	Para-military forces
Brunei	226	2,660	199 (1981)	2,850*	2,400 2 inf bns 1 armd recce sqn 1 lt AA arty bty (forming) 1 special boat sqn 1 engr tp	16 *Scorpion* lt tks; 24 Sankey AT-104 APC; 16 81mm mor	350* 3 *Waspada* FAC(M) with *Exocet* SSM; 3 *Perwira* coastal, 3 river patrol craft (; 2 *Loadmaster* landing craft	100* 1 HS-748 tpt, 2 *Cherokee* lt ac; 2 Bell 206, 12 Bell 212 (1 VIP), 1 HS-76 (VIP) hel	1,750
Fiji	640	1,160 (GDP 1980)	9.88	2,051	1,924 2 inf bns 1 engr sqn 1 arty tp Spt units	4 25-pdr guns/how; 10 81mm mor	127 3 ex-US *Bird*-class coastal minesweepers; 1 marine survey vessel	—	1,488 (Police)
Papua New Guinea	3,900	2.1	36.2 (1981)	3,500*	3,000 2 inf bns 1 engr bn Log units	—	440* 5 *Attack*-class large patrol craft; 2 310-ton landing craft	60* 1 tpt sqn with 4 C-47, 4 *Nomad* MR ac	—

* All services form part of the Army.

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 occurred, or was threatened, the signatories would consult and agree upon measures up to and including the use of armed force to prevent or repel such aggression.

The Inter-American Treaty of Reciprocal Assistance (Treaty of Rio). Signed in September 1947 by all parties to the Act of Chapultepec except Ecuador and Nicaragua, this Treaty expands the Act, constrains signatories to the peaceful settlement of disputes among themselves and provides for collective self-defence should any member party be subject to external attack. Since coming into force on 3 December 1948, it has been invoked some 12 times. Cuba withdrew in March 1960.

The Charter of the Organization of American States (OAS). Dated April 1948, this embraces declarations based upon the Treaty of Rio. The members of the OAS—the signatories to the Act of Chapultepec plus Barbados, El Salvador, Grenada, Jamaica, and Trinidad and Tobago—are bound to peaceful settlement of internal disputes and to collective action in the event of external attack upon one or more signatory states. 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 have 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). In 1962 the Foreign Ministers and, later, the Council excluded Cuba. In 1975 the OAS agreed to normalize relations with Cuba.

Treaty for the Prohibition of Nuclear Weapons in Latin America (The Tlatelolco Treaty). This was signed in February 1967 by 25 Latin American countries, 24 of which have ratified it (Argentina has not). Brazil has stated that she will not implement it until all other Latin American states have done so. Cuba and Guyana have not signed it. The Treaty is not, therefore, in force for those four countries. Britain and the Netherlands have ratified it for the territories within the Treaty area for which they are internationally responsible. Britain, France, the Netherlands, 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). The parties have set up an Agency to monitor compliance with the Treaty.

LATIN AMERICA

1. Argentina
2. Bolivia
3. Brazil
4. Chile
5. Colombia
6. Cuba
7. Dominican Republic
8. Ecuador
9. El Salvador
10. Guatemala
11. Guyana
12. Haiti
13. Honduras
14. Jamaica
15. Mexico
16. Nicaragua
17. Paraguay
18. Peru
19. Uruguay
20. Venezuela

OTHER 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 re-

sulting 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.

In July 1965 El Salvador, Guatemala, Honduras, and Nicaragua agreed to form a military bloc, with a Defence Council, reportedly to co-ordinate measures against possible Communist aggression.

The United States has had a bilateral agreement with Cuba for jurisdiction and control over Guantánamo Bay since this was confirmed in 1934. In 1960 the US stated that it could be modified or abrogated only by agreement between the parties and that she had no intention of giving such an agreement.

The United States has bilateral military sales arrangements at varying levels with most countries of the region and concluded a status of forces agreement with Antigua in 1977/8. The Soviet Union has no formal defence agreements with any of the states in the area, although she has supplied military equipment to Cuba and Peru. Austria, Belgium, Britain, Canada, France, West Germany, Israel, Italy, the Netherlands, Portugal, Switzerland, and Taiwan have also sold arms in the region. Argentina and Brazil are designing and manufacturing for export their own military equipment; Chile is assembling *Mirage* 50 aircraft and light AFV under licence.

ARGENTINA

Population: 28,000,000.
Military service: Army and Air Force 1 year, Navy 14 months.
Total armed forces: 185,500 (118,000 conscripts).
Estimated GNP 1979: $62 bn.[1]
Defence expenditure 1980: 5,866 bn pesos ($3.38 bn).[1]
$1 = 1,735.5 pesos (1980), 1,317 pesos (1979).[2]

Army: 130,000 (90,000 conscripts).
5 army corps (one is the Military Institute).
2 armd cav bdes (6 armd cav regts).
3 inf bdes (1 mech, 2 mot; each 3 regts, plus armd, arty, and engr bns).
3 mountain bdes.
1 jungle bde.
1 AB bde.
1 arty group.
1 indep armd cav bn.
6 AD bns.
1 engr bn.
1 aviation bn (4 detachments).
60 M-4 *Sherman*, 125 *TAM* med tks; some M-41, 120 AMX-13 lt tks; 300 AMX-VTP, some *TAM* VCPT MICV; 75 M-3, 5 BDX, 250 M-113, 50 Mowag *Roland* APC; M-59 155mm towed guns, 200 105mm incl pack, 90 M-114 155mm towed how, 20 M-7 105mm, 24 Mk F3, 6 M-109 155mm SP how; 81mm, 120mm mor; 100 *Kuerassier* 105mm SP ATK guns; 75mm, 89mm, 90mm, 105mm RCL; SS-11/-12, *Bantam, Cobra, Mamba* ATGW; 30mm, 40mm, 90mm AA guns; *Tigercat*, 10 *Roland* SAM.
Aircraft and hel; 3 G-222, 2 DHC-6, 5 *Turbo-Commander* 690A, 1 *Sabreliner*, 4 *Navajo;* 3 *Turbo-Porter*, 4 *Merlin* IIIA, 4 *Queen Air;* Cessna: 15 182, 20 U-17A/B, 5 207, 2 *Citation*, 5 T-41 ac; 9 A-109; Bell: 7 206, 20 UH-1H, 2 47G, 2 212; 7 FH-1100, 2 CH-47C, 18 SA-315B *Lama*, 3 SA-330 *Puma* hel.
(On order: 120 *TAM* med tks; 4 BDX APC; 57 *Kuerassier* 105mm SP ATK guns; 9 *Puma* hel.)

RESERVES: 250,000: 200,000 National Guard, 50,000 Territorial Guard.

Navy: 36,000 (18,000 conscripts), incl naval air force and marines.
4 submarines: 2 Type 209, 2 ex-US *Guppy*.
1 ex-Br *Colossus* aircraft carrier (capacity 14 A-4, 6 S-2 ac; 4 S-61 hel).
1 ex-US *Brooklyn* cruiser with *Seacat* SAM, 2 hel.
9 destroyers: 2 Type 42 with *Exocet* SSM, *Sea Dart* SAM, 1 *Lynx* hel; 7 ex-US (3 *Fletcher* with *Exocet* SSM; 3 *Sumner*, 1 *Gearing*).
2 ex-Fr A-69 corvettes with *Exocet* SSM.
7 patrol ships: 2 ex-US *Cherokee*, 2 *King* (1 trg), 3 ex-US *Sotoyomo*.
3 large patrol craft.
2 TNC-45 FAC(G).
4 *Dabur* FAC(P).
2 ex-US *Higgins* FAC(T)(.
6 ex-Br *Ton* coastal minesweepers/hunters.
1 LSD, 1 LST, 1 LCVP, 4 LCM(.
1 14,000-ton fleet tanker, 1 fleet spt, 2 tpt ships.
(On order: 4 TR-1700, 2 TR-1400 submarines, 4 *Meko* 360 destroyers, 2 A-69, 6 *Meko* 140 corvettes.)

Bases: Buenos Aires, Puerto Belgrano, Mar del Plata, Ushuaia.

NAVAL AIR FORCE: 3,000; 17 combat aircraft.
1 attack sqn with 11 A-4Q (to be replaced by *Super Etendard*).
1 MR sqn with 3 S-2E, 3 SP-2H.
1 tpt sqn with 3 *Electra*, 1 HS-125, 3 I-28.
1 liaison sqn with 8 *King Air*, 4 *Queen Air*, 3 *Turbo-Porter*.
Hel incl 5 S-61D/NR, 9 *Alouette* A-103(III), 2 WG-13 (*Lynx*), 3 *Puma*.
3 trg sqns with 7 EMB-326GB, 15 T-34C, 12 T-6/-28, 2 MB-339A.
(On order: 14 *Super Etendard* fighters, 8 MB-339A trg/COIN; 8 WB-13 hel.)

MARINES: 10,000.
1 bde, 1 force, 1 amph spt force:
5 inf bns.
1 cdo bn.
1 amph bn.
1 fd arty bn.
1 AD bn.
2 security bns.
1 sigs bn.
1 service bn.
6 indep inf coys.
22 LVTP-7, 15 LARC-5, 6 Mowag *Roland* APC; 105mm, 155mm how; 81mm, 106mm mor; 75mm, 105mm RCL: *Bantam* ATGW: 30mm AA guns; 10 *Tigercat* SAM.

Air Force: 19,500 (10,000 conscripts); 223 combat ac, 20 armed hel.
5 air bdes (7 planned).
1 bbr sqn with 9 *Canberra* B-62, 2 T-64.
7 FGA sqns: 3 with 68 A-4P *Skyhawk;* 2 with 26 *Dagger* (*Nesher*); 2 with 32 MS-760A *Paris* II.
1 interceptor sqn with 19 *Mirage* IIIEA, 2 IIIDA.
2 COIN/trg sqns with 45 IA-58A *Pucará*.
1 recce sqn with 20 IA-35 *Huanquero*.
1 COIN hel sqn with 14 Hughes 500M, 6 UH-1H.
1 SAR hel sqn with 6 *Lama*, 2 S-58T.
5 tpt sqns with 1 Boeing 707-320B, 7 C-130E/H, 2 KC-130, 1 *Sabreliner*, 5 *Learjet* 35A, 6 C-47, 11 F-27, 8 F-28, 6 DHC-6, 22 IA-50 *Guarani* II, 2 *Merlin* IVA ac; 9 *Puma* hel.
1 Antarctic sqn with 2 DHC-2, 3 DHC-3, 1 LC-47 ac; 3 S-61R/NR, 6 UH-19, 3 CH-47C (SAR); Bell: 4 UH-1D, 4 47G, 8 212 hel.
1 comms sqn with 14 *Shrike Commander*.
Trainers incl 12 *Paris*, 35 T-34C, 37 Cessna 182, 16 *Huanquero*.
AAM: R-530. ASM: AS-11/-12.
(On order: 11 IA-58 *Pucará* COIN; 16 *Turbo-Commander* tpts; 10 MB-339 trg ac.)

Para-Military Forces: 43,000. Gendarmerie: 12,000; *Shorland* armd cars, 40 M-113 APC, 20 lt ac, 10 hel under Army command, mainly for frontier duties. Argentine Naval Prefecture (coastguard): 9,000; 4 large, 20 coastal patrol craft (5 corvettes on order), 13 aircraft. Federal Police: 22,000; APC, 4 hel.

BOLIVIA

Population: 5,500,000.
Military service: 12 months, selective.
Total armed forces: 26,600.
Estimated GNP 1979: $4.1 bn.
Defence expenditure 1981: 4.4 bn pesos ($176 m).
$1 = 25.09 pesos (1981), 20.2 pesos (1979).

Army: 20,000.
2 corps, 6 div HQ.
4 cav regts (horsed).
1 mech regt (3 bns).
1 mot regt (3 bns) (one more forming).
13 inf regts (incl 1 Presidential Guard), each with 1 mounted, 1 mot inf bns.
3 arty regts.
2 ranger bns.
1 para bn.
6 engr bns.
EE-9 *Cascavel* armd cars; 18 M-113, 10 V-100 *Commando*, 20 Mowag, 24 EE-11 *Urutu* APC; 26 75mm guns; 25 M-116 75mm pack, 25 M-101 105mm how; 18 *Kuerassier* 105mm SP ATK guns.

Navy: 2,600.
1 transport.
40 lake and river patrol craft (mostly(.

Bases: Tiquina, Loma Suarez, Puerto Horquilla.

Air Force: 4,000; 23 combat ac, 12 armed hel.
1 fighter/trg sqn with 13 T-33A/N.
1 COIN sqn with 10 AT-6G.
1 COIN hel sqn with 12 Hughes 500M.
1 SAR hel sqn with 10 SA-315B *Gaviao (Lama)*.
Tpts incl 1 DC-6B, 1 *Electra*, 2 C-54, 1 L-100-30, 1 C-130H, 1 *Sabreliner*, 1 *Learjet*, 6 *Arava*, 3 CV-440, 3 CV-580, 6 C-47, 1 *Super King Air*, 6 F-27.
1 hel sqn with 5 UH-1H.
Liaison ac incl 2 *Turbo-Centurion*, 1 *Turbo-Porter;* Cessna: 11 185, 2 206C, 1 402, 1 421.
2 trg sqns with 12 T-6G, 6 T-41D, 18 T-23 *Uira-*

[1] See p. 112 for all footnotes.

puru, 6 SF-260M, 16 PC-7 *Turbo-Trainer*.
1 airbase defence inf regt.
(On order: 3 *Lama* hel.)

Para-Military Forces: 5,000. *Carabineros*, National Police.

BRAZIL

Population: 124,780,000.
Military service: 12 months.
Total armed forces: 272,550 (113,000 conscripts).
Estimated GNP 1980: $215 bn.
Defence expenditure 1980: 71.92 bn cruzeiros ($1.54 bn).
$1 = 46.7 cruzeiros (1980).

Army: 182,750 (110,000 conscripts).
4 army, 2 indep comd HQ.
8 divs: each up to 6 armd, 4 mech or mot inf bdes.
2 indep inf bdes.
1 indep para bde.
5 lt 'jungle' inf bns.
25 M-4, some M-47 med tks; 250 M-3A1, 250 M-41 lt tks; 120 EE-9 *Cascavel*, M-8 armd cars; EE-11 *Urutu*, M-59, 600 M-113 APC; 500 M-116 75mm pack, 413 105mm, 95 M-114 155mm towed, 50 M-7, 100 M-108 105mm SP how; 81mm, 4.2-in, 120mm mor; 108mm MRL; 3.5-in RL; 106mm RCL; *Cobra* ATGW; 30 35mm, 30 40mm, 40 90mm AA guns; 4 *Roland* SAM.
(On order: 60 X-1A2 med tks; 240 M-18A1 57mm RCL.)

RESERVES: 60,000 first line; 500,000 second line.

Navy: 47,000, incl 13,500 naval air force, marines and auxiliary corps, 3,000 conscripts.
7 submarines: 3 *Oberon*, 4 ex-US Guppy II/III.
1 ex-Br *Colossus* aircraft carrier (capacity 20 ac, incl 7 S-2A ASW ac, 4 *Sea King* hel).
12 ex-US destroyers: 5 *Fletcher* (1 with *Seacat* SAM), 5 *Sumner* (1 with *Seacat*), 2 *Gearing* with *ASROC*.
6 *Niteroi* frigates with 1 *Lynx* hel: 4 with *Exocet* SSM, 2 with *Seacat* SAM, *Ikara* ASW.
10 *Imperial Marinheiro* patrol vessels.
6 river patrol ships; 2 *Pedro Teixeira*, 3 *Roraima*, 1 monitor.
6 *Piratini* large patrol craft.
6 *Schutze* coastal minesweepers.
2 ex-US LST.
4 LCU.
(On order: 3 submarines, 12 corvettes.)

Bases: Rio de Janeiro, Aratu, Belem, Natal, Ladario.

NAVAL AIR FORCE: 14 combat hel.
1 ASW sqn with 5 SH-3D *Sea King*, 9 *Lynx* hel.
1 liaison sqn with 3 *Whirlwind*, 9 *Wasp*, 8 AB-206B, 6 AS-350M *Esquilo* hel.
1 trg sqn with 10 AB-206B hel.

MARINES: 14,500.
1 amph div: 1 Regimental Landing Team (3 inf, 1 arty, 1 engr, 1 service bns); 1 amph bn, 1 COIN bn, 1 reinforcement group.
5 Regional Groups.
LVTP-7, EE-11 *Urutu* APC.

Air Force: 42,800; 172 combat aircraft, 14 armed hel.
Air Defence Command:
1 interceptor sqn with 13 *Mirage* IIIEBR, 4 DBR.
Tactical Command:
2 FGA sqns with 33 F-5E, 5 F-5B.
8 COIN/recce sqns: 6 with 70 AT-26 *Xavante*; 2 with 19 T-25 *Universal*.
Maritime Command:
1 ASW sqn with 8 S-2E, 8 S-2A (7 in carrier).
1 MR sqn with 12 P-95 (EMB-111).
4 SAR sqns with 7 HU-16B *Albatross*, 3 RC-130E, 2 HS-125, 4 EC-95 ac; 5 SH-1D, 2 Bell 47G, 6 SA-330 *Puma* hel.
Transport Command:
1 COIN hel sqn with 4 UH-1D, 6 Bell 206, 4 OH-6A.
13 tpt sqns with 2 Boeing 737, 12 EMB-810C *Seneca* II, 7 C-130E, 3 C-130H, 2 KC-130H, 11 HS-125, 1 *Viscount*, 12 HS-748, 20 DHC-5, 102 EMB-110 *Bandeirante* (56 C-95, 6 R-95, 40 C-95A), 11 EMB-121 *Xingu* ac.
3 liaison sqns with LU-42, T-25 ac; 36 UH-1H hel.
Training Command:
100 T-23 *Uirapuru*, 112 T-25 *Universal*, 97 AT-26 ac; Bell 47 (H-13J) hel.
AAM: R-530, *Piranha*.
(On order: 10 EMB-110 (C-95A), 25 EMB-120 *Brasilia* tpts, 20 AT-26, 28 T-25, 118 T-27 trg ac.)

Para-Military Forces: Some 185,000 Public Security Forces; state, private militias in addition.

CHILE

Population: 11,180,000.
Military service: 1 year (Army and Navy only).
Total armed forces: 92,000 (31,600 conscripts).
Estimated GNP 1979: $18.9 bn.[1]
Defence expenditure 1979: 25.6 bn pesos ($726 m).[1]
$1 = 35.25 pesos (1979).

Army: 53,000 (30,000 conscripts).
6 div HQ.
7 cav regts (3 armd, 3 horsed, 1 hel-borne).
24 inf regts (incl 9 mot, 6 mountain; 1–2 bns each).
6 arty groups (incl AA dets).
6 mountain arty gps.
7 engr bns.
2 btys of *Cactus (Crotale)* SAM.
70 M-4, 50 AMX-30 med tks; 10 M-3, 50 M-41, 47 AMX-13 lt tks; 30 EE-9 *Cascavel* armd cars; 300 M-113, EE-11 *Urutu* APC; 105mm, 36 M-56 105mm pack how; 8 Mk F3 155mm SP how; 81mm, 120mm mor; 106mm RCL; *Milan* ATGW; 20mm, 40mm AA guns; 12 *Cactus* SAM; 6 CASA C-212 tpts, 2 *Cherokee*, 4 *Navajo*, 4 O-1, 18 R-172 *Hawk* XP, 1 *Skymaster* liaison/-trg ac; 7 *Puma*, 6 *Lama*, 3 Bell UH-1H, 2 AB-206 hel.

RESERVES: 160,000.

Navy: 24,000 (1,600 conscripts), incl naval air and marines.
3 submarines: 2 *Oberon*, 1 ex-US *Balao*.
3 cruisers: 1 ex-Swed *Gota Lejon;* 2 ex-US *Brooklyn* with 1 hel.
6 destroyers: 2 *Almirante* with *Exocet* SSM, *Seacat* SAM; 2 ex-US *Sumner* with 1 hel; 2 ex-US *Fletcher*.
5 frigates: 2 *Leander* with *Exocet* SSM, *Seacat* SAM, 1 hel; 3 ex-US *Lawrence* with 2 LCU.
3 ex-US corvettes: 2 *Sotoyomo*, 1 *Cherokee*.
2 *Reshef*-class FAC(M) with 6 *Gabriel* SSM.
4 Lürssen-type FAC(T).
3 large patrol craft (1 ex-US PC-1638).
17 coastal patrol craft(, incl 4 *Dvora*, 1 *Anchova*.
3 511-1152 LST, 2 LCM, 11 LCVP.
2 tankers, 5 transports.
(On order: 2 Type 209 submarines; 1 *Reshef* FAC(M); 9 *Anchova* spt; 4 *Barcelo* patrol craft.)

Bases: Talcahuano, Valparaiso, Puerto Montt, Punta Arenas, Puerto Williams, Iquique.

NAVAL AIR FORCE: (500); 8 combat aircraft.
1 ASW sqn: 6 EMB-111, 2 PBY-5A.
1 SAR/liaison sqn: 3 EMB-110C(N) *Bandeirante*, 4 CASA C-212, 1 *Navajo*.
1 SAR/liaison hel sqn: 10 *Alouette* III, 2 S-58, 4 Bell 206 *JetRanger*, 12 Bell 47G, 2 UH-1D hel.
Trainers: 8 PC-7 *Turbo-Trainer*.

MARINES: (5,000).
1 bde.
1 embarked bn.
Coast-defence units.
5 dets.

Air Force: 15,000; 86 combat aircraft.
3 FGA sqns with 16 *Hunter* F-71, 4 *Hunter* T-77, 15 F-5E, 3 F-5F.
3 COIN sqns with 34 A-37B, 6 AT-26 *Xavante*.
1 fighter sqn with 8 *Mirage* 50C.
1 SAR hel sqn with 6 S-55.
1 tpt sqn with 2 C-130H, 7 DC-6B, 8 C-47.
2 utility sqns with 16 DHC-6, 3 *Twin Bonanza*, 3 DHC-3.
1 hel sqn with 1 *Puma*, 10 UH-1H.
4 trg sqns with 30 T-34A, 25 T-37B, 8 T-41, some *Vampire* T-22/-25, 9 Beech 99, 1 CASA C-101, 10 T-25 *Universal* ac; 10 UH-12E hel.
AAM: *Sidewinder, Shafrir*. ASM: AS-11/-12.
1 AA arty regt.
(On order: 12 *Mirage* 50 fighters, 20 T-25, C-101 *Aviojet* trg ac.)

Para-Military Forces: 27,000 *Carabineros*, with 15 Mowag MR-8 APC, 14 Cessna 310, 4 *Metroliner* ac, 6 Bo-105, 1 FH-1100 hel.

COLOMBIA

Population: 27,310,000.
Military service: 2 years.
Total armed forces: 70,000 (28,500 conscripts).
Estimated GNP 1979: $26.2 bn.
Defence expenditure 1980: 1.392 bn pesos ($30.64 m).
$1 = 45.42 pesos (1980), 41.87 pesos (1979).

Army: 57,000 (28,500 conscripts).
10 inf bdes ('Regional Bdes') (6 mech cav, 6 arty gps, 26 inf, 6 engr bns).
1 trg bde, incl Presidential Guard.
1 ranger bn.
1 AB bn.
1 AA arty bn.
M-4A3 med, 12 M-3A1 lt tks; M-8, M-20 armd cars; 45 *White* M-3A2 APC; 48 M-101 105mm how; mor; 40mm AA guns.

RESERVES: 70,000.

Navy: 9,200, incl 3,000 marines.
2 Type 209 submarines.
2 SX-506 midget submarines (in reserve).
3 destroyers: 2 *Halland* (1 in reserve), 1 ex-US *Sumner*.
2 ex-US frigates: 1 *Crosley*, 1 *Courtney*.
3 large patrol craft (ex-US *Cherokee*).
4 gunboats: 3 *Arauca*, 1 *Barranquilla*.
2 coastal, 8 river patrol craft(.
2 marine bns.
(On order: 4 FV-1500 corvettes.)

Bases: Cartagena, Buenaventura.

Air Force: 3,800; 26 combat ac, 10 armed hel.
1 fighter/recce sqn with 12 *Mirage* 5COA, 4 5COR/D.
1 COIN sqn with 10 AT-33A.
1 recce hel sqn with 10 Hughes OH-6A (500C).
Tpts incl 2 C-130B, 4 C-54, 1 DC-7, 19 C-47, 2 HS-748, 3 *Arava*, 1 F-28, 10 DHC-2, 6 Pilatus PC-6 ac; 1 Bell 212 hel.
1 SAR//hel sqn with 27 *Lama*, 6 HH-43B.
Other hel incl 13 AH-1H, 10 UH-1B/H/N, 12 Hughes 500M, 6 TH-55.
Trainers incl 8 T-37C, 27 T-41D, 3 RT-33, 16 T-33A, 30 T-34B, 10 A-37B, 6 T-35 ac; 8 Bell 47 (OH-13) hel.
AAM: R-530.
(On order: 2 C-130 tpt ac.)

Para-Military Forces: 50,000 National Police Force, 30 hel; Coastguard, 9 vessels.

CUBA

Population: 9,800,000.
Military service: 3 years.
Total armed forces: 227,000.
Estimated GNP 1980: $18.4 bn.
Estimated defence expenditure 1980: 811 m pesos ($1.1 bn).
$1 = 0.72 pesos (1980).

Army: 200,000 (incl 60,000 reservists).
3 armd bdes.
15 inf divs (bdes) (some mech).
Some indep bns.
60 IS-2 hy, 400 T-34, 200 T-54/-55, 50 T-62 med tks; PT-76 lt tks; BRDM-1 armd cars; BMP MICV, 400 BTR-40/-60/-152 APC; M-116 75mm pack, 76mm, 85mm, 122mm, 130mm, 152mm guns/how; 100 SU-100 SP guns; 50 *FROG*-4 SSM; 57mm ATK guns; 57mm RCL; *Sagger*, *Snapper* ATGW: ZU-23, 37mm, 57mm, 85mm, 100mm towed, ZSU-23-4 SP AA guns; SA-7 SAM.

RESERVES: 130,000.

Navy: 11,000.
3 ex-Sov submarines: 2 F-, 1 W-class.
11 ex-Sov large patrol craft: 9 SO-1, 2 *Kronshtadt*.
24 ex-Sov FAC(M) with *Styx* SSM: 5 *Osa*-I, 7 *Osa*-II, 12 *Komar*(.
24 ex-Sov FAC(T): 6 *Turya*, 6 P-6(, 12 P-4(.
22 ex-Sov 7' ' FAC(P)(, 12 coastal patrol craft(.
9 minesweepers: 2 *Sonya*, 7 ex-Sov *Yevgenya*(.
7 T-4 LCM.
Some 50 *Samlet* coast-defence SSM.
(On order: 1 F-class submarine.)

Bases: Cienfuegos, Havana, Mariel, Punta Ballenatos, Canasi.

Air Force: 16,000, incl air defence forces; 175 combat aircraft.
3 FGA sqns: 2 with 30 MiG-17; 1 with 12 MiG-23BM *Flogger* F.
8 interceptor sqns: 3 with 48 MiG-21F; 2 with 30 MiG-21MF; 2 with 40 MiG-19; 1 with 15 MiG-23 *Flogger* E.
1 trg sqn with 22 MiG-15UTI.
4 tpt sqns: 10 Il-14; 12 An-2; 15 An-24; 20 An-26.
4 hel sqns with 15 Mi-1, 24 Mi-4, 20 Mi-8.
Trainers incl 2 MiG-23U, 15 MiG-21U, 1 Il-14, some An-2, 20 Zlin 326.
AAM: AA-2 *Atoll*.
24 SAM bns with 144 SA-2/3, SA-6.

Forces Abroad: Angola 19,000; *Ethiopia* 14,000; *Mozambique* 500; *Other Africa* 1,000; *South Yemen* 750; *Nicaragua* 200; *Grenada* 50.

Para-Military Forces: 15,000 State Security troops; 3,000 Frontier guards with 20 vessels; 100,000 Youth Labour Army. Territorial Militia (being formed): 1 bn to each municipal district, 1 regiment in each of 14 provinces.

DOMINICAN REPUBLIC

Population: 5,835,000.
Military service: voluntary.
Total armed forces: 22,500.
Estimated GNP 1979: $5.5 bn.
Defence expenditure 1979: 91 m pesos ($91 m).
$1 = 1 peso (1979).

Army: 13,000.
3 inf bdes (one has 1 armd recce sqn).
1 arty regt (3 bns).
1 mixed armd bn.
1 inf bn (horsed).
1 Presidential Guard bn.
1 engr bn.
35 AMX-13, lt tks; 20 AML armd cars; 25 M-3A1 half-track APC; 20 M-101 105mm how; 20 40mm AA guns.

Navy: 4,500.
1 ex-Can *River* frigate, 2 ex-US *Tacoma* (in reserve).
5 ex-US corvettes: 2 *Admirable* (ex-minesweepers), 3 *Cohoes*.
2 large patrol craft (3 ex-US *Argo* in reserve).
8 coastal patrol craft(.
1 LSM, 2 LCU.
1 cdo bn.
(On order: PTF-23 patrol boats.)

Bases: Santo Domingo, Bani, Haina.

Air Force: 5,000; 29 combat aircraft.
1 FGA sqn with 6 *Vampire* F-1/FB-50.
1 fighter/trg sqn with 15 F-51D *Mustang*.
1 COIN/trg with 6 T-28D.
Maritime: 2 PBY-5A MR/SAR ac; 3 *Alouette* II/III, 2 H-19, 2 UH-12E, 7 OH-6A hel.
1 tpt sqn with 6 C-46, 6 C-47, 3 DHC-2, 1 Aero *Commander*.
Hel incl 1 SA-365 *Dauphin* 2, Bell 205.
Trainers incl 4 Cessna 172, T-6, 4 T-41.
1 para, 1 AA arty bn.
(On order: 3 Cessna A-37B ac; 2 UH-1 SAR hel.)

Para-Military Forces: 10,000 Gendarmerie.

ECUADOR

Population: 8,250,000.
Military service: 2 years, selective.
Total armed forces: 38,800.
Estimated GNP 1979: $8.6 bn.
Defence expenditure 1980: 5.282 bn sucres ($194.2 m).
$1 = 27.2 sucres (1980), 26.9 sucres (1979).

Army: 30,000.
6 nominal divs (each of 1 armd, 2 inf bdes; 3 with 1 recce sqn).
1 regt of 3 horsed cav gps (bns of 2–3 coys).
1 para bn.
3 arty bns.
1 AA arty bn.
2 engr bns.
1 Presidential Guard sqn.
10 indep inf coys (cadre bns).
40 M-3, 80 AMX-13 lt tks; 27 AML-60/-90 armd cars; VAB, 15 M-113, UR-416, AMX-VCI APC; 18 M-101 105mm towed, 6 Mk F3 155mm SP how; 28 M-167, 10 40mm towed, 44 M-163 *Vulcan* 20mm SP AA guns; 18 *Chaparral* SAM systems; 3 *Turbo-Porter*, 1 *Learjet*; 3 DHC-5D tpts; 2 *Lama* hel.

Navy: 4,000, incl 1,000 marines.
2 Type 209 submarines.
2 ex-US *Gearing* destroyers.
1 ex-US *Lawrence* frigate.
3 Lürssen-type FAC(M) with *Exocet* SSM.
3 *Manta* FAC(M) with *Gabriel* SSM.
2 ex-US PGM-71 large, 7 coastal patrol craft(.
1 511-1152 LST, 2 LSM (all ex-US).
1 *Super King Air*, 1 *Arava*; Cessna: 2 T-37, 2 T-41, 1 320, 1 177, 3 T-34C ac; 2 *Alouette* III hel.
2 marine bns, one on garrison duties.
(On order: 1 destroyer, 6 corvettes, *Exocet* SSM.)

Bases: Guayaquil, San Lorenzo, Galápagos Islands.

Air Force: 4,800; some 55 combat aircraft.
1 lt bbr sqn with 3 *Canberra* B-6.
1 FGA sqn with 10 *Jaguar* S, 2 *Jaguar* B.
1 interceptor sqn with 15 *Mirage* F-1JE, 2 F-1JB.
1 COIN sqn with 10 A-37B.
1 COIN/trg with 12 BAC-167 *Strikemaster*.
MR ac: 1 PBY-5A *Catalina*.
Tpts incl Boeing 727-2T3, 4 *Electra*, 2 C-130H, 4 DC-6B, 6 *Arava*, 5 HS-748, 1 DHC-6 ac; 2 *Puma*, 4 *Lama* hel.
Other hel: 5 *Alouette* III.
Trainers incl 2 T-33A, 23 T-34C, 12 SF-260ME, 20 T-41, 24 Cessna 150A.
AAM: R-550 *Magic*.
(On order: A-37B COIN ac).

Para-Military Forces: 5,800 National Civil Police.

GUATEMALA

Population: 7,200,000.
Military service: conscription; 2 years.
Total armed forces: 15,050.
Estimated GNP 1979: $6.9 bn.
Defence expenditure 1980: 76.8 m quetzal ($69.8 m).
$1 = 1.1 quetzal (1980), 1.0 quetzal (1979).

Army: 14,000.
4 bde HQ.
1 Presidential Guard bde.
9 inf bns.
1 para bn.
1 engr bn.
1 armd car coy.
15 arty btys.
7 M-3 *Stuart* lt tks; 6 M-3A1, 15 M-8 armd cars; M-3, 10 M-113, 10 RBY-1, 7 *Commando* APC; 12 75mm pack, 36 105mm how; 81mm, 12 4.2-in mor.

Navy: 600, incl 200 marines (3 coys).
15 coastal patrol craft(.
1 LCM.

Bases: Santo Tomás de Castillas, Sipacate.

Air Force: 450; 10 combat aircraft.
1 COIN sqn with 10 A-37B.
1 tpt sqn with 1 DC-6, 11 C-47, 9 *Arava*.
1 liaison sqn with Cessna: 6 170, 12 172, 1 180, 2 U-206C.
1 hel sqn with 8 Bell UH-1D, 2 Bell 212, 3 *Lama*, 3 *Alouette* III.
1 trg sqn with 12 PC-7 *Turbo-Trainer*.

Para-Military Forces: 3,000, *Policia Militar Ambulante*.

HONDURAS

Population: 3,900,000.
Military service: conscription; 8 months.
Total armed forces: 11,200.
Estimated GNP 1979: $2.17 bn.
Defence expenditure 1980: 90.4 m lempiras ($45.2 m).
$1 = 2 lempiras (1979, 1980).

Army: 10,000.
1 Presidential Guard bde (2 bns).
6 inf bns.
2 arty bns.
1 engr, 1 sigs bn.
17 *Scorpion* lt tks; 12 M-116 75mm pack, 12 M-101 105mm how; 81mm, 120mm mor; 57mm RCL.
(On order: 105mm how.)

Navy: 200.
7 *Swift* patrol craft: 3 105-ft fast, 4 65-ft coastal(.
(On order: 105-ft patrol craft.)

Base: Puerto Cortes.

Air Force: 1,000; 27 combat aircraft.
1 FGA sqn with 12 *Super Mystère* B2.

AT-26 Xavante has COIN role in Latin American air forces.

1 COIN sqn with 6 F-86F *Sabre*, 6 A-37B.
1 recce sqn with 3 RT-33A.
Tpts incl 2 C-54, C-45, 1 C-47, 3 *Arava*, 1 *Westwind*.
1 liaison sqn with 2 Cessna 180, 2 185.
Hel: 2 UH-19D, 10 UH-1H.
1 trg sqn: 6 T-6, 24 T-28F, 5 T-41A.
(On order: A-37B COIN, T-37B trg ac.)

Para-Military Forces: 3,000 Civil Guard.

MEXICO

Population: 69,000,000.
Military service: voluntary, with part-time conscript militia.
Total armed forces: 119,500 regular, 250,000 part-time conscripts.
Estimated GNP 1979: $120 bn.
Defence expenditure 1981: 27.6 bn pesos ($1.166 bn).
$1 = 23.68 pesos (1981), 22.8 pesos (1979).

Army: 95,000 regular, 250,000 conscripts.
1 mech bde gp (Presidential Guard) (3 bns).
2 inf bde gps (each of 2 inf, 1 armd recce, 1 arty bns).
1 para bde (2 bns).
Zonal Garrisons incl:
28 indep cav, 3 arty regts, 64 indep inf bns.
AA, engr and spt units.
M-3, M-5 lt tks; 100 M-3A1, M-8, 15 MAC-1 armd cars; HWK-11, M-3 APC; M-116 75mm pack, M-101 105mm towed; M-8 75mm, M-7 105mm SP how.

Navy: 20,000, incl naval air force and marines.
2 ex-US *Fletcher* destroyers.
6 frigates: 1 ex-US *Edsall* (trg ship), 4 ex-US *Lawrence/Crosley*, 1 *Durango*.
34 ex-US patrol ships: 18 *Auk*, 16 *Admirable* ex-minesweepers.
31 *Azteca* large patrol craft.
15 patrol craft(: 4 *Polimar*, 2 *Azueta*, 1 *Guanajuato* coastal, 8 river.
3 tpts incl 2 ex-US 511-1152 LST; 1 repair ship, 6 fleet tugs.
(On order: 6 F-30 *(Descubierta)* corvettes, 3 *Azteca* large patrol craft.)

Bases: Gulf: Vera Cruz, Tampico, Chetumal, Ciudad del Carmen, Yukalpeten.
Pacific: Acapulco, Ensonada, La Paz, Puerto Cortes, Guaymas, Mazatlan, Manzanillo, Salina Cruz, Puerto Madero, Lazaro Cardenas.

NAVAL AIR FORCE: (350); 14 combat aircraft.
1 MR sqn with 14 HU-16 *Albatross*.
1 liaison sqn with 1 *Learjet* 24D, 1 DHC-5D, 1 DC-3, 2 F-27, 6 *Bonanza*, 4 *Baron;* Cessna: 4 150, 8 152, 1 337, 1 402; 1 Stearman N-2-55.
1 hel sqn with 1 *Alouette* II, 4 *Alouette* III, 5 Bell 47G, 2 UH-1H.
Trainers: 2 T-34B.
(On order: 6 corvettes; 10 SA-315B *Lama* hel.)

MARINES: (3,810).
3 bn HQ.
19 security coys.

Air Force: 4,500; 14 combat aircraft.
1 COIN sqn with 14 AT-33A.
1 SAR sqn with 18 LASA-60 ac; 9 *Alouette* III, 1 Hiller 12E hel.
1 Presidential (tpt) sqn with 2 Boeing 727, 1 *Jetstar*, 1 BAC-111, 2 C-47.
4 tpt sqns with Boeing 737, 1 DC-7, 2 C-118, 5 C-54, 1 *Electra*, 25 C-47, 3 *Sabreliner*, 1 HS-125-400, 3 *Skyvan*, 12 *Islander*, 10 *Arava*, 10 Aero *Commander*, 1 DHC-5D.
1 hel sqn with: Bell; 14 47G, 5 206B, 3 212, 10 205; 5 *Puma*.
6 trg sqns: 2 with 20 T-6G; 4 with 45 T-28D.
Trainers incl 1 *Baron*, 20 Beech F-33-9, 20 *Musketeer*, 12 PC-7 *Turbo-Trainer*.
1 para bn.
(On order: 10 F-5E fighters, 2 F-5F, 26 PC-7 *Turbo-Trainer* trg ac.)

PARAGUAY

Population: 3,270,000.
Military service: 18 months; Navy 2 years.
Total armed forces: 16,000.
Estimated GNP 1979: $2.0 bn.
Defence expenditure 1980: 8.79 bn guaranies ($64 m).
$1 = 137.3 guaranies (1980), 126 guaranies (1979).

Army: 12,500.
1 cav div (bde) (2 mech cav regts, 1 inf bn, 1 arty bty).
6 inf divs (bn gps).
2 indep horsed cav regts.
1 arty regt.
2 indep inf bns.
1 Presidential Guard bn.
5 engr bns.
1 sigs bn.
1 hel coy.
3 M-4 med, 15 M-3A1 lt tks; M-8 (mod) armd cars; 3 M-3 (mod) APC; M-116 75mm pack, 48 M-101 105mm how; 40mm AA guns; 2 Bell 47, 3 UH-12E hel.

Navy: 2,500, incl 500 marines and naval air.
2 *Humaita* river defence vessels.
3 corvettes (ex-Arg *Bouchard* minesweepers).
9 patrol craft: 1 large, 8 coastal(.
1 ex-US LSM.
1 marine 'regt' (bn).
1 C-47, 2 Cessna U-206, 1 Cessna 150M, 2 AT-6 trg ac; 2 Bell 47G hel.

Bases: Asunción/Puerto Sajonia, Bahía Negra.

Air Force: 1,000; 27 combat aircraft.
1 FGA sqn with 6 A-37B.
2 COIN sqns; 1 with 9 EMB-326 *Xavante;* 1 with 12 AT-6G *Texan*.
1 tpt sqn with 5 DC-6B, 2 C-54, 3 CV-240, 10 C-47, 1 DHC-6, 1 *Dove*, 1 DHC-3.
1 liaison flight with 5 Cessna 185, 1 Cessna 421.
1 hel sqn with 14 UH-13A, 1 FH-1100, 2 UH-12E.
1 trg sqn with 8 Fokker S-11, 8 T-23 *Uirapuru*, 1 MS-760, 10 T-6, 5 Cessna 185.
1 para regt (bn).
(On order: 10 EMB-110 tpts.)

Para-Military Forces: 4,000 civil police, internal security forces.

PERU

Population: 18,075,000.
Military service: 2 years, selective.
Total armed forces: 130,000 (51,000 conscripts).
Estimated GNP 1979: $11.1 bn.[1]
Defence expenditure 1979: 96.7 bn soles ($431 m).[1]
$1 = 224.55 soles (1979).

Army: 75,000 (51,000 conscripts).
2 armd divs (bdes).
1 Presidential Guard cav div: 2 horsed regts.
8 inf and mech divs (bdes), each of 3 bns.
1 AB div (para-cdo bde).
1 jungle div (bde).
10 arty bns.
4 engr bns.
3 armd recce sqns.
2 air sqns: 1 liaison, 1 hel.
450 T-54/-55, 60 M-4 med, 110 AMX-13 lt tks; M-8 armd, 50 M-3A1 scout cars; 200 M-113, 40 V-150 *Chaimite*, 10 UR-416 APC; 90 M-101 105mm, 122mm, 130mm, 152mm SP, 4 M-114 155mm guns/how; 120mm mor; 28 40mm, 76mm towed, ZSU-23-4 SP AA guns; SA-2, SA-3, SA-7 SAM; U-10B, 5 Cessna 185 lt ac; 41 Mi-8 (35 in store), 4 *Alouette* III, 5 *Lama* hel.
(On order: 50 M-48A2 med tks; 15 Fiat 6616 armd cars; 100 SPz-12-3 MICV, 10 Fiat 6614, 150 M-113 APC; 2 *Nomad* lt tpt ac.)

Navy: 15,000, incl naval air, 3,000 marines; 11 combat aircraft, 10 armed hel.
9 submarines: 3 Type 209, 6 ex-US (2 *Guppy* I, 4 *Abtao*).

3 cruisers: 2 ex-Neth *De Ruyter* (1 with *Exocet*, 3 hel), 1 ex-Br *Ceylon*.
9 destroyers: 2 ex-Br *Daring* with *Exocet* SSM; 2 ex-US *Fletcher*, 5 ex-Neth (1 *Holland*, 4 *Friesland*).
2 *Lupo* frigates with *Otomat* SSM, *Aspide* SAM, 1 hel.
3 PR-72P FAC(M) with *Exocet* SSM.
4 river gunboats, 3 river, 4 lake patrol craft(.
3 ex-US LST, 2 ex-US LSM.
2 tpts; 3 replenishment, 3 spt tankers.
1 ASW sqn with 9 S-2E *Tracker*.
1 ASW hel sqn with 4 SH-3D, 6 AB-212.
1 MR sqn with 2 F-27MPA.
1 hel utility sqn with 10 Bell 206B, 6 UH-1D/H, 2 *Alouette* III.
Tpts: 3 C-47, 1 *Aztec*.
Trg: 6 T-34C ac; 2 Bell 47G hel.
1 Marine bde (3 bns).
(On order: 3 Type 209 submarines, 2 *Lupo* frigates, 3 PR-72P FAC(M) with *Exocet* SSM, 6 lake patrol craft.)

Bases: Callao, San Lorenzo, Talara, Iquitos (river), Puno (lake), Madre de Dios (river).

Air Force: 40,000; 115 combat aircraft.
2 lt bbr sqn with 32 *Canberra* B-2/B(I)-8/B(I)-56.
4 FGA sqns: 2 with 24 *Mirage* 5P; 2 with 36 Su-22.
2 COIN sqns with 20 A-37B.
1 OCU with 2 *Canberra* T-4, 1 *Mirage* 5DP.
6 tpt sqns: 4 L-100-20, 9 C-130E/H; 5 DC-6, 4 C-54; 16 An-26, 2 F-27, 1 F-28; 6 DHC-6; 15 DHC-5; 12 *Turbo-Porter*.
2 liaison sqns: 18 *Queen Air*, 1 F-28, 3 *King Air*.
4 hel sqns: 12 *Alouette* III; 20 Bell 47G; 17 Bell 212; 6 Mi-6, 5 Mi-8.
Trainers incl 4 Su-22UTI, 6 T-34A, 8 T-33A, 19 T-41, 26 T-37B/C, 18 TA-37, 4 Cessna 150.
ASM: AS-30.
(On order: 14 MB-339 COIN ac.)

Para-Military Forces: 25,000. *Guardia Civil* with Mowag *Roland* APC, Coastguard with 11 large, 15 other patrol craft.

URUGUAY

Population: 2,945,000.
Military service: voluntary.
Total armed forces: 29,700.
Estimated GNP 1979: $7.0 bn.
Defence expenditure 1978: 727.6 bn pesos ($134.5 m).
$1 = 7.92 pesos (1979), 5.41 pesos (1978).

Army: 22,000.
4 div HQ (regional).
1 mech bde (2 cav regts).
4 inf bdes, each with 3 bns.
1 ceremonial inf bn.
4 arty bns.
1 AA bn.
5 engr bns.
17 M-24, 29 M-3A1, 22 M-41 lt tks; FN-4-RM-62, 10 M-3A1 scout cars; 15 M-113 APC; 75mm gun; 25 M-101 105mm how.
(On order: 15 *Scorpion* lt tks.)

Navy: 4,700, incl naval air, naval infantry.
3 ex-US frigates: 1 *Dealey*, 2 *Cannon*.
2 corvettes: 1 *Auk*, 1 *Aggressive* (ex-US minesweepers).
4 patrol craft: 1 *Adjutant*, 3 *Vigilante*.
2 ex-US LCM.
6 S-2A/G MR ac, 1 *Super King Air*, 6 SNB-5 (C-45) tpts, 4 T-34B/C-1, 6 SNJ-4/6, 9 T-28 ac; 2 SH-34J hel.
1 naval inf bn.

Base: Montevideo.

Air Force: 3,000; some 23 combat aircraft.
1 COIN sqn with 5 AT-33A, 8 A-37B.
1 recce/trg sqn with 10 T-6G.
1 SAR sqn: 7 U-17A ac; 6 UH-1B, 3 UH-1, 2 H-23F hel.
3 tpt sqns: 5 C-45, 12 C-47, 2 F-27; 3 Cessna 182A/D, 7 *Queen Air*, 6 EMB-110B/C, 2 FH-227 ac, 1 Bell 222 hel.
Trainers incl 6 T-41D, 25 T-34B.
(On order: 5 IA-58B *Pucará*.)

Para-Military Forces: 1,500. Coastguard with 6 coastal patrol craft(.

VENEZUELA

Population: 16,458,502.
Military service: 18 months, selective.
Total armed forces: 40,800.
Estimated GNP 1980: $47.9 bn.
Defence expenditure 1981: 4.8 bn bolivares ($1.1 bn).
$1 = 4.29 bolivares (1979, 1981).

Army: 27,000.
1 armd bde (2 med, 1 lt tk bns).
1 cav bn horsed.
2 mech bns.
11 inf bns.
3 ranger bns.
7 arty gps.
5 AA arty and engr bns.
142 AMX-30 med, 40 AMX-13 lt tks; 12 M-8 armd cars; AMX-VCI, 20 UR-416 APC; 75mm pack, 105mm pack, 135 M-101 105mm towed, 20 Mk F3 155mm SP how; 81mm, 120mm mor; 40 M-18 76mm SP ATK guns; 106mm RCL; SS-11, AS-11 ATGW; 40mm AA guns.

ARMY AVIATION:
1 tpt sqn with 2 *Arava*, 2 *Merlin*, 1 *Islander*, 1 *Queen Air*.
2 hel sqns: 1 with 20 *Alouette* III, 6 Bell 206B, 3 UH-1D/H; 1 with 2 Bell 205A, 2 UH-19, Bell 47G.

Navy: 9,000, incl naval air and 4,500 marines.
3 submarines: 2 Type 209, 1 ex-US *Guppy* II.
2 ex-US *Sumner* destroyers.
4 frigates: 2 *Lupo* with *Otomat* SSM, *Aspide* SAM, 1 hel; 2 *Almirante Clemente*.
3 Vosper Thornycroft FAC(M) with *Otomat* SSM.
3 Vosper Thornycroft FAC(G).
1 LST, 3 LSM, 2 transports, 12 LCVP (all ex-US).

NAVAL AIR: 6 combat aircraft, 6 armed hel.
1 ASW sqn with 6 S-2E.
1 ASW hel sqn (afloat) with 6 AB-212.
1 SAR sqn with 4 HU-16A *Albatross*.
1 tpt sqn: 1 HS-748, 1 *King Air* ac, 2 Bell 47J hel.
(On order: 2 Type 209 submarines, 4 *Lupo* frigates, 4 AB-212 ASW hel.)

MARINES:
3 bns, 1 AA, 1 amph coy. APC, M-42 SP 40mm AA guns.

Bases: Caracas, Puerto Cabello, La Guaira, Puerto de Hierro.

Air Force: 4,800; 102 combat aircraft.
2 lt bbr/recce sqns with 23 *Canberra* (14 B-82, 6 B(I)-82, 1 PR-83, 2 T-84).
1 FGA sqn with 16 *Mirage* (9 IIIEV, 5 5V, 2 5DV).
2 interceptor/FGA sqns: 1 with 14 CF-5A, 4 CF-5B; 1 with 18 F-86K.
1 COIN sqn with 15 OV-10E.
1 Presidential (tpt) sqn with 1 Boeing 737, 1 DC-9, 1 HS-748, 1 Cessna *Citation* ac; 1 UH-19, 6 Bell 206B, 1 206C hel.
2 tpt sqns: 1 with 20 C-47, 1 HS-748; 1 with 6 C-130H, 12 C-123A.
2 utility/liaison sqns: 1 with 4 *Islander*, 1 *King Air*, 1 with 9 *Queen Air*, 12 Cessna 182N, 2 Cessna 310R.
2 hel sqns: 1 with 13 *Alouette* III, 20 UH-1D/H; 1 with 9 UH-19, 2 Bell 212; other: 8 Agusta A-109, 1 Bell 412.
Trg Command: 12 *Jet Provost*, 23 T-2 *Buckeye* (12 armed), 25 T-34 *Mentor*, 2 *Beech 95 Travelair*.
AAM: R-530.
1 para bn.
(On order: 2 C-130H-30 ac, 1 Bell 412 hel.)

Para-Military Forces: Fuerzas Armadas de Cooperación: 20,000: 28 MICV; 120 60mm mor; 3 *Arava*, 1 *King Air* ac; hel; 43 coastal patrol craft.

[1] Rapid inflation makes defence expenditure and GNP figures in local currency and dollar terms unreliable.

[2] Year average exchange rates.

ARMED FORCES OF OTHER LATIN AMERICAN STATES*

Country	Estimated population (000)	Estimated GNP 1979 ($m)	Defence expenditure 1980 ($m)	Total armed forces	Army: Manpower and formations	Army: Equipment	Navy: Manpower and equipment	Air Force: Manpower and equipment	Para-military forces
El Salvador	4,950	3,500	71.7	9,850	9,000 4 inf 'bdes' (bns) 1 arty 'bde' (bn) 1 mixed cav regt 1 engr bn 1 AA arty bn 1 para 'bn' (coy) 2 cdo/ranger coys	12 AMX-13 lt tks; 10 M-113, 20 UR-416 APC; 30 M-101 105mm how; 81mm mor; 57mm RCL; *LAW* RL	100 3 patrol boats(	750 11 *Ouragan*, 4 *Super Mystère*, 4 *Magister* 6 *Rallye* COIN; 6 C-47, 5 *Arava* tpts; 3 T-34, 10 T-6, 6 T-41, 3 *Magister* trg ac; 1 *Alouette* III, 1 FH-1100, 1 *Lama*, 10 UH-1H hel	7,000
Guyana	855	521	17 (1978)	7,000†	2 inf bns	4 *Shorland* armd cars; 12 81mm mor	1 large, 7 coastal patrol craft(	6 BN-2A, 1 *Super King Air* 200, 1 Cessna U-206, 1 DHC-6 tpts; 2 Bell 206B, 2 Bell 212 hel	5,000
Haiti	5,950	1.5	15.3 (1979/80)	7,500	7,000 Pres Guard (1 inf bn) 10 inf coys Garrison det	M-113, 6 V-150 *Commando* APC; 75mm pack, M-101 105mm how; 81mm mor; 57mm RCL; 37mm, 57mm ATK guns	300 (Coastguard) 2 *Sotoyomo* patrol ships, 2 *Cape*, 5 coastal patrol craft(	200 8 O-2A COIN; 3 DC-3, 3 DHC-3, 1 *Baron*, 1 Cessna 402 tpts; 3 Cessna 150, 1 172, 1 *Bonanza* trg ac; 3 H-34, 2 S-58T, 4 Hughes 300/500 hel	14,900
Jamaica	2,270	2.9	17 (1978)	4,000†	1 inf bn 1 spt bn	*Ferret* armd cars; V-150 *Commando* APC; 6 81mm mor	1 large; 5 coastal patrol boats(	2 *Islander*, 1 DHC-6-300, 1 *King Air*, 1 *Duke*, 2 Cessna 185 ac; 4 Bell 206B, 3 212 hel	8,200
Nicaragua	2,520	1.341	5.4 (1979)	6,700†	5,000 18 inf coys (being reorganized) 1 engr coy 1 fd, 1 AA arty bty	3 M-4 med tks; 3 PT-76 lt tks; 45 *Staghound* armd, 3 M-3A1 scout cars; 4 M-101 105mm how; 12 20mm, 8 40mm AA guns	200 4 *Dabur*, 1 Sewart, 9 coastal patrol craft; 1 LCM	1,500 4 T-33A, 6 T-28D COIN; 2 *Aviocar*, 5 C-47 ac; 2 CH-34, 4 OH-6A, 1 Hughes 269 hel	8,000

* Costa Rica and Panama maintain para-military forces, numbering 5,000 and 11,000 respectively.
† All services form part of the Army.

SCIENCE/SCOPE

The new imaging infrared Maverick air-to-ground missile scored eight direct hits in nine firings to complete the first phase of its development and evaluation testing. The Hughes-built Mavericks were fired from U.S. Air Force A-10 and F-4 aircraft against tanks, a simulated radar van, trucks, and other ground targets. Tests were made day and night, at high and low altitudes, and at various ranges and aircraft speeds. The lone miss was due to a procedure error and was not attributed to either the guidance unit or the operation of the missile. The missile's seeker senses heat radiated by the target area and projects a TV-like picture on a cockpit display. The crew locks the seeker on a target and fires the missile. The missile guides itself to the center of the target.

The millimeter-wave radar seeker for the new Wasp anti-armor missile has begun flight tests to see how well it distinguishes tanks and other military targets from non-target vehicles and their surroundings. Wasp, which would be fired in clusters of 10 or more against masses of enemy tanks, must have this capability because it is to pick a target and aim itself with almost no help from the launching aircraft. For the tests the seeker is being flown day and night in all kinds of weather, including rain, fog, and snow. Hughes is developing Wasp for the U.S. Air Force under a competitive validation contract.

An entirely new breed of radar technology may help solve increasingly nagging problems facing military strategists. The Track-While-Scan Quiet Radar, under exploratory development at Hughes for the U.S. Army Missile Command, would stand a much smaller chance of being detected, jammed, or destroyed by enemy radiation-seeking missiles. Still it would be able to sort out many kinds of threats in a crowded sky. Whereas conventional radars emit huge bursts of power in a sweeping pattern, Quiet Radar emits a low-power continuous-waveform signal while shooting out thousands of tiny narrow beams in a rapid-fire, random sequence.

The U.S. Navy's AIM-54C Phoenix air-to-air missile has demonstrated its enhanced long-range performance in a test firing off the California coast at Point Mugu. The shot of the improved Hughes-built Phoenix was the first to test the guidance system's new command-inertial function, which makes the missile more accurate during the first phase of flight after launch. The radar-guided AIM-54C was fired from an F-14 Tomcat at a range of 90 miles from a BQM-34A drone target. The F-14 was flying at 36,000 feet at a speed of Mach 1.55. The target was flying toward the F-14 at 30,000 feet and at Mach 0.9. The unarmed missile passed close enough to destroy the target had the missile been equipped with a warhead.

A new laser designator and rangefinder can be mounted on the U.S. Army's Fire Support Team armored vehicles or on tripods. The Hughes Ground/Vehicular Laser Locator Designator (G/VLLD) directs an invisible beam of coded laser pulses at a target. The reflected pulses can be detected by special sensors in aircraft or laser-homing weapons, or can be used to determine the target's range. Engineering development models have been used in laser-guided weapons tests since 1977. One unit, operating at a pulse repetition frequency commonly used for laser-guided weapons, served in more than 15,600 missions without a malfunction.

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The East-West Conventional Balance in Europe

Any assessment of the military balance between NATO and the Warsaw Pact involves comparison of the deployed strengths of both men and equipment and of reinforcement potential, consideration of qualitative characteristics, of factors such as geographical advantages, military technology, deployment, training, and logistic support, and of differences in national doctrine and philosophy. It must be set within the context of the strategic nuclear balance, of military forces world-wide, and, in particular, of the relative strengths of the navies and long-range air forces of both sides.

Certain elements in the equation change very little over time. Warsaw Pact equipment, doctrine, and procedures are standardized, whereas those of NATO are not, despite long-standing attempts to improve interoperability and encourage uniformity. The Pact's advantages in flexibility and logistic support will be obvious, as will the geographical advantages which permit it to reinforce any of its fronts on interior lines and, in almost every case, overland. The West has hitherto relied on its superior technology and—although there is evidence that the East has been catching up and, in some instances, has actually overtaken the West—some Western advantage still remains, though this is now much smaller than it was.

The question of balance, as a practical calculation, begins by a comparison of the relative numerical strengths of each side, and this is shown in the table at the end of this essay *(p. 116)*.

MANPOWER

The total numbers of men in uniform in the armed forces of the countries which comprise NATO and the Warsaw Pact are given in the table, as are the ground force figures. Yet much of this manpower will be employed elsewhere than in Europe—particularly in the case of the United States and the Soviet Union—and so figures are given for the ground forces in place in Europe. (For convenience, Europe in this case is assumed to exclude the territory of the Soviet Union.) However, in the event of hostilities erupting or threatening to erupt, two kinds of augmentation can take place: first, standing forces not in Europe can be moved there; second, reserve forces can be mobilized either for combat in place or in order to be moved to Europe by external powers. A *total* reserve figure can be assessed but, as with standing manpower, not all these reserves would be allocated to Europe—particularly, again, of non-European powers.

FORMATIONS

Totals for the numbers and types of divisions and division-equivalents in place and manned in time of peace are shown in the table. Estimates of the numbers of divisions existing in peacetime which are not in Europe but are presumed to be earmarked for it as reinforcements *prior* to mobilization, and of the number of divisions or division-equivalents on both sides which could be added to the order of battle on mobilization and earmarked for the European Theatre, are also listed.

Some qualifications and explanations are necessary. First, divisions on the two sides, and within the two sides, are very unequal both in strengths and equipment holdings. Second, the assumption is made that only European Military Districts of the Soviet Union *(see p. 59)* would in fact provide forces for the European Theatre. Third, territorial defence units have been excluded from the figures in the table. Fourth, rates of mobilization and of forward movement would not be equal. A Norwegian brigade mobilized in place should be ready for defence long before a Soviet division could be mobilized around Leningrad and moved to attack it. On the other hand, an American division based in the continental United States and without equipment prepositioned in Europe will in all likelihood be slower to move into action than a Soviet division from Belorussia. Fifth, Europe is divided into distinct areas of possible confrontation where local balances may look very different to the overall balance and where, particularly on the NATO side, communications between battlefronts will prove very difficult. As a simplification in this analysis, NATO has been divided into North and Central Europe, on the one hand, and Southern Europe (Italy, Greece, and Turkey), on the other. Finally, substantial combat elements are held outside divisional establishments and are not listed.

EQUIPMENT

Equipment holdings can be broken down into categories. The complicating factors are that total holdings of equipment do not necessarily match what is in divisional establishments (there are equipment reserves, non-divi-

sional units, and stockpiles), and not all equipment will be in theatre at the outbreak of hostilities. In the case of Soviet formations moving from the Western USSR, they will be expected to take their full unit inventories. In the case of American reinforcing formations, some 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*. As a separate category, estimates of the *additional* equipment presumed to come with Soviet reinforcing divisions moved to Europe have also been included; these figures are shown with a + sign below the line for USSR and in Pact total figures. Two ratios for equipment are given: one without reinforcement and one after Soviet divisions have reinforced the Pact in Europe.

NAVAL FORCES

The assessment lists the numbers of vessels presumed to be in the Atlantic, Channel, North Sea, and Mediterranean for NATO and, for the Warsaw Pact, 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. In the case of naval or maritime aircraft, classification by type is necessarily somewhat arbitrary but 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 and fighters (including armed helicopters) requires similar assumptions to those made in the case of ground forces. The figures for US aircraft are for those based in Europe and do not take account of possible reinforcements from the continental US; the Soviet figures show a possible augmentation of frontal aviation from the Western military districts as a result of reinforcement. These figures are necessarily estimated. In the case of bombers, in particular, the question of allocation to the nuclear role is important. An assessment of nuclear systems is given in the Table on p. 118, and figures given here are for all medium-range bombers, regardless of whether or not they might be reserved for nuclear delivery. It is necessary to stress the point that the increasing number of multi-role aircraft on both sides tends to make mission distinctions otiose. Aircraft intended primarily for ground attack often have at least a limited self-defence capability, but national terminology separates the standard air-superiority fighter and the interceptor, and this distinction has been applied.

DEFINING THE COMBAT ZONE

The Northern and Central European sectors are shown as one entity. Yet this is inevitably an incomplete notion. Norwegian defences, for example, are pulled in two directions. The land forces have as their main responsibility the protection of the northern approaches to the country and they have either deployed or plan to deploy virtually all their active field forces to the north because the Soviet formations in the northern Leningrad Military District pose a substantial potential threat. The Norwegian Navy must assign its larger vessels to support the 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 Air Force has to support both sectors. Schleswig-Holstein, though also part of NATO's Northern Command, must anticipate attack from East Germany.

NATO's Southern Flank is even more divided. Italy must contest any Pact threat from Central Europe towards the central Mediterranean basin. Greece and Turkey must between them defend Thrace and the Aegean Sea and its air space, while Turkey must also defend her border in the Caucasus. This means that NATO has to be prepared to fight here on three widely separated fronts, each with its own tactical challenges and each with its own peculiar supply requirements. Yet it is impossible, without making a number of assumptions, to forecast the size and composition of the forces on both sides which would be assigned to those three fronts during hostilities. Pact forces in the south-western sector and threatening Thrace and the Dardanelles would be based on the Southern Group of Forces—Hungary, Bulgaria, and Romania plus the Soviet formations—perhaps supported by formations from the Carpathian and Odessa Military Districts. The south-eastern sector, threatening Eastern Turkey, would be the responsibility of the Trans-Caucasus MD, and reserves for this front would most probably come from the North Caucasus MD. Trans-Caucasus MD is also responsible for the border with Iran.

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 the political will to mobilize, on the ability to make decisions and put them into effect, and on how far enemy action obstructs mobilization.

The Warsaw Pact has maintained a reserve based upon large numbers of conscripts who have completed their period of obligatory service. The Soviet Union in particular uses the Military District organization for recalling and placing reservists into skeleton formations for war. The limitations of Soviet internal communications might make it difficult to switch divisions from one part of the USSR to another, but 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.

Within Europe many countries can mobilize in place, although very many distinctively different methods are adopted. 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, it must be noted that 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.

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 in crew-served anti-tank missiles, a number of naval vessel types and some naval aircraft. What is not shown by these figures 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, in marked contrast, suffers from doctrines which are by no means identical and from a wide variety of everything from weapon systems to support vehicles, with consequent duplication of supply systems and some 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 apparently reliable. However, crew comfort and safety standards are significantly lower than those demanded in the West. While these factors may not be detrimental to efficiency over 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 inferior to that of the Warsaw Pact. Certain NATO countries, too, still lack sufficient spares and ammunition. Some Pact nations may also suffer from shortages, but the fact that their equipment is standardized would 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

The Warsaw Pact has long contemplated the use of surface-to-surface missiles to deliver high-explosive, nuclear, and chemical warheads against targets deep in enemy rear areas. However, the Soviet Union is also increasing her inventory of modern fighter-bombers and these pose an increasingly significant long-range threat. In terms of Pact defence against air attack, a large number of interceptors must be added to an impressive array of surface-to-air missiles and artillery pieces. It is clear that in war NATO air forces would face a formidable task in maintaining air support for the NATO ground forces on the European battlefield.

The Warsaw Pact continues to enjoy the benefits of standardized aircraft servicing and handling facilities. Although its aircraft cannot generally operate from unimproved runways, there are a very large number of modern airfields available 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 and in hardening airfields. NATO probably still enjoys a measure of overall electronic superiority and may enjoy a somewhat greater flexibility in command and control in combat conditions, but electronic counter-measures are being emphasized by the Pact, and tend to negate NATO's advantage.

SUMMARY

The numerical balance over the last 20 years has slowly but steadily moved in favour of the East. At the same time, the West has largely lost the technological edge which allowed NATO to believe that quality could substitute for numbers. One cannot necessarily conclude from this that NATO would suffer defeat in war, but one can conclude that there has been sufficient danger in the trend to require urgent remedies.

Assessing the balance between NATO and the Warsaw Pact based on comparisons of manpower, combat units, or equipment contains a large element of subjectivity. In the first place, the Pact has superiority in some areas and NATO in others, and there is no fully satisfactory way to compare these asymmetrical advantages. Tank superiority can be negated by combinations of many different kinds of anti-tank systems. Secondly, it is not possible to reduce to numbers such qualitative factors as training, morale, leadership, tactical initiative, terrain, and geographical advantage, all of which are vitally significant in warfare. Thirdly, there is no agreement as to the form and scope that any hostilities which might break out would be likely to take. Such an assessment would have a vital bearing on the composition of the forces involved, resupply stocks, reinforcements, and many other considerations. The table

Comparison of NATO and Warsaw Pact Manpower and Equipment

		NATO (less US)							Non-Soviet Pact
		N. Europe[a]	S. Europe	US	Total	*Ratio*	Total	USSR	
Manpower (000)									
Total manpower in uniform		1,685	1,199	2,049	4,933	*1.03 : 1*	4,788	3,673	1,115
Reserves (all services)		2,038	1,808	880	4,646	*1 : 1.53*	7,118	5,200	1,918
Total ground forces		1,016	922	775	2,713	*1.04 : 1*	2,613	1,825	788
Total ground forces in Europe		980	922	221	2,123	*1.27 : 1*	1,669	881[b]	788
Divisions[c]									
Divs in Europe and manned in peacetime (incl Trans-Caucasus)	Tk	20½	7½	2½	30½		29	15	14
	Mech	28	3½	2½	34½		49	26	23
	Other	5	18½	0	23½		0	0	0
Divs manned and available for immediate reinforcement	Tk	0	0	2	2		1	1[d]	0
	Mech	0	0	3	3		1	1[d]	0
	Other	0	0	3½	3½		8	8[d]	0
Extra divs available on mobilizing reserves	Tk	½	0	3	3½		26½	24[d]	2½
	Mech	1	0	12	13		60	43[d]	17
	Other	½	0	1½	2½		2	0	2
Ground Force Equipment									
Main battle tanks		7,356	6,697	3,000	17,053	*1 : 1.54 (1 : 2.65)*	26,300 (+19,200)	13,000 (+19,200[e])	13,300
Arty, MRL		3,674	5,266	562	9,502	*1 : 1.05 (1 : 2.05)*	9,980 (+9,466)	4,680 (+9,466[e])	5,300[b]
SSM launchers		163	48	144	355	*1 : 1.75 (1 : 3.45)*	620 (+604)	272 (+604[e])	348
ATK guns		850	114	0	964	*1 : 1.94 (1 : 3.75)*	1,868 (+1,746)	678 (+1,746[e])	1,190[b]
ATGW launchers		4,240	900	644	5,784	*4.03 : 1 (3.17 : 1)*	1,437 (+383)	287 (+385[e])	1,150[b]
AA guns		3,435	1,718	120	5,273	*1.47 : 1 (1 : 1.23)*	3,586 (+2,900)	1,086[e] (+2,900[e])	2,500[b]
SAM launchers		1,284	304	180	1,768	*1 : 1.78 (1 : 3.56)*	3,151 (+3,142)	1,751[e] (+3,142[e])	1,400[b]
Naval Units									
Submarines: cruise missile attack		0	0	0	0	–	54	54	0
		103	36	52	191	*1.21 : 1*	158	150	8
Carriers		5	1	6	12	*3 : 1*	4	4	0
Cruisers		1	2	13	16	*1 : 1.25*	20	20[b]	0
Destroyers		50[b]	35	43	128	*5.57 : 1*	23	22[b]	1
Frigates		107[b]	37	34	178	*1.63 : 1*	109	105[b]	4
Corvettes/large patrol craft		56	64	0	120	*1.06 : 1*	113	60[b]	53
FAC(M/T/P)		162	71	3	236	*1 : 1.75*	412	200[b]	212
MCM[f]		217	88	3	308	*1 : 1.30*	400	264[b]	136
Amphibious[g]		183	196	33	412	*2.09 : 1*	197	120[b]	77
Naval and Maritime Aircraft									
Bombers		0	0	0	0	–	280	280	0
Attack		122	0	192[h]	314	*2.47 : 1*	127	85[b]	42
Fighters		15	0	144[h]	159	–	0	0	0
ASW		24[h]	22	60[h]	106	*1 : 1.18*	125	125[b]	0
MR/ECM		161	26	66[h]	253	*3.61 : 1*	70	60[b]	10
ASW hel		164	109	48[h]	321	*1.87 : 1*	172	160[b]	12
Land Attack Aircraft and Fighters[h]									
Bombers		81	0	0	81	*1 : 4.51*	365	365	0
FGA		1,083	718	492	2,293	*1.31 : 1 (1 : 1.42)*	1,755 (+1,500)	1,170[b] (+1,500[b])	585
Fighters		42	72	90	204	*1 : 3.26 (1 : 7.67)*	665 (+900)	665[b] (+900[b])	0
Interceptors		435	137[h]	0	572	*1 : 2.61*	1,490	0	1,490
Reconnaissance[i]		220	117	60	397	*1 : 1.32 (1 : 2.26)*	524 (+375)	360[b] (+375[b])	164
Armed hel		398[j] (+207)	5[j] (+164)	330[h]	733[j] (+1,104)	*4.70 : 1 (1.37 : 1)*	156 (+650)	100 (+650[b])	56

[a] Includes French forces and Canadian forces in Europe.
[b] Estimated figures.
[c] 'Tk' includes tank and armoured divs; 'Mech' includes mechanized, motorized and motor rifle; 'Other' includes airborne, airportable, mountain, amphibious and light infantry.
[d] From western and southern European USSR.
[e] Field forces only; PVO-Strany would provide additional AD equipment.
[f] Includes support craft and inshore boats.
[g] All types.
[h] Octu aircraft are not included in these totals.
[i] Includes ew/ecm aircraft.
[j] Known totals. Figures in square brackets show additional potential armed hel.

which forms part of this presentation attempts to distinguish between forces in being and those which might be made available over the longer term. It can pass no judgements as to the reliability of the forces or the political will and cohesion of the two alliances.

The overall balance continues to be such as to make military aggression a highly risky undertaking. Though tactical redeployments could provide a local advantage in numbers sufficient to allow an attacker to believe that he might achieve tactical success, there would still appear to be insufficient overall strength on either side to guarantee victory. The consequences for an attacker would be unpredictable, and the risks, particularly of nuclear escalation, incalculable.

Theatre Nuclear Forces in Europe

East and West have traditionally maintained nuclear delivery systems to cover targets in Europe. These include both weapon systems of intercontinental range (which could be delivered over shorter distances) and shorter range systems. Any comparison of nuclear systems of greater than simply battlefield range (over 160 km) intended for the destruction of targets in Europe is therefore inevitably artificial.

Moreover, this assessment does not necessarily imply that a nuclear war confined to Europe is feasible. On the contrary, even a modest exchange of nuclear warheads in Europe would, in all probability, escalate rapidly to the strategic nuclear level.

Nevertheless, despite both technical and conceptual difficulties in defining a neat regional relationship for nuclear forces, it is important to identify and assess those weapon systems on both sides whose primary mission is, *prima facie,* to cover targets in Eastern Europe, the Western USSR, and Western Europe. There are two related reasons for making the attempt. First, the threat that they pose and the means of response must be taken into account by military planners. Second, the major investment that the Soviet Union has made in recent years in modern medium-range nuclear systems suggests that there are, in the Soviet perspective, tangible military and political advantages to be derived from nuclear preponderance in the European region.

Assumptions made at the outset determine the result, and these can be controversial. Many weapon systems are technically flexible, and there are bound to be uncertainties over mission priorities. Moreover, the weapon systems in East and West are not identical and some judgement as to qualitative factors must be included.

In the following assessment the Institute applies the method of evaluation evolved for *The Military Balance 1980–81.* Numbers have in some cases changed (due to retirements, to re-evaluation, and to the introduction of new systems) resulting in changes in sub-totals and totals.

ASSUMPTIONS

• This evaluation, like those provided in the two previous years, is based on the assumption that the relevant delivery systems are those of beyond battlefield range which can be available after a period of warning sufficient to permit dispersal but not long enough for reinforcement or redeployment. The analysis is thus confined to the consideration of forces which can be expected to survive a pre-emptive attack *after* dispersal has taken place, the total number of warheads that each side might be expected to have available for launching against the other, and the number that might be expected to survive to penetrate the other side's defences.

To go further would require an extremely complex analysis dependent on assumptions about raid size, accuracy, vulnerability, meteorological conditions, timing, and many other factors. At best this could only result in a series of scenarios which would do little to clarify the pre-release relationship of forces which is all that this analysis attempts.

Even the method of comparing systems likely to survive a pre-emptive attack contains artificiality, since any retaliatory strike in reaction to the pre-emptive attack would find fewer nuclear targets, because silos would be empty; nor would that retaliation necessarily be a *theatre* nuclear retaliation.

The presentation given here cannot therefore be taken as a scenario of a European nuclear war; rather it seeks to assess the question of theatre nuclear forces from the perspectives of the respective military planners who need to be able to count on the functioning of a certain number of delivery systems.

• As to the forces counted, Soviet Strategic Rocket Forces (specifically SS-11 and SS-19 missiles), which could be given targets in Europe, have not been included. There is little doubt that some of these missiles have in the past been so targeted, and all modern Soviet ICBM could be quite rapidly re-targeted on Europe should the need arise. Soviet *Yankee*-class SSBN and other maritime systems could also be targeted on Europe. The decision to exclude these systems from the assessments rests on plausibility, not certainty. It is based on the inference that the *primary* missions of these systems (those for which they have been acquired) suggest other roles than that of being used against targets on land in Europe, and that, since the number and accuracy of the warheads of the Soviet M/IRBM force has

increased substantially with the rapid deployment of the SS-20 missile, Soviet planners are no longer likely to need to divert ICBM, SLBM, or maritime systems to cover targets on land in Western Europe.

• On the Western side, where many similar considerations apply, the Institute's assessment does, however, include 400 US SLBM *Poseidon* warheads, albeit in a separate category. The reason for this is that they were explicitly allocated to SACEUR's planning authority in the 1960s in order to remedy a shortfall in NATO's nuclear delivery systems. Because SACEUR is presumed to be able to count on these warheads to cover targets in Eastern Europe and the Soviet Union *before* the implementation of the full US SIOP (Single Integrated Operational Plan), it is appropriate to include them in an assessment of those systems whose primary mission is related to the European Theatre.

• Range estimation for aircraft poses another major definitional problem. It will depend critically upon speed and flight profile, whether external tanks are carried and, most obviously, whether aircraft are refuelled in flight. The figures given are *radii* and are believed to be the *operational* maxima for the aircraft concerned, rather than ferry ranges. This distinction was not always applied in the first assessment made in *The Military Balance 1979–80*. Strike aircraft do not, of course, have to return to their bases but can recover on any friendly territory if this extends their effective range; this is *not* taken into account.

• The designation of aircraft for a theatre nuclear strike role is also inevitably somewhat uncertain. Nuclear *capability* does not necessarily imply a primary nuclear *role*, and, in the case of NATO at least, the nuclear role for aircraft has progressively diminished. We believe that a substantial number of Soviet aircraft types which could be adapted for nuclear strike are probably retained in the interceptor role, and this has led in our assessment to some reduction in numbers of Soviet nuclear-capable aircraft, particularly of MiG-23/-27 *Flogger*, among which only the MiG-27 is likely to be used in the ground-attack role.

• The Table lists the types and numbers of systems presumed to be available, and warheads available are deduced by assessing the number of warheads each system can deliver, the presumed utilization of those systems in the nuclear role in Europe, and their serviceability. A judgement is then made as to the number of warheads which might be expected to arrive on target by assessing survivability, reliability, and penetration and multiplying the warheads available by these factors. Additional criteria are explained in footnotes to the Table.

CONCLUSION

Comparison of the two halves of the table at the end of this essay shows that, if *Poseidon* is excluded from the calculations, the Warsaw Pact relies more heavily on the missile element of its theatre nuclear systems (70% of arriving warheads) than NATO (55%); but if *Poseidon* is included, the NATO percentage rises to 78%. It is also significant that the Warsaw Pact's aircraft appear to be better able to survive and penetrate to their targets than NATO's, as shown by the judgement that 29% of Pact air-delivered warheads are expected to survive and arrive at their targets, against 23% for NATO. This reflects the facts that Soviet aircraft are generally newer than those of NATO and that Warsaw Pact air defences are somewhat denser.

Without *Poseidon* being included on the NATO side, the Warsaw Pact overall advantage in arriving warheads is about 3.27:1; with *Poseidon* that advantage falls to about 1.57:1. This emphasizes the critical nature of the assumption as to whether or not to include *Poseidon* warheads. Nevertheless, even with the inclusion of *Poseidon* on the Western side and the continued exclusion of Soviet strategic systems, the balance is distinctly unfavourable to NATO and is becoming more so. The Soviet SS-20 programme, intended to replace the older SS-4 and SS-5 missiles, has continued, resulting in an increase in Pact warhead numbers based on more survivable launchers. It is not clear that all SS-4s and SS-5s will be taken out of operation once the SS-20 deployment is complete, although the numbers of the older missiles are falling steadily. However, nothing has yet been done to reduce substantially the vulnerability of NATO's existing nuclear delivery systems or to increase their ability to penetrate Pact defences. Improvement in both respects must await the implementation of NATO's decision of December 1979 to deploy long-range ground-launched cruise missiles (GLCM) and 108 *Pershing* II MRBM in Europe, a programme unlikely to be completed before the end of the decade.

Long- and Medium-range Nuclear Systems for the European Theatre

Category and type	Range/ combat radius[a]	First deployment[b]	Inventory[c]	Factors: Warheads per system	Factors: Delivery error[d]	Factors: Serviceability	Warheads available (approx.)[e]	Indices: Survivability[f]	Indices: Reliability[g]	Indices: Penetration[h]	Arriving warheads (approx.)[i]	Operating countries and notes
WARSAW PACT												(USSR unless noted)
IRBM	(nm/km)											
SS-20	2,700/5,000	1977	230	3	0.66[j]	0.9	410	0.9	0.8	1.0	295	Mbrs (?1 reload per system)
SS-5 *Skean*	2,200/4,100	1961	40	1	1.0	0.75	30	0.6	0.7	1.0	13	
MRBM												
SS-4 *Sandal*	1,000/1,900	1959	340	1	1.0	0.7	238	0.5	0.65	1.0	77	
SRBM												
SS-12 *Scaleboard*	490/900	1969[k]	650	1	0.75	0.8	390	0.7	0.75	1.0	205	
Scud B	160/300	1965[l]										
Scud B	160/300	1965	18	1	1.0	0.8	14	0.7	0.75	1.0	7	GDR
SLBM												
SS-N-5 *Serb*	600/1,120	1964	57	1	1.0[j]	0.45[j]	26	0.8	0.6	1.0	12	On 13 G II, 7 H II subs
Ballistic missile sub-totals			1,335				1,108				609 (46% of available warheads)	
Aircraft	(km)											
Tu-22M/-26 *Backfire B*	4,025	1974	65[m]	4[n]	0.4	0.8	83	0.7	0.85	0.7	35	
Tu-16 *Badger*	2,800	1955	310	2[o]	0.4	0.7	174	0.7	0.75	0.5	46	
Tu-22 *Blinder*	3,100	1962	125	2[o]	0.4	0.7	70	0.7	0.8	0.55	22	
Su-24/Su-19 *Fencer*	1,600	1974	480	2	0.2	0.8	154	0.55	0.8	0.65	44	
MiG-27 *Flogger D*	720	1971	500[m]	1	0.4	0.8	160	0.6	0.8	0.65	50	
Su-17 *Fitter C/D*	600	1974	700	1	0.2	0.8	112	0.55	0.8	0.65	32	
Su-7 *Fitter A*	600	1959	165	1	0.2	0.7	23	0.5	0.7	0.5	4	
MiG-21 *Fishbed J–N*	400	1970	750[m]	1	0.2	0.8	120	0.5	0.8	0.6	30	
Air-delivered weapon sub-totals			3,095				896				263 (29% of available warheads)	
Warsaw Pact totals			4,430				2,004				872	
NATO												
IRBM	(nm/km)											
SSBS S2/-3	1,600/3,000	1971/80	18	1	1.0	0.9	16	0.6	0.8	1.0	8	France, 9 S-3 in place
SRBM												
Pershing 1A	390/720	1962	180	1	1.0	0.9	162	0.7	0.8	1.0	91	US, FRG
SLBM												
Polaris A3	2,500/4,600	1967	64	3[p]	1.0	0.45[q]	28	0.9	0.8	1.0	20	Britain. M.V. MARV (*Chevaline*) in service shortly
MSBS M-20	1,600/3,000	1977	80	1	1.0	0.45[q]	36	0.9	0.8	1.0	26	France
Ballistic missile sub-totals			342				242				145 (60% of available warheads)	
Land-based aircraft	(km)											
Vulcan B-2	2,800	1960	57	2	1.0	0.7	79	0.6	0.8	0.5	19	Britain. Incl 9 tkr/rec
F-111 E/F	1,900	1967	156[r]	2	0.5	0.8	125	0.6	0.8	0.75	45	US ac in Europe
Mirage IVA	1,600	1964	33	1	1.0	0.7	23	0.6	0.8	0.5	6	France
Buccaneer	930	1962	60	1	0.5	0.7	42	0.6	0.8	0.5	10	Britain
F-104	800	1958	318	1	0.3	0.7	67	0.4	0.8	0.3	6	Belgium, FRG, Greece, Italy, Netherlandt, Turkey
F-4	750	1962	40	1	0.3	0.8	10	0.4	0.8	0.55	2	Turkey
F-4	750	1962	224	1	0.3	0.8	78	0.4	0.8	0.55	14	US Europe-/dual-based ac
Jaguar	720	1974	80[s]	1	0.5	0.8	32	0.4	0.8	0.6	6	Britain, France
Mirage IIIE	600	1964	30	1	0.5	0.8	12	0.4	0.8	0.45	2	France
Carrier-based aircraft	(nm/km)											
A-6E	540/1,000	1963	20[t]	2	0.5	0.8	16	0.5	0.8	0.6	4	US
A-7E	480/900	1966	40[t]	2	0.5	0.8	32	0.5	0.8	0.4	6	US
Super Etendard	300/560	1980	12[t]	2	0.5	0.8	10	0.5	0.8	0.5	2	France
Air-delivered weapon sub-totals			1,170				526				122 (23.2% of available weapons)	
NATO totals (excluding *Poseidon*)			1,512				768				267	
US CENTRAL SYS												
Poseidon C-3	2,800/4,500	1971					400[u]	0.9	0.8	1.0	288	
NATO totals (including *Poseidon*)							1,168				555	

[a] *Range*: given for nautical miles and kilometres for missiles. For aircraft, average combat radius in kilometres is given, assuming high-level transit, low-level penetration of air defences and average payload, unrefuelled.
[b] Production runs will continue for up to 10 years from first in service date.
[c] Total nuclear-capable systems available.
[d] Approx. percentage thought likely to be allocated to nuclear role against Europe. For USSR, assumes about 25% generally deployed in East (except where noted) and some 70% of bbrs and some 25% of ftrs are retained in nuclear role.
[e] Given by: Inventory × Warheads × Utilization × Serviceability.
[f] Survivability is a function of weapon system characteristics, tactics and location in relation to attacking force.
[g] Estimated likelihood of system functioning as planned after launch.
[h] Dependent on effectiveness of defence against specific system and ECM fit. For NATO, assumes Moscow ABM defences not targetable after MRM suppression.
[i] Country: Warheads available × Survivability × Reliability × Penetration.
[j] Assumes 33% in W. USSR, 33% in "swing zone" in the Central USSR and with range to threaten NATO and Far East.
[k] All assumed in Western Sov Area (primarily Baltic). 36 II SSBN SALT counted. G4 now retired.
[l] Takes account of approximate submarine refit time and missile serviceability.
[m] Numbers in nuclear strike role reassessed from 1980 BI.
[n] Some authorities give 3 as average warhead loading.
[o] ASM could be carried instead of free fall bombs, and this would improve the penetration figure substantially.
[p] MRV counts as one regardless of dispersal pattern (warheads not separately targetable).
[q] F-111E/F could be reinforced by F-111D (not SALT counted and might be assumed available to strategic Europe), but these are not available on day-to-day alert. FB-111A not assumed available for theatre use.
[r] Only 80 nuclear-capable aircraft in Anglo-French inventory of 239. Half of these assumed retained for nuclear role.
[s] Assumes 2 carriers in US 6th Fleet (Mediterranean), temporary redeployment not allowed for. Half the inventory retained for nuclear role against land targets.
[t] Assumes one out of two French carriers in range.
[u] Figure assumed to be available to SACEUR for NATO targeting. SALT counted systems.

Chemical Agents

Chemical agents are chemical substances which are intended to be used in military operations to incapacitate, seriously injure, or to kill men through their physiological effects. They must not be confused with bacteriological agents which owe their effects to the multiplication of their organisms within the victim. Chemical agents may be grouped, according to their effects on human targets, into six main categories: incapacitating, vomiting, choking, blood, blister, and nerve agents. Chemical herbicides and smoke and flame weapons are frequently included under the chemical agent heading in literature on the subject but, since their effects are not directed primarily against human targets, they will be excluded from consideration here. An additional category—irritants—does not come under the definition of chemical agents under the Geneva Protocol of 1925, nor are irritants normally used in war. They are, however, used extensively in police and internal security operations. In that context they fall within the technical description of chemical agents cited above, and they are therefore included in the present listing.

IRRITANTS

These relatively harmless gases act directly on the endings of the nerves in mucous membranes and on the eyes. There are two groups; tear and sneezing agents. Their effects are immediate, but recovery is rapid when the victim leaves the contaminated area. There is some evidence that, if used in confined, unventilated spaces, they can seriously affect people already prone to respiratory ailments. They are not lethal in the open air where they are normally employed. Distribution is usually by aerosol, from pressure canisters, hand or rifle grenades, or cartridges.

INCAPACITATING AGENTS

Intended to act on the mind of the victim, these agents cause disorientation, mental disturbance, and sleepiness, rendering individuals incapable of concerted effort. Their effects are unpredictable but may persist for hours or days after exposure. Complete recovery is expected without medical treatment.

VOMITING AGENTS

These are normally solids which vaporize when heated and condense to form aerosols. They irritate the eyes and mucous membranes and cause vicious nasal discharge, sneezing, coughing, severe headache, acute pain and tightness in the chest, nausea, and vomiting. The effects last for about 30 minutes after leaving the area of moderate concentration. At higher concentrations, effects are likely to last up to three hours after departure.

CHOKING AGENTS

The oldest of military agents, now thought to be obsolete, these attack the cell tissue of the lungs, producing pulmonary oedemas. They are susceptible to atmospheric conditions—particularly wind direction, wind velocity, and temperature gradient—and lack persistence, which limits their tactical flexibility.

BLOOD AGENTS

These agents, which are absorbed into the body by breathing, prevent the body cells from using oxygen brought to them by the blood. This leads speedily to tissue damage. These agents are extremely volatile, dispersing rapidly after deployment. Their use just before an attack would therefore force the defenders to protect themselves, thus reducing their combat efficiency, while the attackers, who would not need similar protection, would retain theirs.

BLISTER AGENTS

These agents, in both liquid and vapour form, attack the protein enzymes and co-enzymes in the body causing inflammation, blisters, and general destruction of tissues. The eyes are very susceptible, and burns in the lungs and bronchia obstruct breathing. Blister agents may be odourless, and their effects may not be noted for some period after exposure. They are also persistent. The best therapy against them is rapid and complete decontamination.

NERVE AGENTS

These are highly toxic, odourless, colourless, and hard to detect. They are generally non-persistent, but can be made persistent by adding a thickener. They are absorbed into the body by breathing, through ingestion through the mouth, or through the skin. They react with an enzyme (cholinesterase) permitting the stimulator acetylcholine to accumulate. This causes the nervous system to lose control, resulting in uncontrolled contraction of the muscles, fatigue, paralysis, and disorientation, and gives the symptoms of pin-point eye pupils, bronchial constriction, running nose, salivation, nausea, and diarrhoea. Without proper treatment, death usually occurs within 15 minutes of a fatal dosage being absorbed.

DOSAGE

Dosage (also referred to as 'toxicity' and 'lethality product') of a chemical agent is a function of its concentration multiplied by the time the victim is exposed to it. *CS*, for example, is said to affect its victims instantly, though not lethally, in concentrations of 1 to 8 milligrammes per cubic

metre of air (mg/m³). Adding the time factor, the dosage is expressed as mg/m³ per minute (mg/m³/min). When an agent is lethal, the medium lethal dosage (LD) that will kill 50% of the population is expressed as $LD_{(50)}$, and the medium lethal concentration/time (LCT) that will kill 50% of the exposed population as $LCT_{(50)}$. The lower the LCT number in mg/m³/min, the higher the toxicity. For example, even the non-lethal *CS* could kill, given a very high LCT of perhaps 11,000 mg/m³/min. *Sarin*, on the other hand, would be lethal at perhaps 100 mg/m³/min. Effective dissemination of chemical agents is measured in kilogrammes per hectare (kg/ha).

PROTECTION

Protection against chemical agents may be provided either by virtue of the construction of the vehicles or structures in which the troops move or live, or by means of pressure systems intended to keep the agents out, or by special clothing worn by the individual. The heart of any personal system is the respirator: a device fitted with a carbon filter, often with additional chemical and physical additives, which provides protection against inhalation of all chemical agents. NATO protective clothing incorporates a filter barrier to protect the skin against blister and nerve agents. Warsaw Pact protective clothing is usually made of impermeable rubber. All protective clothing more or less impedes normal activities including the use of communications equipment. The clothing itself is non-porous, and hence uncomfortable to wear in hot weather and during exertion. Combat efficiency is therefore reduced during periods when troops are at risk of attack by chemical agents.

To be safe, troops must protect themselves before the agent attacks. Some form of early warning is essential. Detection of early types of agent was by smell, or by observing deployment of cylinders or the explosion of known chemical munitions. Specially designed electrochemical detectors are used against later agents.

After exposure to liquid chemical agents, men and equipment have to be decontaminated. Personal decontamination may be done by using an oxidizing agent like fuller's earth. Vehicles and equipment may be washed down with soapy water, bleach, or an ordinary water rinse. Nerve agents require special treatment but one immediate therapy, applied as soon as symptoms are recognized, is an injection of a mixture of trimedoxime, atropine, and benactyzine. (BAT/TAB and Nemicol-5 are, respectively, the NATO and Warsaw Pact standard-issue antidotes.)

MANUFACTURE

All countries with a sophisticated chemical industry could manufacture chemical agents, although special facilities might be required in order to produce and store chemical munitions. Many of the agents do not store for extended periods, and special handling and comprehensive safety precautions are mandatory. The US and the Soviet Union are the only nations which are known to have an existing chemical agent bulk manufacturing capability.

USE

Chemical agents clearly have a psychological effect upon target troops, particularly those poorly trained in defensive measures. Effectiveness depends critically on climatic conditions—wind speed and direction, temperature, and temperature gradient. Field storage and handling require special precautions, although this could be greatly eased by the recent US development of 'binary' munitions—in which the chemicals that combine to form the nerve agent are safely separated within the shell by a membrane, and are kept separated until the shell explodes.

As the accompanying table shows, delivery means range from aerosols carried on the person, through the larger calibre mortar bombs and virtually the full range of artillery calibres, to rockets and aircraft with spray tanks. During hostilities, chemical agents would be used to inhibit defence, to make it impossible to occupy or to move through contaminated areas, to inhibit reinforcement, or to reduce the mobility of a marching force.

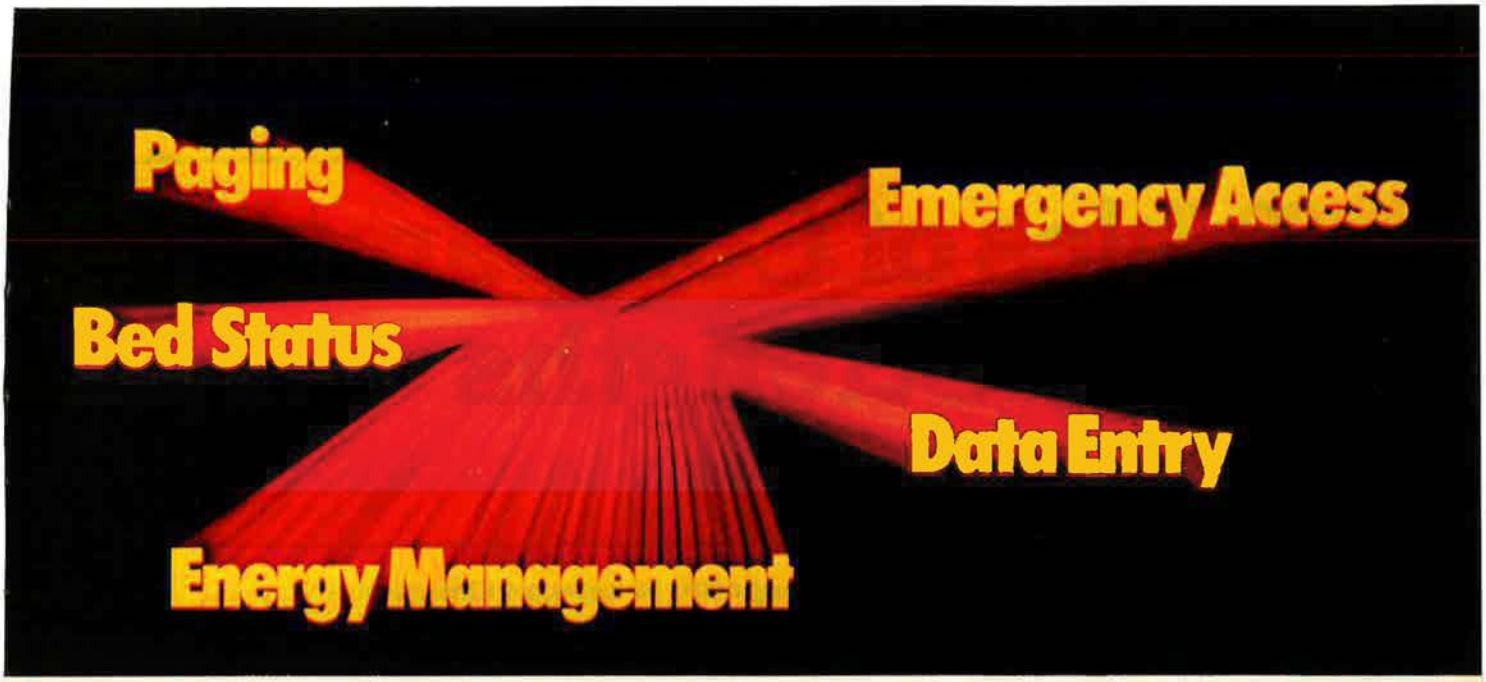
Stock levels of chemical weapons are impossible to assess, although reports suggest US holdings total 42,000 tons while claiming the USSR's stockpile to be 350,000 tons. Included in these figures is between 10% and 30% of the conventional artillery ammunition stocked. There is no clear evidence about the numbers of personnel involved in the respective chemical warfare (CW) programmes. The United States cites a total strength of CW-assigned personnel of 4,700 of which some 2,200 are with the field units and perhaps 2,500 are reservists. The Soviet Union and Warsaw Pact have Army specialist units from company level upwards, and various estimates of the total CW establishment range from 70,000 to over 100,000 men. Other NATO countries, such as the Federal Republic of Germany, also maintain CW specialist units, and most forces conduct some defensive CW training.

Chemical Warfare Agents in Current Military Inventories

Category and agent	US Army code	Physical state (before dissemination)	Means of dissemination	Persistence	Lethality (LC_{Ct50} in mg/m³/min)	Absorbed via	Symptoms (Very with exposure and individual)
Irritant							
Tear	CN[a]	Solid. Apple blossom smell	aerosol, vapour	few minutes	25,000	inhalation	Immediate copious tears
	CA[b]	Pink/brown liquid. Sour fruit smell	aerosol, vapour,	few minutes	25,000	inhalation	Immediate copious tears; itching/burning skin
	CS[c]	White crystals. Pepper smell	aerosol, vapour, grenades, thermogenerator	some minutes	11,000	inhalation	Immediate copious tears; burning, coughing, nausea; itching/burning skin
	CR[d]	n.a.	aerosol, grenades, thermogenerator	n.a.	n.a.	inhalation	Immediate copious tears; burning, coughing, nausea
Incapacitating	BZ[e]	Solid (Now obsolete)	bomb	some minutes	n.a.	inhalation	Fast heartbeat, dizziness, vomiting, dry mouth, blurred vision, stupor, decreasing random activity
Vomiting Adamsite	DM[f]	Yellow/green solid. No odour	aerosol, thermogenerator	some minutes	15,000	inhalation	Headache, cold symptoms, nausea, vomiting
Choking Chlorine[g]		Liquid. Bleach smell. Greenish-yellow cloud when disseminated	cylinders	hours	19,000	inhalation	Irritation of eyes, throat and respiratory passages. After latent period, lack of oxygen, collapse, yellow expectorant, unconsciousness, death
Phosgene	CG[h]	Colourless liquid gas. New-mown hay smell	artillery shell, bomb	hours	3,200	inhalation	As above
Diphosgene[i]		As phosgene. Easier to load and handle	artillery shell, bomb	hours	3,200	inhalation	As above
Blood Agent Hydrogen Cyanide	AC[j]	Colourless liquid. Almond or peach kernel smell. Clogs charcoal filters	aerosol from shells, rockets	short-term	4,500	inhalation	Giddiness, convulsions, death
Cyanogen Chloride	CK	Colourless gas. Almond smell, but can go unnoticed	aerosol from shells, rockets	short-term	11,000	inhalation	Choking, irritation, slowed breathing rate, death
Blister Agents Mustard	HD[k]	Colourless to pale yellow liquid. Faint garlic smell	mor bombs, arty shells, aircraft spray, land mines, thermogenerator, bombs, missiles	hours/days	1,500 (inhaled) or 10,000 (skin)	skin, highly toxic if inhaled	Delayed irritation, redness, blisters. If inhaled, similar to chlorine
Lewisite[l]		Dark, oily liquid. Geranium smell	as above	as above	1,200–1,500 (inhaled) 100,000 (skin)	skin, inhalation	Less effective than HD. May not now be in service
Nerve Agents Tabun	GA[m]	Colourless to dark brown liquid. Faintly fruity smell at times, no odour when pure	aerosol from shells, bombs, rockets	some days	400 (inhaled)	inhalation, skin	Blurred vision, breathing difficult, sweat, nausea, loss of control of body functions, asphyxia, death
Sarin	GB[n]	Colourless liquid	aerosol from 105mm, 8-in shells, bombs	hours	100 (inhaled)	inhalation, skin, mouth	as above, US standard agent. Lethal dose 1 milligramme
Soman	GD[o]	Colourless liquid. Fruity, camphor odour when pure	122mm, 130mm, 152mm, 203mm shells, 122mm, 205mm rkts.	hours	100 (inhaled)	as above	As above. Possible Soviet standard agent. Lethal dose about 0.7 milligramme
	VX[p]	Colourless liquid	Bombs, landmines, 155mm, 8-in shells, spray tanks, missiles	hours	100 (inhaled)	as above	As above. US standard agent. Lethal dose said to be 4 milligrammes

Chemical names and structures for the agents listed are as follows:

[a] Chloroacetophenone: $C_6H_5COCH_2Cl$
[b] Bromobenzeylcyanide: $C_6H_5CH(Br)CN$
[c] O-chlorobenzylidene malononitrile: $ClC_6H_4CHC(CN)_2$
[d] Dibenz oxazepine
[e] 10-chloro-5, 10-dihydrophenarsazine: $NH(C_6H_4)_2ASCl$
[f] Diphenylamino-chloroarsine (also Phenarsazine chloride): $C_6H_4(AsCl)NHC_6H_4$
[g] Chlorine: Cl_2
[h] Carbonyl chloride: $COCl_2$
[i] Trichloromethyl chloroformate: $ClCOOCCl_3$
[j] Hydrogen cyanide or hydrocyanic acid: HCN
[k] Bis (2-chloroethyl)-sulphide: $ClCH_2CH_2CH_2Cl_2$
[l] Dichloro (2-chlorovinyl)-arsine: $ClCH:CHAsCl_2$
[m] O-ethyl NN-dimethyl phosphoramidocyanidate: $C_5H_{11}OP(O)CN(NCH_3)_2$
[n] Isopropyl methylphosphonofluoridate: $CH_3P(O)(F)OCH(CH_3)_2$
[o] Pinacolyl methyl phosphonofluoridate: $CH_3P(O)(F)OCH(CH_3)C(CH_3)_3$
A Soviet agent 'VR-55' has been reported. This may be *Soman*
[p] O-ethyl S-2-diisopropylaminoethyl methylphosphonothiolate



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Tables of Comparative Strengths

1. Nuclear Delivery Vehicles: Comparative Strengths and Characteristics

(A) United States and Soviet Union

(I) MISSILES AND ARTILLERY

United States						Soviet Union					
Category and type	Number deployed (7/81)	First deployed	Range[a]	Throw-weight (000 lb)[b]	Warheads, max. yield[c] and notes	Category and type[f]	Number deployed (7/81)	First deployed	Range[a]	Throw-weight (000 lb)[b]	Warheads, max. yield[c] and notes
Strategic			(nm/km)			**Strategic**			(nm/km)		
Land-based *(ICBM)*[d]						**Land-based** *(ICBM)*[d]					
Titan II	52	1962	8,100/15,000	7.5	1 × 9 MT, General Electric Mk 6.	SS-11 *Sego*	580	1966	5,700/10,500	1.5–2	Mod 1: 1 × 1–2 MT. Mod 3 (has replaced some Mod 1): 3 × 100–300 KT (MRV).
Minuteman II	450	1966	6,100/11,300	1–1.5	1 × 1–2 MT, Avco Type 11B/C.	SS-13 *Savage*	60	1968	5,400/10,000	1	1 × 1 MT.
Minuteman III	550	1970	7,000/13,000	1.5–2	3 × 165 KT (MIRV), GE Mk 12/12P.	SS-17	150	1975	5,400/10,000	6	Mod 1: 4 × 900 KT (MIRV). Mod 2: 1 × 5 MT operational. SS-17 has replaced some SS-11, using modified SS-11 silos.
						SS-18	308	1975	5,700/10,500	16.7	Mod 1: 1 × 18–25 MT.
									5,000/9,300	n.a.	Mod 2: 8 × 2 MT (MIRV).
									5,700/10,500	n.a.	Mod 3: 1 warhead, CEP about 600ft.
									n.a.	n.a.	Mod 4: 1 × 10–50 MT.
						SS-19 Mod 1	300	1975	6,000/11,000	7.5	6 × 550 KT (MIRV) (in modified SS-11 silos).
						Mod 2		n.a.	5,500/10,200		1 × 5 MT (tested).
Sea-launched *(SLBM)*						**Sea-launched** *(SLBM)*					
Polaris A-3	80	1964	2,500/4,600	1	3 × 200 KT (MRV) Lockheed Mk 3.	SS-N-5 *Serb*	57	1964	600/1,120	n.a.	1 × 1–2 MT. (Includes 39 non-SALT.)
Poseidon C-3	432	1971	2,500/4,600	2	10 × 50 KT (MIRV) or 14 RV over reduced range.	SS-N-6 *Sawfly*					
						Mods 1,2	165	1969	1,300/2,400	1.5	1 × 1–2 MT tested.
Trident C-4	64	1980	4,000/7,400	3+	8 × 100 KT (MIRV)	Mod 3	288	1969	1,600/3,000	1.5	2 × 3 KT range (MRV).
						SS-N-8	291	1972	4,300/8,000	1.5	1 × 1–2 MT.
						SS-NX-17	12	1977	2,700/5,000	3	1 × MT; also tested with MIRV. May be solid-fuel successor to SS-N-6.
						SS-N-18	176	1978	4,500/8,000	5	3 × 1–2 MT (MIRV). Solid-fuel successor to SS-N-8.
Intermediate						**Intermediate**					
Land-based *(IMRBM)*						**Land-based** *(IMRBM)*[d]					
						SS-4 *Sandal*	340	1959	1,000/1,900	n.a.	1 × 1 MT. Being withdrawn.
						SS-5 *Skean*	40	1961	2,200/4,100	n.a.	1 × 1 MT. Being withdrawn.
						SS-20	230	1977	2,700/5,000	n.a.	Mod 1: 1 × 1.5 MT.
									3,000/5,600	n.a.	Mod 2: 3 × 150 KT (MIRV).
									4,000/7,400	n.a.	Mod 3: 1 × 50 KT.
Tactical[e]						**Tactical**					
Land-based *(SRBM)*[d]			(km)			**Land-based** *(SRBM)*[d,e]			(km)		
Pershing	108	1962	160–720	n.a.	Dual-capable, 1 × high KT range.	SS-1b *Scud* A	410	1957	150	n.a.	1 × KT range. To be replaced by SS-23.
Lance	36	1972	70–110	n.a.	Dual-capable, 1 × low KT range.	SS-1c *Scud* B		1965	160–300		
						FROG-7	482	1965	16–70	n.a.	1 × KT range. Being replaced by SS-21.
						SS-12 *Scaleboard*	65	1969	490–900	n.a.	1 × MT range. Being replaced by SS-22.
						SS-21	n.a.	1978	65–120	n.a.	n.a.
						SS-22	n.a.	1979	540–1,000	n.a.	n.a.
						SS-23	n.a.	1979–80	190–350	n.a.	n.a.
(GLCM)						*(GLCM)*			(nm/km)		
						SS-C-1b *Sepal*	(100)	1962	240/450	n.a.	1 × KT range. Similar to SS-N-3.
Sea-launched *(SLCM)*						**Sea-launched** *(SLCM)*					
						SS-N-3 *Shaddock*	324	1962	240/450	n.a.	1 × 350 KT or conventional.
						SS-N-7 *Siren*	138(–)	1968	25/45	n.a.	1 × 200 KT or conventional.
						SS-N-9	130(+)	1968/9	150/280	n.a.	1 × 200 KT or conventional.
						SS-N-12	56	1979	550/1,000	n.a.	2 warheads. SS-N-3 replacement.
									2,000/3,700	n.a.	
						SS-N-19	40	1980	n.a.	n.a.	Carried in O-class SSGN, *Kirov* cruisers.
Air-launched *ALCM*			(km)			**Air-launched** *ALCM*			(km)		
ALCM											
SRAM	1,250	1972	55–160	2.2	1 × KT range. Carried on B-52G/H (20), FB-111A (6).	AS-2 *Kipper*	n.a.	1961	200	2.2	1 × KT range or conventional.
						AS-3 *Kangaroo*	(70)	1961	600	n.a.	1 × MT range.
						AS-4 *Kitchen*	(135)	1962	300	n.a.	1 × KT range.
						AS-6 *Kingfish*	(65)	1977	250	n.a.	200 KT.
Artillery[e]						**Artillery**					
M-110 203mm SP how	56	1962	29	—	Dual-capable, 1 × KT range.	S-23 180mm towed gun	(168)	1950/55	30	—	Dual-capable, 1 × KT range.
M-109 155mm SP how	252	1964	14	—	Dual-capable, 1 × 2 KT.						

(II) AIRCRAFT[a]

United States						Soviet Union					
Category[b] and type	Number deployed (7/81)	First deployed	Range[a]	Max. speed (Mach)	Weapons load (000 lb)	Category[b] and type[f]	Number deployed (7/81)	First deployed	Range[a]	Max. speed (Mach)	Weapons load (000 lb)
Bombers			(nm/km)			**Bombers**			(nm/km)		
Long-range						*Long-range*					
B-52D	75[c]	1956	5,300/9,900	0.95	60	Tu-95 *Bear*	105	1956	6,900/12,800	0.78	40
B-52G	151[c]	1959	6,500/12,000	0.95	70	Mya-4 *Bison*	45[d]	1956	6,000/11,200	0.87	20
B-52H	90[c]	1962	8,600/16,000	0.95	70						
Medium-range						*Medium-range*					
FB-111A	60	1969	2,540/4,700	2.5	37.5	*Tu-16 Badger*	580[e]	1955	3,500/6,400	0.8	20
						Tu-22 *Blinder*	165[d]	1962	1,200/2,250	1.5	12
						Tu-22M/-26 *Backfire*	135[d]	1974	4,350/8,000	2.5	17.5
Strike aircraft[g]						**Strike aircraft**					
Land-based			(km)			*Land-based*			(km)		
F-4C/D/E	204	1962	2,250	2.4	16	Su-7 *Fitter A*	165	1959	1,400	1.7	5.5
F-111/E/F	156	1967	4,700	2.2/2.5	28	MiG-21 *Fishbed J/K/L/N*	750	1970	1,100	2.2	2
						MiG-27 *Flogger D*	500	1971	1,400	1.7	7.5
Carrier-based			(nm/km)			Su-17/-20 *Fitter C/D*	740	1974	1,800	1.6	11
F-4J/N	(144)	1962	1,200/2,250	2.2	16	Su-19/-24 *Fencer*	480	1974	1,600	2.3	8
A-6E	(60)	1963	1,700/3,200	0.9	18						
A-7E	(144)	1966	1,500/2,800	0.9	20						

(III) HISTORICAL CHANGES IN LAUNCHER STRENGTH (incl trg ac but not reserves)

United States												Soviet Union											
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981		1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
ICBM	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,054	1,052	ICBM	1,527	1,527	1,575	1,618	1,527	1,477	1,350	1,400	1,398	1,398	1,398
SLBM	656	656	656	656	656	656	656	656	656	656	576	SLBM	448	500	628	720	784	845	909	1,028	1,028	1,028	989
Long-range bombers	360	390	397	397	397	387	373	366	365	338	316	Long-range bombers	140	140	140	140	135	135	135	135	156	156	150

(B) Other NATO and Warsaw Pact Countries

(I) MISSILES AND ARTILLERY

NATO (excluding USA)						Warsaw Pact (excluding USSR)					
Category and type[l]	Number deployed (7/81)	First deployed	Range[a]	Warheads and max. yield[k]	Countries equipped	Category and type[l][m]	Number deployed (7/81)	First deployed	Range[a]	Warheads and max. yield[k]	Countries equipped
Land-based			(nm/km)			**Land-based**					
IRBM[d]											
SSBS S-2/-3	18	1971/1980	1,600/3,000	1 × 150 KT	France.						
SRBM[d]			(km)			*SRBM*[d]			(km)		
Honest John	42	1953	40	1 × KT range	Greece, Turkey[m].	SS-1c *Scud B*,					
Pershing	72	1962	720	1 × KT range	FRG.[m]	KY-3 *Scud C*	143	1965	270–450	Dual-capable. 1 × KT range.	All.[n]
Pluton	42	1974	120	1 × 15–25 KT	France.						
Lance	61	1976	110	1 × KT range	Belgium, Britain, FRG, Italy, Netherlands.	*FROG-3/-7*	205	1957-65	40–60	Dual-capable. 1 × KT range.	All.[o] *FROG-3* obsolescent.
Sea-launched			(nm/km)			**Sea-launched**					
SLBM											
Polaris A-3	64	1967	2,500/4,600	3 × 200 KT (MRV)	Britain (to be fitted with *Chevaline* warhead).						
MSBS M-20	80	1977	1,600/3,000	1 × MT	France.						
Artillery			(km)			**Artillery**					
M-110 203mm sp how	202	1962	16	Dual-capable. 1 × KT range.	Belgium, Britain, Denmark, FRG, Greece, Italy, Netherlands, Turkey.[m]						
M-109 155mm sp how	1,402	1964	16	Dual-capable. 1 × 2 KT range	Belgium, Britain, Canada, Denmark, FRG, Greece, Italy, Netherlands, Norway, Turkey.[m]						

(II) AIRCRAFT[a]

NATO (excluding USA)							Warsaw Pact (excluding USSR)						
Category[b] and type[g]	Number deployed (7/81)	First deployed	Range[a]	Max. Speed (Mach)	Weapons load (000 lb)	Countries equipped	Category and Type[f]	Number deployed (7/81)	First deployed	Range[a] (km)	Max. Speed (Mach)	Weapons load (000 lb)	Countries equipped
Bombers							**Bombers**						
Medium-range			(nm/km)										
Vulcan B2	48	1960	3,500/6,400	0.95[i]	21	Britain							
Strike aircraft							**Strike aircraft**						
Land-based			(km)				*Land-based*[n]						
F-104	318	1958	2,400	2.2	4	Belgium, FRG, Greece, Italy, Netherlands, Turkey.	Su-7 *Fitter A*	115	1959	1,400	1.7	5.5	Czechoslovakia, Poland.[o]
F-4	180	1962	2,200	2.4	16	FRG, Greece, Turkey.	Su-20 *Fitter C*	35	1974	1,800	1.6	4.0	Poland.[o]
Buccaneer	60	1962	3,700	0.95	12	Britain.							
Mirage IVA	33	1964	3,200	2.2	16	France.							
Mirage IIIE	30	1964	2,400	1.8	19	France.							
Jaguar	80	1974	1,600	1.4	10	Britain, France.							
Carrier-based			(nm/km)										
Super Etendard	36	1980	800/1,500	1.0	16	France.							

Notes to Table I:

[a] Ranges given in nautical miles and/or km. Use of maximum payload may reduce a missile's operational range by up to 25% of figures shown. Figures for aircraft are theoretical maximum 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 800nm/1,500km, compared with a maximum ferry *range* of 2,500nm/4,700km.

[b] Throw-weight is the weight of post-boost vehicle (warheads, guidance systems, penetration aids) deliverable over a given range. At maximum range, throw-weight will be less than shown.

[c] 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.

[d] ICBM = range of over 3,500 nm (6,400 km); IRBM = 1,300–3,500 nm (2,400–6,400 km); MRBM = 430–1,300 nm (800–2,400 km); SRBM = under 430 nm (800 km).

[e] Deployment figures for systems in Europe only, incl European USSR. Carrier-based ac figures assume 6 carriers in European area.

[f] Names of Soviet missiles and aircraft (e.g. *Scarp, Bear*) are of NATO origin. Numerical designations of Soviet missiles (but not aircraft) are of US origin.

[g] All the types listed are dual-capable, but some in the strike categories are not presently configured for the nuclear role.

[h] Long-range = over 5,200nm/9,000km; medium-range = 3,000nm/5,600km–5,200nm/9,000km; bomber = aircraft primarily designed for bombing missions.

[i] Excluding ac in storage or reserve.

[j] Excluding tankers (LRAF: 35 Mya-4, 10 Tu-16; Naval Air: 70 Tu-16).

[k] Including Naval Air Force bombers (some 270 Tu-16, 40 Tu-22, 70 Tu-22M/-26).

[l] Listed as a medium-range bomber on the basis of reported range characteristics.

[m] All NATO missiles of American origin, except SSBS, *Pluton* and MSBS (French). All Warsaw Pact vehicles of Soviet origin.

[n] Nuclear warheads held in American custody. No nuclear warheads held on Danish or Norwegian soil. In few cases is the M-109 likely to have a nuclear role.

[o] Nuclear warheads held in Soviet custody.

[p] *Vulcan* and *Buccaneer* of British origin; F-104 and F-4 American; *Mirage* and *Super Etendard* French; *Jaguar* Anglo-French. All Warsaw Pact aircraft of Soviet origin. It is uncertain how many are nuclear capable.

2. Indices of NATO Defence Expenditure, Current and *Constant* Prices[a]

(in local currency, 1970=100)

Country	1960	1975	1976	1977	1978	1979	1980 (provisional)	% Growth[b] 1960–70	% Growth[b] 1970–79
Belgium	53.9	186.5	217.8	239.3	264.8	282.7	306.4	6.4	12.2
	72.5	*124.7*	*133.4*	*136.4*	*144.9*	*148.2*	*150.4*	*3.3*	*4.5*
Britain	67.7	211.3	250.9	279.1	306.5	366.4	454.9	4.0	15.5
	100.6	*114.6*	*116.8*	*112.1*	*113.7*	*117.1*	*122.7*	*0*	*1.8*
Canada	80.3	151.7	174.1	200.1	223.0	230.8	245.6	2.2	9.8
	105.3	*106.6*	*113.6*	*121.1*	*123.9*	*117.6*	*113.5*	*–0.5*	*1.9*
Denmark	40.4	191.3	206.0	230.1	258.8	285.1	343.5	9.5	12.3
	71.4	*122.9*	*121.3*	*122.1*	*124.7*	*125.4*	*134.6*	*3.4*	*2.5*
France	57.7	171.3	195.6	225.1	255.3	290.0	335.6	5.6	12.6
	85.7	*112.5*	*117.2*	*123.7*	*128.4*	*133.7*	*139.6*	*1.6*	*3.3*
Germany	53.7	166.5	172.4	178.0	188.7	119.2	212.9	6.4	8.0
	70.2	*123.6*	*122.4*	*121.7*	*125.8*	*127.6*	*129.2*	*3.6*	*2.8*
Greece	36.0	309.1	291.9[c]	346.1[c]	392.7[c]	199.2[c]	217.8[c]	10.8	8.0
	44.2	*172.6*	*144.1[c]*	*152.1[c]*	*153.3[c]*	*139.3[c]*	*122.0[c]*	*8.5*	*3.7*
Italy	45.5	198.7	231.0	290.2	324.4	395.8	456.0	8.2	16.5
	67.0	*116.7*	*115.8*	*124.1*	*127.5*	*135.6*	*128.9*	*4.1*	*3.5*
Luxembourg	63.2	201.0	236.3	247.4	278.8	300.0	356.5	4.7	13.0
	81.5	*141.8*	*131.9*	*148.9*	*162.8*	*167.5*	*187.3*	*2.1*	*5.9*
Netherlands	43.5	182.6	197.0	233.4	236.1	260.9	268.7	8.7	11.3
	65.6	*120.7*	*119.7*	*133.2*	*129.5*	*137.3*	*132.8*	*4.3*	*3.6*
Norway	38.1	171.0	192.2	213.9	243.5	261.5	293.0	10.1	11.3
	59.2	*115.0*	*117.8*	*120.1*	*126.6*	*129.6*	*131.2*	*5.4*	*3.0*
Portugal	24.1	158.0	150.3	176.1	208.3	261.5	321.0	15.3	11.3
	37.3	*78.6*	*61.5*	*58.2*	*60.9*	*62.4*	*61.9*	*10.4*	*–3.6*
Turkey	38.6	271.4[c]	427.3[c]	681.4[c]	811.6[c]	1,152.1[c]	2,076.2[c]	10.0	31.2
	68.4	*131.9[c]*	*177.3[c]*	*222.0[c]*	*182.3[c]*	*178.1[c]*	*202.2[c]*	*3.9*	*6.6*
United States	58.3	116.8	116.9	129.6	135.0	151.1	173.6	5.5	4.7
	76.5	*84.3*	*79.7*	*83.0*	*80.4*	*80.9*	*81.9*	*2.7*	*–1.9*

[a] Constant price series defence expenditures (in italics) are deflated by consumer price indices. These reflect general (not defence sector) rates of inflation.

[b] Average annual compound growth rates.

[c] Based on *national*, not NATO, definitions of defence expenditure.

3. Average Strength of Military Formations (in thousands)

	Division					Brigade				Squadron
	Armoured		Mechanized		Airborne	Armoured		Mechanized		
	Men	Tanks	Men	Tanks	Men	Men	Tanks	Men	Tanks	Fighter aircraft
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. Some GSFG tk divs may have up to 415 tks, and mech divs up to 320.

[b] Strength of a regiment, which is the equivalent formation in the Soviet and Chinese command structures. (The term 'regiment' is, however, often employed, particularly in West European countries, to describe a battalion-size unit, and it is so used in *The Military Balance*.)

[c] Infantry division.

[d] Britain 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.

4. Comparisons of Defence Expenditure and Military Manpower 1975-81

Country	$ million			$ per head			% of government spending[a]			% of GNP[b]		Numbers in armed forces (000)			Est. reservists[c] (000)	Para-military (000)
	1975	1980	1981	1975	1980	1981	1975	1980	1981	1975	1980	1975	1980	1981	1981	1981
Warsaw Pact[d]																
Bulgaria	457	1,140	1,340	52	128	151	6.0	6.0	6.0	2.7	3.4	152.0	149.0	149.0	240.0	175.0
Czechoslovakia	1,706	3,520	n.a.	116	229	n.a.	7.3	7.6	n.a	3.8	4.0	200.0	195.0	194.0	325.0	157.5
Germany, East	2,550	4,790	6,960	148	285	415	7.9	7.5	8.5	5.5	6.1	143.0	162.0	167.0	305.0	70.2
Hungary	506	1,080	1,240	48	101	115	3.5	3.8	3.9	2.4	2.3	105.0	93.0	101.0	143.0	75.0
Poland	2,011	4,670	n.a.	59	131	n.a.	7.0	6.0	n.a	3.1	3.2	293.0	317.5	319.5	605.0	72.0
Romania	707	1,470	1,350	33	66	61	3.7	4.0	2.3	1.7	1.3	171.0	184.5	184.5	300.0	37.0
Soviet Union[e]	124,000	n.a.	n.a.	490	n.a.	n.a.	n.a.	n.a.	n.a.	12–14%		3,575.0	3,663.0	3,673.0	5,200.0	560.0
NATO[f]																
Belgium	1,971	3,735	3,560	200	378	359	10.0	9.3	9.0	3.0	3.3	87.0	87.9	89.5	155.5	16.0
Britain	11,118	24,448	28,660	198	437	512	11.6	12.3	12.3	4.9	5.1	345.0	329.2	343.6	276.4	6.9
Canada[g]	2,965	4,240	4,990	130	177	205	11.9	n.a.	9.1	2.2	1.7	77.0	78.6	79.5	23.3	—
Denmark	939	1,404	1,520	185	274	295	7.3	6.4	7.1	2.2	2.4	34.0	35.1	32.6	57.5	73.3
France	13,984	20,220[g]	26,008	264	374	483	20.2	20.3	20.5	3.9	3.9	502.0	494.7	504.6	450.0	88.9
Germany[h]	16,142	25,120	25,000	259	410	405	24.4	22.2	22.6	3.7	3.2	495.0	495.0	495.0	750.0	—
Greece	1,435	1,770[g]	n.a.	159	236	n.a.	25.5	19.8	n.a.	6.9	5.1	161.2	181.5	193.5	390.0	34.0
Italy	4,700	6,580	8,887	84	n.a.	155	9.7	n.a.	5.1	2.6	2.4	421.0	366.0	366.0	738.0	193.9
Luxembourg	22	49	51	65	134	140	3.0	3.3	3.3	1.1	1.0	0.6	0.7	0.7	—	0.5
Netherlands	2,978	5,239	4,930	218	374	348	11.0	7.3	9.5	3.6	3.4	112.5	115.0	102.8	171.0	12.7
Norway	929	1,570[g]	n.a.	232	383	n.a.	8.2	10.8	n.a.	3.1	2.9	35.0	37.0	37.0	162.0	85.0
Portugal	1,088[g]	890	944	124	90	94	35.2	12.0	10.9	6.0	3.8	217.0	59.5	70.9	n.a.	37.3
Turkey[g]	2,200	2,921	3,106	55	54	67	26.6	22.0	19.0	9.0	4.2	453.0	567.0	569.0	470.0	120.0
United States	88,983	142,700	171,023	417	644	759	23.8	23.3	23.7	5.9	5.5	2,130.0	2,050.0	2,049.1	879.4	56.6
Other European																
Austria	410	915	870	54	122	116	3.7	4.1	3.8	1.0	1.2	38.0	50.3	50.3	910.0	—
Fire	128	285	n.a.	41	86	n.a.	4.3	3.3	n.a.	1.6	n.a.	12.1	14.8	14.0	22.5	—
Finland	388	656	713	83	142	149	5.0	5.4	5.1	1.4	1.5	36.3	39.9	39.9	700.0	4.0
Spain	1,701	n.a.	3,980	48	129	105	14.5	12.5	12.0	1.8	n.a.	302.3	342.0	342.0	1,085.0	104.0
Sweden	2,483	3,588	3,790	303	432	455	10.5	7.7	7.7	3.4	3.2	69.8	66.1	64.3	500.0	0.5
Switzerland	1,047	1,832	1,840	160	290	154	19.3	18.9	20.2	1.8	n.a.	18.5	18.5	20.5	621.5	—
Yugoslavia	1,705	3,634	3,470	80	164	154	49.9	56.9	n.a.	5.6	n.a.	230.0	264.0	252.5	500.0	2,020.0
Middle East																
Algeria	285	705	914	17	36	47	4.7	5.3	n.a.	2.2	n.a.	63.0	101.0	101.0	100.0	10.0
Egypt	6,103	n.a.	n.a.	163	n.a.	n.a.	42.0	n.a.	n.a.	50.4	n.a.	322.5	367.0	367.0	335.0	139.0
Iran	8,800	4,200	n.a.	268	110	n.a.	24.9	12.3	n.a.	17.4	n.a.	250.0	240.0	195.0	400.0	75.0
Iraq	1,064	2,700	n.a.	107	202	n.a.	43.7	24.0	n.a.	7.9	n.a.	135.0	242.3	252.3	250.0	79.8
Israel	3,552	5,200	7,340	1,045	1,333	1,835	50.1	32.0	30.6	35.9	23.2	156.0	169.6	172.0	504.0	4.5
Jordan	155	n.a.	420	57	n.a.	127	22.0	22.3	25.0	12.2	n.a.	80.2	67.2	67.5	35.0	11.0
Libya	203	n.a.	n.a.	83	n.a.	n.a.	13.7	n.a.	n.a.	1.7	n.a.	32.0	53.0	55.0	n.a.	5.0
Morocco	224	676	1,210	13	34	56	4.5	20.7	16.7	2.8	6.7	61.0	116.5	120.0	n.a.	30.0
Saudi Arabia	6,771	20,704	27,695	1,153	2,518	2,664	20.0	28.1	31.0	18.0	n.a.	47.0	47.0	51.7	n.a.	36.5
Sudan	120	245	n.a.	7	13	n.a.	15.1	12.7	n.a.	n.a.	n.a.	48.6	68.0	71.0	n.a.	3.5
Syria	706	4,040	2,389	96	459	261	25.3	30.5	30.8	15.1	13.1	177.5	247.5	222.5	102.5	9.8
Africa																
Ethiopia	84	385	n.a.	3	17	n.a.	19.4	n.a.	n.a.	2.9	n.a.	44.8	229.5	230.0	20.0	169.0
Nigeria	1,786	1,702	n.a.	28	22	n.a.	11.8	8.7	n.a.	7.1	n.a.	208.0	146.0	156.0	2.0	—
South Africa	1,332	2,556	n.a.	53	89	n.a.	18.5	18.1	n.a.	5.3	n.a.	50.5	86.1	92.7	157.0	145.0
Zimbabwe	102	444	n.a.	16	6	n.a.	12.3	22.0	n.a.	3.0	n.a.	5.7	13.5	34.0	16.0	40.0
Asia																
Australia	2,492	3,900	n.a.	184	272	n.a.	8.6	9.7	n.a.	3.2	3.0	69.1	71.0	72.6	63.8	—
China	n.a.	56,941	n.a.	n.a.	56	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3,250.0	4,450.0	4,750.0	n.a.	12.0
China (Taiwan)	1,007	n.a.	n.a.	61	n.a.	n.a.	n.a.	n.a.	n.a.	6.9	n.a.	494.0	438.2	451.0	1,170.0	100.0
India	2,660	4,406	5,119	4	7	7	21.1	16.7	16.9	3.0	3.8	956.0	1,104.0	1,104.0	240.0	300.0
Indonesia	1,108	2,070	2,387	9	14	5	16.7	12.3	n.a.	3.8	n.a.	266.0	241.8	273.0	n.a.	82.0
Japan	4,620	8,960	11,497	42	75	98	6.6	4.7	5.0	0.9	0.9	236.0	241.0	243.0	41.6	—
Korea, North	878	1,300	1,470	54	74	74	n.a.	14.6	14.7	n.a.	n.a.	467.0	678.0	782.0	300.0	38.0
Korea, South	943	3,460	4,400	28	91	113	29.2	36.0	n.a.	5.1	5.7	625.0	600.6	601.6	1,240.0	2,800.0
Malaysia	385	1,465	2,250	31	108	157	17.3	14.3	23.0	4.0	n.a.	61.0	66.0	102.0	51.0	90.0
New Zealand	243	426	n.a.	79	135	n.a.	4.3	3.9	n.a.	1.8	1.8	12.7	12.6	12.9	9.8	—
Pakistan	725	1,540	n.a.	10	n.a.	17	12.3	n.a.	n.a.	7.2	n.a.	392.0	438.6	450.6	513.0	109.1
Philippines	407	962	863	10	20	17	19.3	13.0	n.a.	2.6	2.0	67.0	112.8	112.8	124.0	110.5
Singapore	344	574	n.a.	152	239	n.a.	18.1	16.5	n.a.	5.3	6.1	30.0	42.0	42.0	50.0	37.5
Thailand	542	1,092	1,279	13	23	26	25.7	20.5	18.7	3.7	n.a.	204.0	230.8	238.1	500.0	44.5
Latin America																
Argentina	1,031	3,380	n.a.	41	12.3	n.a.	9.7	15.1	n.a.	0.9	n.a.	133.5	139.5	185.5	250.0	43.0
Brazil	1,283	1,540	n.a.	12	13	n.a.	9.3	6.8	n.a.	1.3	0.7	245.5	272.6	272.6	560.0	185.0
Colombia	106	31	n.a.	4	12	n.a.	n.a.	9.3	n.a.	0.8	n.a.	64.3	65.8	70.0	70.0	50.0
Cuba	n.a.	1,100	n.a.	n.a.	111	n.a.	n.a.	n.a.	n.a.	n.a.	8.5	117.0	206.0	227.0	130.0	18.0
Mexico	586	803	1,166	10	12	17	2.4	1.1	n.a.	0.7	n.a.	332.5	357.0	369.5	250.0	—
Peru	383	n.a.	n.a.	24	n.a.	n.a.	15.3	n.a.	n.a.	3.1	n.a.	56.0	95.5	130.0	n.a.	25.0
Venezuela	494	1,118	1,399	41	53	85	5.4	n.a.	n.a.	1.7	2.3	44.0	40.5	40.8	n.a.	20.0

[a] This series is designed to show national trends only; differences in the scope of the government sector invalidate international comparisons.
[b] Based on local currency. GNP estimated where official figures unavailable.
[c] Reservists with recent training.
[d] The difficulty of calculating suitable exchange rates makes conversion to dollars imprecise.
[e] See pp. 61.
[f] Defence expenditures are based on the NATO definition. Figures from 1980 provisional only. GDP figures used.
[g] Expenditure and GNP figures estimated from nationally-defined data.
[h] Incl. aid to W. Berlin.

A Living History

More than 1,000,000 people wander through the labyrinthine display halls of the US Air Force Museum each year. The Museum's main attraction is its 130 airplanes—everything from a Wright Flyer to the huge XB-70. But it's not just an airplane museum, it's a museum about people—the people who made the Air Force what it is today.

BY CAPT. PHIL LACOMBE, USAF
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Photos by William A. Ford
ART DIRECTOR

"THIS is not just an airplane museum," says Col. Richard Uppstrom, Director of the US Air Force Museum at Wright-Patterson AFB, Ohio. "This is a tapestry, woven of the lives of the men and women who made the Air Force what it is today—and, of course, the machines too."

That's exactly what the Museum's staff of fifty-five people has created—a work of art accurately depicting the development of America's military airpower from its first stirrings to the space program.

The Museum is the largest and oldest military aviation museum in the world—dating back fifty-eight years to a corner of a hangar at McCook Field near Dayton, Ohio, where a few World War I airplanes were displayed. Today, the Museum is located on the Wright Field portion of Wright-Patterson AFB, in a ten-year-old, $7 million building. Financed entirely by public contributions, the building is located on a 400-acre site not far from the historic Huffman Prairie where the Wrights conducted many of their early aviation experiments.

Prologue to Flight

The beginnings of American military aviation are inseparable from man's initial thoughts about flight, and the Air Force Museum recognizes this. The vision of early thinkers is commemorated in the first displays encountered on the self-guided tour through the Museum's chronologically arranged collection.

The first display, known as the Prologue to Flight, includes a valued statue of the mythical Greek hero Icarus, who flew toward the sun on gossamer wings; an animated model of da Vinci's helicopter design; and a large inscription setting the tone for the displays that follow: "Since the beginning of time, there have been those men who looked to the sky, who envied birds their graceful, soaring flight, who said to themselves, 'if I could but fly,' this is the story of those men and the remarkable things that have happened since." These words are at once an effective introduction to the Museum and a summary of its message.

From the Prologue display, you enter the Museum's maze. Strategically placed signs lead you on a winding tour past the various aircraft and memorabilia displayed in two large galleries divided into sections or minimuseums of important periods in Air Force history. There are basically seven different periods on display: The Prologue to Flight; Early Flight; World War I; the 1920s and '30s; World War II; Korea; and a still unfinished display representing the years since Korea, Vietnam, and the Space Age—plus several smaller special exhibits dedicated to specific subjects, like space food and Air Force Chaplains.

The Museum, though packed with aircraft and easily understood displays of photographs, documents, uniforms, and hardware, is still "in its first iteration," according to Colonel Uppstrom. "We haven't finished designing and building the Museum's displays through the '70s, but we are getting close."

Early Aircraft

The Museum staff agrees that the 1,000,000 visitors each year seem to be most interested in the 130 aircraft on display in the main building, the park in front, and the two-hangar Annex located about three-quarters of a mile away on the old Wright Field flight line. The first airplane you encounter on the tour of the main building is the Wright Military Flyer of 1909. Since the original 1909 machine is in the National Air and Space Museum, the Museum's staff built this one. It was constructed by the restoration branch according to the Wrights' original specifications and includes an engine and other metal items provided by the Wright estate. Royal Frey, the Curator, smiles when he talks about the reproduction: "General [Benjamin] Foulois once told me that he believed this plane was about as original as the one in the Smithsonian. He said the only part that he didn't have to replace on that airplane was the upper wing—because he never learned to land it upside-down—so the one at the Smithsonian isn't much more original, only older."

The next airplane on the Museum tour is a 1911 Modified B Flyer. This airplane was donated by Eugene Kettering, a former Chairman of the Air Force Museum Foundation, who is credited with raising much of the money required to build the Museum's building. The late Mr. Kettering also donated his collection of 600 scale model airplanes. This collection provides Museum visitors with a one-seventy-sixth scale microcosm of the world's most important aircraft in one room.

On a wall nearby is a display dedicated to Cpl. Eddie Ward—the first enlisted man in the US Army's original air arm, the Aeronautical Division of the Signal Corps. A photo of Corporal Ward, his uniform, and a copy of the letter transferring him to the Aeronautical Division are displayed. "You'll note on the letter," says Frey, "there were two enlisted men assigned to the Aeronautical Division, Ward and a private. Shortly after reporting for duty, however, the private disappeared."

Another airplane in the Early Flight display has special significance for the Museum staff—it's a World War I Standard J-1 trainer that "was just a pile of junk when we got it," Frey says. When the staff was finished putting it together and making new pieces to replace lost parts, they decided to leave the plane uncovered, so visitors could

Views of the Museum. Top, a Goblin parasite jet fighter is dwarfed by its mother ship, the huge Convair B-36J bomber. Above, massive C-133A Cargo Master displayed outside the main Museum building receives a lot of attention from Museum visitors. Right, framed by the landing gear of a KB-50, the only existing XB-70 Valkyrie greets visitors outside the Museum entrance.

see the kind of construction that went into building these early aircraft. The highly varnished wood seems to give off a brown glow—a fitting tribute to these modern builders of wooden airplanes.

Unobtrusively placed on a wall is a letter from then-Lieutenant Foulois to the War Department outlining the circumstances surrounding his 1913 crash in a privately owned Wright Flyer on loan to the Army. Pointing to the letter, Frey labels it "the first aircraft accident report."

World War I Aircraft

Another special attraction greets you as you enter the World War I display area—a Sopwith Camel. Perfect in every detail and requiring only minor preparations to be flyable, this Camel was built in the Museum's shops. Made to the specifications of the original Sopwith factory drawings of 1917, the Camel shows the real artistry of the Museum's restoration division. Without their dedication and talent, there would be no Camel on display in the Museum, since the only original Camel available went for $43,000 at an auction—far more than the Museum could afford.

Nearby are displays of Capt. Eddie Rickenbacker's memorabilia. "He saved everything, including the train ticket he purchased to go to the front in 1918," Frey says. Besides the ticket, the display includes Captain Rickenbacker's World War I diary and his Medal of Honor. "I never called on him for something that he wasn't right there and ready to help," Frey notes.

Another wall contains pictures of a group of American airmen in strange uniforms. They served with the Polish Air Force during the Bolshevik attack on Poland after World War I. Further along are pictures of Gen. Jimmy Doolittle after completing the first transcontinental flight in less than twenty-four hours on September 4, 1922. "Hardly anyone knew about it at the time," Frey laughs. "Because the newspapers were on strike, General Doolittle didn't get the recognition he deserved for that flight."

Through the 1920s and '30s

A couple of other significant 1920s era aircraft stand beneath a Caquot Type R observation balloon—the type most used by Americans in France during World War I. The balloon once carried two passengers under its hydrogen-filled envelope. Today it hangs from the ceiling, inflated by a continuous flow of air from an automobile heater fan unit mounted on a back wall.

Around the corner from the balloon is another of the Museum's very special aircraft—the Douglas World Cruiser *New Orleans*. With a range of 2,200 miles, the *New Orleans* and another World Cruiser completed the first successful aerial circumnavigation of the globe on September 28, 1924, after logging 23,345 miles in 174 days.

Then there's the first of the modern bombers—the only Martin B-10 still around. Frey says this airplane was found in back of an Argentinian Navy training school and donated by the Government of Argentina. Under the fluorescent light, the blue and yellow B-10 seems to glow, painted like the B-10 that Hap Arnold led from Washington, D. C., to Fairbanks, Alaska.

A short distance from the B-10 stands another Alaska-tested pre-World War II aircraft, the Douglas O-38F. An observation plane, this particular aircraft didn't become famous until June 1968 when the Air Force Museum arranged for a helicopter to lift its well-preserved remains from the wilderness seventy miles southeast of Fairbanks. After crashing there in 1941, the plane remained forgotten until recovered by the Air Force Museum staff.

A number of World War II vintage trainers are also on display. Among them are the last of the 10,346 Stearman PT-13 Kaydets ever built, and a sleek Ryan PT-22. The only remaining P-6E Hawk is also on display near the only American-built aircraft to be used operationally by the Japanese during World War II, the Seversky P-35.

Air Force Music

As you enter the World War II display, you encounter a small case commemorating the music of the Army Air Corps and Army Air Forces. The original score of "Off We Go Into the Wild Blue Yonder" still has the songwriter's penciled marks changing the words, "What do you think of the Air Corps now?" to "Nothing'll stop the Army Air Corps." But the highlight of the music collection is Maj. Glenn Miller's trombone. The well-known bandleader led the Army Air Forces Band in Europe until he was lost in a plane over the English Channel. Frey, a World War II fighter pilot who brought the Miller display to the Museum, is especially fond of it, remembering that "Glenn Miller's band was second only to the Bob Hope show in raising our spirits during the war."

World War II

All of the US World War II airplane types are there. The B-25 on display was rebuilt by the North American Co. to the same configuration as the B-25s that bombed Tokyo in 1942. There's a Bell P-39Q Airacobra with a gun that fired through the propeller spinner and the P-63E Kingcobra that was exported under the Lend-Lease program and earned praise from Russian pilots. Among the other famous planes on display are an A-20 Havoc, a B-26D Marauder, a P-47 Thunderbolt, and an A-36A, the dive-bomber predecessor of the famous P-51 Mustang.

No Air Force museum would be complete without its P-40E Warhawk, painted like those flown by the famed Flying Tigers, and a B-17 Flying Fortress. Then there's Curator Frey's favorite—a P-38L Lightning, painted like the one he was flying when he was shot down over Germany in 1944. Other interesting World War II aircraft on display include various transports; a Waco CG-4A glider, like those used on D-Day; and the first operational helicopter, the Sikorsky R-4B Hoverfly.

At the far end of the World War II display rests the Museum's B-29 Superfortress. This is the famous *Bockscar*, which dropped the atomic bomb over Nagasaki on August 9, 1945. Behind *Bockscar* are two large bombs—the Fat Man and Little Boy atomic bombs, like the ones used on Japan. An astute visitor can compare these two behemoths against the much smaller, but more powerful, thermonuclear device on display in another section of the Museum.

Since part of the Museum's mission is to depict the aircraft that were significant in the history of the US

A group of grade school children take turns inspecting the cockpit of the Museum's T-6G Texan, a mainstay of American military aviation training during the forties.

Air Force, there are a few foreign planes also on display in the World War II section. Among the German airframes present are a Fieseler Storch, like the one that rescued Mussolini from the Appennine Mountains in 1943; a Junkers Ju 52-3M trimotor transport; a Junkers Ju 88D-1 used for various combat missions; a Focke-Wulf FW 109D-9 fighter; and two of Germany's advanced interceptors, the Me 163B Komet and Me 262 Schwalbe—the world's first operational turbojet aircraft.

Other important foreign aircraft on display include the well-respected British Supermarine Spitfire and a Lysander III. There is also a Japanese fighter, the George 21 from the latter part of the war, and an unrestored Zero is awaiting its turn in the shops. Rounding out the important foreign aircraft of World War II are a German buzz-bomb and the Kugisho Ohka Japanese suicide bomb. The Ohka, which means Cherry Blossom, was a manned, rocket-propelled bomb employed with some success against the US fleet during the closing stages of the war.

As you depart the World War II display for the Korean and more modern displays, you pass America's first jet, the Bell P-59 Aircomet and a row of X-planes—research vehicles. Here is the needle-like X-3 Stiletto, a truly beautiful but unsuccessful attempt at a design for sustained supersonic flight. One of the three X-15s is there and the Museum Annex has the unique Ryan X-13 Vertijet that took off and landed vertically.

POW Display

Frey's personal experience as a POW was invaluable in putting together the POW displays. On display in the German section are items procured from his fellow prisoners of Stalag Luft One—everything from a rat maze, to a stove built from powdered milk tins. The ingenuity of the prisoners in attempting to escape is also on display. There are tin can air pumps and air shafts, and candles that "not only provided light, but when they would start to go out, you would signal the guys on the air pump at the mouth of the tunnel to feed you some more air," according to Frey. In addition, there are several examples of the POWs' craft skills—knitted items, embroidery, leather, and woodwork. These materials once toured the country as the Kriegie Kraft Karnival—an idea, Frey says, that was born in his camp before it was liberated by the Russians in May 1945.

Korea and Beyond

Entering the Korean War and 1950–1970 exhibit area, there is the requisite shift in emphasis from propellers to jets. Nonetheless, the displays are just as exciting and the aircraft as unique as those in the Early Flight exhibit, but for different reasons. Here, it is obvious that the Air Force is making an effort to preserve those aircraft that have achieved unique accomplishments.

There's the F-82B Twin Mustang named *Betty Jo* that made the longest nonstop flight by a propeller-driven fighter and an F-80 Shooting Star of the type that shot down a MiG-15 in the world's first all-jet air battle. Also on hand are an F-84E; an F-86A, USAF's first operational jet with a swept wing; and, of course, the famed F-100 Sabre. The C-119 on display was the first plane to catch a returning space capsule in mid-air, and there is also a B-45 Tornado, the nation's first four-engine jet bomber.

As in the World War II section, the Korean conflict display also features foreign aircraft. In this case, there is a very special MiG-15 Fagot. The plane on display was flown to South Korea by a defecting North Korean pilot who was awarded a $100,000 bounty from the US.

One of the most popular of the Museum's attractions is the B-36J that towers over all the other aircraft. Crawling inside the plane is one of the rare treats afforded to Museum visitors on special occasions like the recent Tenth Anniversary Celebration.

Dwarfed beneath the B-36 is one of the two XF-85 Goblins ever built. This stubby little fighter looks as though someone removed everything aft of the cockpit and stuck a couple of small stabilizers on it. You might not believe it, but it did fly—and rather well at that. Designed to provide fighter protection for B-36s beyond normal fighter ranges, the Goblin was lowered and launched from the B-36 on a trapeze. After completing a mission, the Goblin pilot extended a large hook from the nose of the aircraft, attached it to the trapeze, and was hoisted back inside the B-36!

Famous Airplanes

The displays of important aircraft continue throughout the Museum,

though some of the most recent arrivals are kept in the Annex or out of doors in the Air Park. There's the only VC-121 ever built. It was called *Columbine III* when it served as President Eisenhower's airplane. Harry Truman's VC-118, the *Independence*, is also on display in the Annex. Other important post-World War II propeller-driven planes on display include the huge C-133 that set a record by lifting 117,900 pounds of cargo to 10,000 feet in 1958; the EC-121 known as *Triple Nickel*, the first radar plane to direct a US fighter to aerial victory during the Vietnam conflict; and the Douglas A-1E Skyraider that Maj. Bernard Fisher flew when he earned the Medal of Honor for his daring rescue of a downed fellow pilot in Vietnam. An HU-16B, holder of the world's altitude record for twin-engined amphibians, is parked outside the Museum in the Air Park.

Some of the more modern aircraft on display are very special. The B-47 sitting outside was the first plane to have a "fly-by-wire" control system, and the blue-and-white "fly-by-wire" YF-4 still sports canards just behind the cockpit from the Precision Aircraft Control Technology Configuration tests. There is also an XC-142A, the four-engine tilt-wing vertical takeoff landing plane, and one of the three F-107As. Also here are the F-104 that won the 1962 William Tell Air Defense Weapons Meet, and the B-58 Hustler that won the Mackay and Bendix Trophies in 1962, setting three separate records.

Three of the most impressive planes aren't inside the main building. In front of the building, its fuselage poised like a white cobra striking out, sits the only surviving XB-70 Valkyrie. Two more high flyers are in the Annex, a U-2 and a YF-12. For Museum Director Colonel Uppstrom, the YF-12 is a very special aircraft. He readily admits to enjoying his job, but never as much as when he flew in the backseat of the YF-12 on its final flight from Edwards AFB, Calif., to Wright-Patterson AFB in 1979.

There Is Space

These three airplanes, sophisticated though they are, do not mark the end of the tour of Air Force history. There is Space. Though the Museum staff hasn't even begun to prepare its final space displays, they do have several significant items on exhibit. Outside the Museum building, a collection of Air Force missiles points to the sky. Inside, there are the X-24A and X-24B lifting bodies, a Mercury space capsule, a Gemini spacecraft, and the Apollo-15 Command Module that carried its three-man crew to the moon and back in 1971. In addition, some of the Air Force's earliest high-altitude testing vehicles are on display—like the pressurized balloon gondola from the Stargazer program.

Working from original factory plans and improvising for parts that aren't available anymore, Tom Campbell of the restoration branch crafts the leading edge of a P-26 aircraft wing.

Though the tour of the Museum's aircraft may be complete, the job of the Museum isn't. Colonel Uppstrom describes the Museum's mission as preserving the history, traditions, and hardware of the Air Force for educational and historical reasons. The Museum continues to collect the memorabilia of the Wrights, Doolittles, and Arnolds of today, as well as adding aircraft to the Museum collection from the Air Force inventory. It also means seeking out those important aircraft that are not yet among the Museum's holdings.

The Museum's list of the airplanes it would most like to have includes any World War I airplane and about fifty others from the 1919 through World War II period. They are also waiting particularly for a B-1 bomber. "We have a considerable network of people watching for planes for us," says Colonel Uppstrom. "We have contacts in the Military Sales Program who let us know if an interesting plane is being returned to the US from an ally. People on the Air Staff also help us and we work very closely with the Military Aircraft Storage and Disposition Center."

Staff Is Too Small

Frey notes that Colonel Uppstrom is already the commander of one of the largest fleets in the world—more than 850 aircraft. Nearly 700 of them are on loan at about 150 federal installations, such as the Air Force Academy and various military bases. Another forty-two nonfederal institutions, including the Confederate Air Force, also have Museum aircraft on display. The Aircraft Loan to Museums Program, which became the responsibility of the Museum in 1970, has caused an additional strain on the Museum's busy staff. Some Museum staff members note that they cannot possibly inspect all loaned aircraft often enough to ensure they are not being vandalized, cannibalized, or allowed to deteriorate unreasonably. In fact, a couple of Museum staffers indicate their belief that some of the Museum's aircraft on loan may have been severely damaged by neglect or intentional misuse.

Manpower limitations caused by the Museum's growth are a major concern. "When they started putting together the Museum in the 1950s," Frey says, "the staff was about the same size as it is now."

The maintenance burden is a continual challenge for the small staff. To meet the growing maintenance requirement, Colonel Uppstrom has established a "First Aid" team from the Museum's restoration branch. The team "applies band-aids to the most serious corrosion problems on the aircraft displayed outside," Colonel Uppstrom says. The problem is getting worse. In fact, it has become so severe that the time is rapidly approaching when the day-to-day maintenance backlog will surpass the annual number of man-

Reagan Display at Air Force Museum

The US Air Force Museum recently celebrated its Tenth Anniversary in its specially built home at Wright-Patterson AFB, Ohio, with a weekend celebration. Highlighting the festivities was the unveiling of the Ronald Reagan display within the Museum's "Celebrities in Uniform" exhibit.

President Reagan's World War II Air Corps overcoat, identification card, uniform insignia, and other mementos were added to the memorabilia of other well-known former Air Force people—such as Jimmy Stewart, Clark Gable, Gene Raymond, Jackie Coogan, and Glenn Miller.

Representing President Reagan and speaking at the dedication was Col. Barney Oldfield, USAF (Ret.). Colonel Oldfield, a well-known writer and executive with Litton Industries, became a friend of the President's during the late 1930s and 1940s in Hollywood. Mr. Reagan was one of Colonel Oldfield's clients when he was a press agent with Warner Brothers.

Colonel Oldfield was instrumental in the success of the year-long effort by Museum Curator Royal Frey to acquire memorabilia of the President's service in the Army Air Forces. From Colonel Oldfield's exchange of notes and letters with the President, Frey learned that President Reagan would gladly donate whatever mementos he still had from his service days. However, presentation of the materials was delayed.

New exhibit—Reagan display.

The effort finally paid off when an apparently routine package showed up at the Museum. Frey opened the package and found a handwritten letter addressed to him from the President, as well as the promised items.

The exhibit, built by the Museum, presents the President's mementos in an uncluttered, attractive display case.

hours available from the Museum restoration staff.

At the same time, the restoration work backlog continues to grow—three years ago it was sixteen years of work; now it is more than eighteen years. This increase results from acquisitions being made more quickly than restorations can be accomplished.

Out of Roof

Compounding the problem further is the space restriction at the Museum. With the Museum's main building and Annex hangars full, there are more than twenty aircraft and missiles still displayed out of doors. Every time a new airplane is added to the Annex or Main Building, another airplane must be moved outside the shelter. The Museum has "run out of roof."

Preservation of the unprotected machines is especially difficult. The Museum's staff "bird-proofs" the planes by covering every opening that might allow a bird to enter, but can't halt the deterioration caused by the weather. They've tried. "We even brought in Ph.D. metallurgists," says Colonel Uppstrom. "They told us there was no magic solution to corrosion and advised that we wash each airplane once per month." The most the Museum has been able to manage is one wash every two or three years.

Said to be the first Museum Director to have actually asked for the job, Colonel Uppstrom is full of hope: "We have no problem that can't be solved by throwing piles of money at it." He points to a framed drawing on his wall. It depicts the Museum's 800-foot by 240-foot main building joined by a second similar building. Even if the second building opened tomorrow, Colonel Uppstrom says they would still have to store some airplanes at the Annex.

Fewer airplanes or increased selectivity aren't the answers. "We are already pretty selective about what we acquire," Frey says. "Our criterion for selection is to ask ourselves, 'If someone had saved one of these in 1923, would we be happy to have it now and can we handle it?' " Some aircraft don't meet the criteria, like the huge XC-99, which they couldn't afford to restore, and Howard Hughes's *Spruce Goose*, which they quickly passed over a couple of years ago.

Colonel Uppstrom maintains that the answer to the dilemma is already present: the commitment of the public and the Air Force to continuing the Museum and its purpose. The Air Force commitment is obvious from the funding through the dedication of units that voluntarily restored aircraft for the Museum. From the public, the commitment is equally great. The Museum Foundation raised the original $6 million for the building and then added another $1 million for the visitor center that was added later. The Foundation also operates the gift shop, bookstore, and café within the Museum, to help support the collection.

A new program, the Friends of the Museum, was patterned after the Smithsonian Associates program. A ten-dollar subscription fee brings the program's growing membership of more than 7,000 a monthly newsletter and helps to support Museum activities.

Another indication of the Museum's popularity and its recognition as an important Air Force and national resource is its increased use for conferences, meetings, and other events. Dick Baughman, the Museum public affairs officer, says the Museum now averages two such events each week. In addition, the Museum's research facilities—a collection of aircraft plans and drawings, flyers' diaries and papers, and related materials—is becoming increasingly important to scholars, teachers, and researchers.

The Museum's staff frequently emphasizes that this is not just an airplane museum—it is a museum of people. Judging from the popularity of the Museum, the depth of commitment of its staff, and the public's apparent willingness to support it, they are right. It is the oldest and largest military aviation museum in the world—it may well be the best. ■

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BOEING

The times may seem dire as Christmas draws nigh, with the Soviet military buildup continuing and cries for disarmament in Western Europe shaking the NATO Alliance. But as we ponder past holiday seasons that were also gloomy, there is a basis for hope.

A Question of Resolve

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

AN earnest young man dropped by the other day to inform me of his concern about the way things are going in Great Britain, the not always United Kingdom. Although an American, the young man lives in London and has, almost inevitably, acquired a British accent, a distraction that made me wonder why Brits in this country never take on American accents. But never mind.

The young man did have a serious message, one that had to do with creeping neutralism in the British Isles and the danger it poses to the defense of the West. The recent British Labor Party proclamation should be enough to send chills down the spine of anyone who believes in the concept of allied security. Undoubtedly, then, the man is right to worry, although he is too young to remember another time in the late thirties when the Oxford Group was giving out similar signals about a Britain gone soft. That movement, along with *Reichsmarschall* Hermann Göring's bomber force, was a casualty of the Battle of Britain.

Still, there is no denying dangerous signs do exist that a substantial number of people in Britain believe in unilateral disarmament, even if the consequences of that disarmament mean shuffling off into the dreary shadows of the Soviet Empire.

The immediate catalyst for Europe's disarmament movement is the program for modernizing and enhancing NATO's nuclear weapons arsenal, a program that will bring cruise missiles to England's midlands. This better red than dead syndrome is not, of course, confined to the UK. The October disarmament rally in Bonn drew 250,000 people into the narrow streets of that somber old town.

Clearly, no one can question the seriousness of the times. What is in question, apparently, is the resolve of Europeans to face up to them. Since a good bit of this neutralism stems from the hysteria arising from any contemplation of nuclear war, the argument that nuclear war is best prevented by nuclear strength gets lost in the polemics. Rolling over is a less contentious, hence easier, option.

After all these years, it must now be plain to everyone, Soviets and NATO allies alike, that there will never be a serious effort on the part of the Alliance to balance off the Soviet conventional preponderance. For whatever reason, and no one has yet come up with a reassuring one, the Soviets continue to maintain, and add to, Warsaw Pact conventional forces far greater in size than any conceivable NATO threat can justify, a policy they have now applied to their nuclear forces.

Some years ago, NATO's theater nukes were, along with an implied intention to use them if a Soviet invasion got out of hand, the equalizer. Now, with SS-20s threatening all of Europe, the NATO arsenal is beginning to look less formidable and hence less credible. If the protesters have their way in banning these new nuclear weapons, there would be little basis for any credibility at all in NATO's strategy of flexible response. And if the strategy has no credibility, of what use is the Alliance?

And so, while there may be good cause for worry about the way things are going in the UK, especially if the elections in 1984 (how did Orwell ever fasten on that year?) bring the radical Labor faction to power, our present concern should be saved for the Continent.

According to another recent visitor, this time a German with a long and distinguished record in both military and civilian life, these are discouraging times in the Federal Republic. The demonstration in Bonn was not just an orchestrated performance of radicals and innocents, although there was some of that, but an alarming indication of a drift toward neutralism. Willy Brandt, a discredited political figure after the disclosure that his trusted aide, Guillaume, was a professional East German spy, has emerged once again to bedevil his fellow Social Democrat, Chancellor Helmut Schmidt, with statements calculated to undermine the German decision to accept Pershing I missiles.

This campaign from the left, along with the nervous indecision of the weak coalition governments in Belgium and the Netherlands, gives the nuclear weapon modernization program a decidedly shaky future. Only Italy, for all its political troubles, seems steadfast in the decision to accept the missiles. Even there, the disarmament movement managed to organize 250,000 demonstrators on an October day in Rome. All of which suggests there is an unseen hand masterminding and coordinating these antinuclear, anti-American, outbursts throughout Europe.

These are tricky days for NATO and for the whole concept of European defense. Greece, with the election of Andreas Papandreou making NATO's bad dreams come true, is now, at best, an uncertain quantity. We have yet to see what France's turn to the left will do to its NATO ties which have been, since de Gaulle, a la carte, and thus unpredictable.

This is not the best Christmas season ever, but we have seen a lot less cheery ones. For those of us who can remember, there was that last lunge of von Rundstedt through the Ardennes in December 1944, which seemed to threaten an interminable extension of a war we had thought almost won. Then there was a cold Christmas in 1948 when Europe, just beginning to dig out from World War II, seemed on the edge again. The hope for averting a Soviet walkover hinged on the tenuous link of the Berlin Airlift.

The memories of Christmases in Korea and, finally, Vietnam, are not happy ones. We have seen a lot of trouble these past forty years, but one way or another, we still have things better than the people who have caused the trouble. It cannot be accidental, not after all that time. ■

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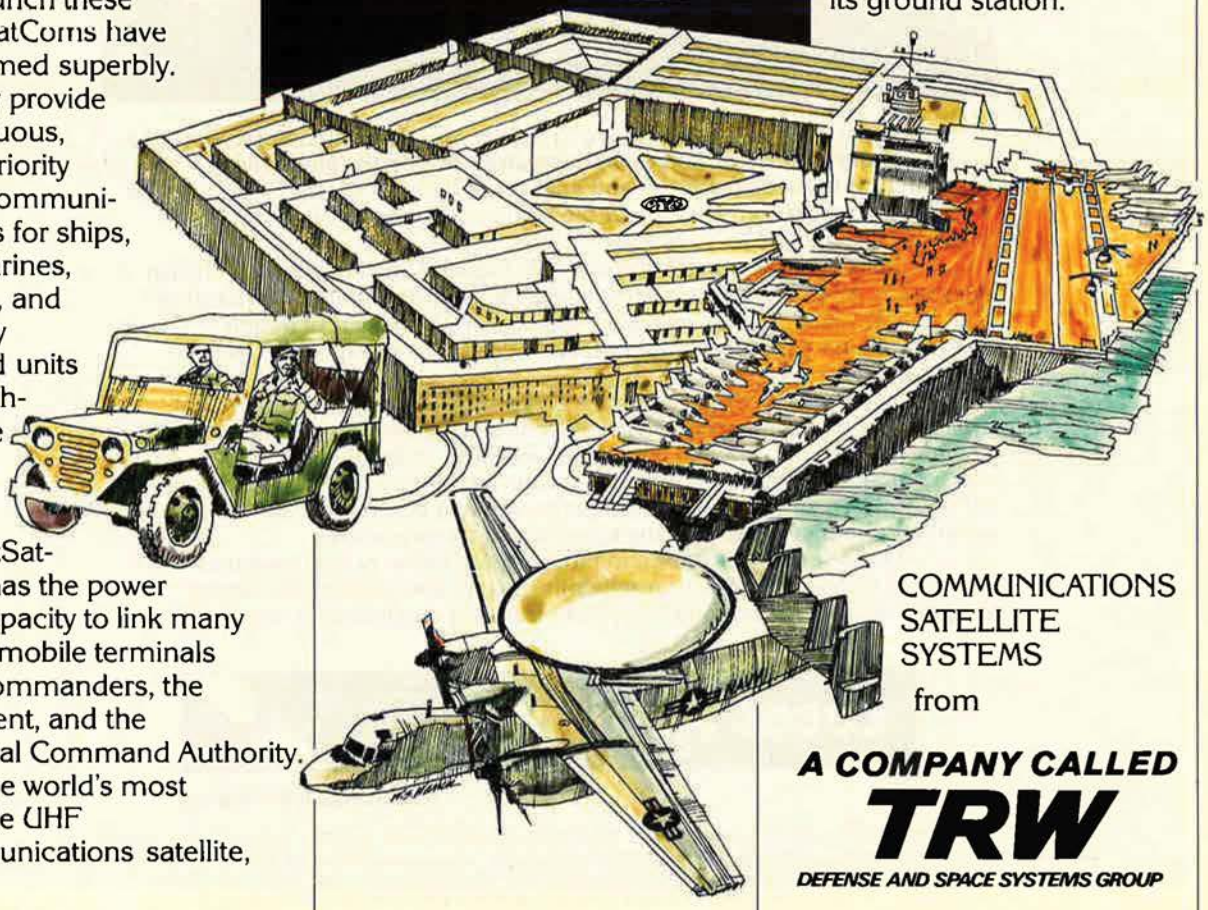

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ALL THE WORLD'S AIRCRAFT SUPPLEMENT

DECEMBER 1981

Artist's impression of the McDonnell Douglas C-17, selected as the winning design to meet USAF's C-X heavy-lift cargo transport requirement

MCDONNELL DOUGLAS

MCDONNELL DOUGLAS CORPORATION: Head Office and Works: Box 516, St Louis, Missouri 63166, USA

MCDONNELL DOUGLAS C-17

The US Air Force's C-X programme is for a long-range, heavy-lift air-refuellable cargo transport, intended primarily to provide inter-theatre airlift of outsize loads, including tanks and infantry fighting vehicles, directly into airfields in potential conflict areas. Design requirements therefore include outstanding STOL performance. The first production aircraft, if the programme receives a full go-ahead, are intended for delivery to Military Airlift Command in the late 1980s, with full operational capability planned for the early 1990s. The C-X is only one ingredient of an Air Force airlift improvement plan that also includes enhancement of current aircraft capabilities, and expanded cargo-carrying capability for the Civil Reserve Air Fleet.

The USAF request for proposals (RFP) for the C-X, issued in October 1980, stressed the need for an aircraft that could be integrated with other USAF airlift equipment, to enhance the responsiveness and flexibility of the nation's conventional military forces. On September 2, 1981, McDonnell Douglas announced that, against competing designs from Boeing and Lockheed, the Douglas Aircraft Company had been selected as prime contractor for full-scale engineering development of this aircraft, which has the USAF designation C-17. Selection did not, at that stage, represent an Air Force commitment to build, since the USAF was still evaluating alternative ways of overcoming the current shortfall in airlift capability. Award of a contract is therefore dependent upon Defense Department approval of the Air Force's overall plan for satisfying its airlift requirements.

The McDonnell Douglas C-17, making use of technology developed for its earlier YC-15 advanced medium STOL transport prototypes (see 1979–80 *Jane's*), will be able to airlift outsize combat equipment which at present can be carried only by the Lockheed C-5A Galaxy, and offer a short-field performance currently provided only by the C-130 Hercules. It will be able to operate from runways only 915 m (3,000 ft) long and 18.3 m (60

ft) wide; on the ground, it will be able to execute a 180° turn in only 24.5 m (80 ft); and a fully-loaded aircraft, using thrust reversal, will be able to reverse up a one in 40 gradient.

TYPE: Long-range heavy-lift cargo transport.

AIRFRAME: General survivability features include ample provisions for crew and troop shielding; redundant load paths, to minimise the effects of battle damage; facility for critical line-replaceable units (LRUs) to be replaced in flight, and for all LRUs to be replaced without removing other equipment.

WINGS: Cantilever high-wing monoplane, of supercritical section with 25° sweepback. NASA-type winglet at each tip, also of supercritical section. Full-span leading-edge slats. Externally-blown flap system, developed from that used on McDonnell Douglas YC-15, to reduce final approach and landing speeds by directing engine efflux over single-hinged, double-slotted Fowler-type trailing-edge flaps to provide extra lift. Flaps, constructed of titanium, use superplastic-forming/diffusion-bonding techniques, and extend over approx two-thirds of each trailing-edge.

FUSELAGE: Conventional semi-monocoque structure, upswept at rear. Rear-loading ramp/door in underside of rear fuselage. Twin strakes under extreme rear of fuselage.

TAIL UNIT: Cantilever T tail. Sweptback fin, with small dorsal fin; inset rudder, in upper and lower segments. Sweptback tailplane, with elevators.

LANDING GEAR: Hydraulically retractable tricycle type, with free-fall emergency extension. Twin-wheel nose unit and six-wheel main units, designed for sink rate of 5.03 m (16.5 ft)/s and suitable for operation from paved runways or unpaved strips. Main-wheel units, each consisting of two legs in tandem with three wheels on each leg, retract into bottom of large fairings on lower fuselage sides; nose unit is forward-retracting.

POWER PLANT: Four 167.2 kN (37,600 lb st) Pratt & Whitney PW2037 turbofan engines, pylon-mounted in individual underwing pods and each fitted with a directed-flow thrust reverser deployable both in flight and on the ground. Provision for in-flight refuelling.

ACCOMMODATION: Normal flight crew comprises pilot and co-pilot, side by side on flight deck, plus a loadmaster. Provision for additional crew members if required for special missions. Access to flight deck via downward-opening airstair door on each side of lower forward fuselage. Bunks for crew immediately aft of flight deck area; crew comfort station at aft end of cargo hold on starboard side, adjacent to rear loading ramp. Main cargo hold can accommodate Army wheeled vehicles, including five-ton expandable vans, in two side-by-side rows, or Jeeps in triple rows, with straight-in loading via hydraulically actuated rear loading ramp which forms underside of rear fuselage when retracted. Alternatively, aircraft can be equipped as a troop transport, with rows of stowable tip-up seats along the centreline and each side wall, or with litters for medical evacuation mission. Airdrop capability includes single platforms of up to 24,945 kg (55,000 lb), or up to 102 paratroops. The C-17 will be the only aircraft able to airdrop outsize firepower such as the US Army's new infantry fighting vehicle (three of which comprise one deployment load); it can also carry the new M1 main battle tank in combination with other vehicles. Main access to cargo hold is via rear-loading ramp, which is itself capable of supporting 18,145 kg (40,000 lb) of cargo. Undersurface of rear fuselage aft of ramp is formed by door which moves upward inside fuselage to facilitate loading and unloading. Paratroop door at rear on each side, above the rear end of the main landing gear fairing, and two emergency exits above each fairing, forward of the paratroop door.

SYSTEMS: Include fully-redundant flight control and hydraulic systems; independent fuel feed systems; electrical system; APU (in tailcone) operable in flight; explosion-protection system; and fire suppression system. All phases of cargo operation and configuration change can be handled by a single loadmaster.

AVIONICS AND EQUIPMENT: Automatic flight control system, with advanced digital avionics and six CRT displays: dual vertical (VSD) and dual horizontal situation displays (HSD), plus com and nav mission cockpit display units (CDU). Head-up display on left-hand side, for pilot; active frequencies (incl radio transmissions and last received radio identification) are displayed on glareshield in front of co-pilot's seat. Colour VSDs display flight and air data; HSDs display, also in colour, four selectable navigation modes (compass, map, 'sky clear' equipment, and chart), with weather radar overlay on map and SKE formats. Com CDU utilises pre-stored frequencies and channels, and has quick-recall capability; a single page suffices for normal control of all radios and IFF. Nav CDU provides for flight plan entry either manually or by pre-prepared cassette, and permits insertion of in-flight planning changes without disturbing ongoing navigation. All information from CDUs needed to monitor flight and navigation is presented automatically on VSD/HSDs. Master warning/caution annunciator provides automatic monitoring of all main systems and provides visual alerts on glareshields, aural and voice alerts on intercom. Cargo hold equipment includes integral rails and roller conveyors in floor (incl ramp); sidewall rails; tiedown rings of 11,340 kg (25,000 lb) rating, spaced at 61 cm (24 in) intervals; cargo winch and retrieval winch; and Oxford-type tow/release for cargo platforms.

DIMENSIONS, EXTERNAL:

Wing span	50.29 m (165 ft 0 in)
Wing area, gross	353 m² (3,800 sq ft)
Length overall	52.02 m (170 ft 8 in)
Height overall	16.31 m (53 ft 6 in)

DIMENSIONS, INTERNAL:

Cargo compartment:	
Length, incl 5.79 m (19 ft 0 in) rear-loading ramp	26.52 m (87 ft 0 in)
Max width	5.49 m (18 ft 0 in)
Height under wing	3.61 m (11 ft 10 in)
Max height	4.11 m (13 ft 6 in)

WEIGHTS:

Weight empty	117,480 kg (259,000 lb)
Typical payload:	
inter-theatre logistics mission (2.5g load factor)	58,605 kg (129,200 lb)
heavy logistics mission (2.25g load factor)	71,895 kg (158,500 lb)
Max payload (2.25g load factor)	78,110 kg (172,200 lb)
Max T-O weight	259,455 kg (572,000 lb)

PERFORMANCE (estimated):

Max cruising speed at high altitude Mach 0.775

Max cruising speed at low altitude 350 knots (648 km/h; 403 mph) CAS

Airdrop speed at S/L 115–250 knots (213–463 km/h; 132–288 mph) CAS

Airdrop speed at 7,620 m (25,000 ft) 130–250 knots (241–463 km/h; 150–288 mph) CAS

Approach speed with max payload 116 knots (215 km/h; 134 mph) CAS

Min ground turning radius:

three-point turn	24.38 m (80 ft)
180° turn	39.62 m (130 ft)
wingtip/tailplane clearance	38.10 m (125 ft)

Runway LCN (paved surface) better than 40

T-O field length with max payload 2,320 m (7,600 ft)

Landing field length with max payload, using thrust reversal 915 m (3,000 ft)

Radius, T-O with 39,055 kg (86,100 lb) payload in 975 m (3,200 ft), land in 760 m (2,500 ft), T-O with similar payload in 885 m (2,900 ft) and land in 730 m (2,400 ft), all at load factor of 3.0g, no in-flight refuelling 500 nm (925 km; 575 miles)

Radius, T-O with 63,865 kg (140,800 lb) payload in 2,320 m (7,600 ft) at load factor of 2.25g, land in 915 m (3,000 ft), T-O with zero payload (load factor of 3.0g) in 730 m (2,400 ft) and land in 610 m (2,000 ft), no in-flight refuelling 1,900 nm (3,520 km; 2,190 miles)

Range with payloads indicated, with no in-flight refuelling, using thrust reversal on landing:

78,110 kg (172,200 lb), T-O in 2,320 m (7,600 ft), land in 915 m (3,000 ft), load factor of 2.25g 2,400 nm (4,445 km; 2,765 miles)

71,895 kg (158,500 lb), T-O in 2,320 m (7,600 ft), land in 885 m (2,900 ft), load factor of 2.25g 2,700 nm (5,000 km; 3,110 miles)

58,605 kg (129,200 lb), T-O in 1,830 m (6,000 ft), land in 795 m (2,600 ft), load factor of 2.5g 2,800 nm (5,190 km; 3,225 miles)

self-ferry (zero payload), T-O in 1,100 m (3,600 ft), land in 610 m (2,000 ft), load factor of 2.5g 5,000 nm (9,265 km; 5,755 miles)

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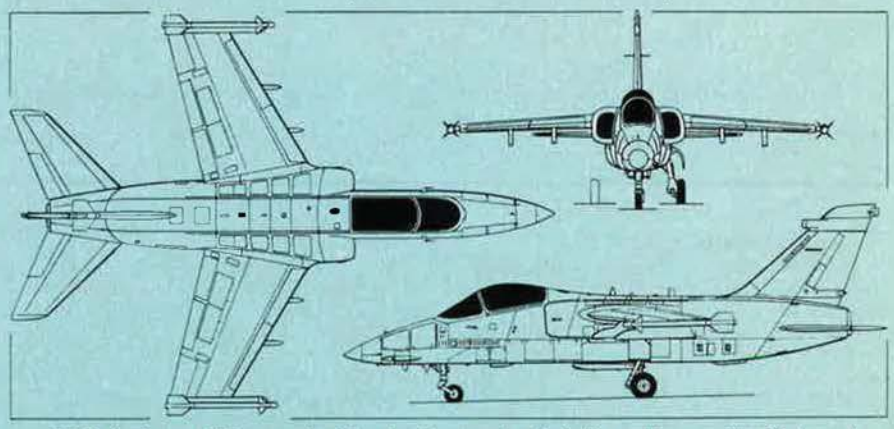
AM-X

This single-seat combat aircraft is under development to meet the requirements of the Italian and Brazilian Air Forces. Work on the project, at that time for the Italian Air Force only, was started by Aeritalia in mid-1977. Aermacchi became an associate in the programme in mid-1978, the AM-X designation signifying Aeritalia/Macchi—Experimental. A non-afterburning version of the Rolls-Royce Spey Mk 807 turbofan engine was selected by the Italian Air Force as the AM-X power plant in October 1978.

In March 1980, following completion of an 18-month project definition phase, ordered by the Italian Air Force, the Brazilian government announced its intention of taking part in the AM-X programme, and in July of that year EMBRAER became an industrial partner of the two Italian



AM-X single-seat fighter, under joint development by Aeritalia and Aermacchi of Italy and EMBRAER of Brazil *(Pilot Press)*

Artist's impression of the AM-X lightweight tactical fighter under development for the air forces of Italy and Brazil

companies. The development phase, initiated in January 1981, was followed two months later by an initial memorandum of understanding between the two air forces concerned.

Primary roles of the AM-X are short/medium-range interdiction, close air support, and reconnaissance, with secondary capability for anti-shipping attack and counter-air duties. Its design, coupled with sophisticated avionics and other airborne systems, is expected to meet effectively all tactical and operational requirements of its operators during the late 1980s and 1990s. It will be capable of carrying out these missions under exacting operational conditions, at high subsonic speed and very low altitude, by day and by night, in poor visibility, if necessary from bases with poorly-equipped or damaged runways. Basic design requirements included good take-off and landing performance; high subsonic speed with good penetration capability; an internally-mounted gun; wingtip positions for Sidewinder-type air-to-air missiles; underwing pylons for external stores; comprehensive avionics systems; and a proven, in-production power plant requiring a minimum of modification.

In the Italian Air Force the AM-X is intended to take over duties performed currently by four types of aircraft: the G91, which will be phased out of its close air support role by 1985/86; the G91Y interdictor, also due for phase-out by 1985/86; and the F-104G and F-104S versions of the Starfighter, scheduled for replacement in the strike role by 1986/87 and 1990 respectively. The close air support and interdiction tasks will be undertaken fully by the AM-X; counter-air duties will be shared with the longer-range Tornado. A total of 187 aircraft, enough for eight squadrons, is needed to meet these re-equipment plans, with deliveries beginning ideally in late 1986, to ensure initial operational capability by the second half of 1987.

The Brazilian Air Force requirement is for 144 aircraft. These will differ primarily in avionics and weapon delivery systems, and will have two internally-mounted 30 mm DEFA cannon instead of the single multi-barrel 20 mm weapon of the Italian version. Procurement is planned over the six-year period 1984–89, at the rate of 24 per year.

Six prototypes are being built, including two airframes for static and fatigue testing. First flight is scheduled for late 1983/early 1984, and two flying prototypes will be assembled and flown in each country. All three participating companies are involved equally in both programme management and aircraft development. EMBRAER will build the wings and landing gear; fuselages and tail units will be manufactured by the two Italian partners. Engines will be licence-built in Italy by Fiat Aviazione and Alfa Romeo. There will be final assembly lines in both Italy and Brazil.

TYPE: Single-seat interdiction, close air support, and reconnaissance aircraft, with secondary capability for anti-shipping attack and counter-air.

WINGS: Cantilever shoulder-wing monoplane, with 31° sweepback on leading edges and thickness/chord ratio of 12%. Three-spar torsion-box structure, machined from solid aluminium alloy with integrally-stiffened skins. Three-point attachment to fuselage. Leading-edge slats (two segments each side) over most of span. Hydraulically actuated two-segment Fowler-type double-slotted flaps, of carbonfibre, over approx two-thirds of each trailing-edge. Forward of each pair of flaps is a pair of electrically operated, hydraulically actuated spoilers, which are operated separately in inboard and outboard pairs. Hydraulically actuated ailerons, with manual reversion. No tabs.

FUSELAGE: Conventional semi-monocoque oval-section structure, built chiefly of aluminium alloy. Forward section incorporates main avionics and equipment bays, airborne systems, and cockpit; central section includes main landing gear bays; rear section houses power plant and some items of equipment. Extreme rear fuselage, complete with tailplane, is detachable for access to engine. Small ventral strake under each side of rear fuselage.

TAIL UNIT: Sweptback fin and carbonfibre rudder. Variable-incidence tailplane, mid-mounted on fuselage, with carbonfibre elevators. No tabs. Fly-by-wire control of rudder. Hydraulically actuated elevators, with manual reversion.

LANDING GEAR: Retractable tricycle type, of levered-suspension design, with single wheel on each unit. Nosewheel has hydraulic steering. Hydraulic extension and retraction, nose unit retracting forward, main units forward and inward into underside of engine air intake trunks. Mainwheel tyre pressure 9.65 bars (140 lb/sq in). Hydraulic brakes and anti-skid system.

POWER PLANT: One 49.1 kN (11,030 lb st) Rolls-Royce Spey Mk 807 non-afterburning turbofan engine, with lateral intakes. Fuel in compartmented fuselage tank and two integral wing tanks. Single-point pressure refuelling, via standard NATO connector. Provision for auxiliary underwing fuel tanks of up to 1,000 litres (220 Imp gallons) capacity each on inboard underwing pylons, 455 litres (100 Imp gallons) capacity on outboard pylons.

ACCOMMODATION: Pilot only, on Martin-Baker Mk 10L zero-zero ejection seat. One-piece wraparound windscreen and one-piece canopy. Cockpit pressurised and air-conditioned. Two-seat training version under study.

SYSTEMS: Environmental control system (ECS) provides air-conditioning of cockpit and reconnaissance pallets, cockpit pressurisation, air intake de-icing, windscreen demisting, and anti-g systems. Duplicated redundant hydraulic systems, driven by engine gearboxes, operate at pressure of 207 bars (3,000 lb/sq in) for actuation of primary flight control system, flaps, spoilers, landing gear, wheel brakes, anti-skid system, nosewheel steering, and gun purging. Primary electrical system: AC power (115/200V at fixed frequency of 400Hz) supplied by two 30kVA IDG generators, with two transformer-rectifier units for conversion to 28V DC; 36Ah nickel-cadmium battery for emergency use, to provide power for essential systems in the event of primary and secondary electrical system failure.

AVIONICS AND EQUIPMENT: In terms of redundancy and monitoring, avionics system is designed to permit successful completion of mission, even in the event of initial failure. Modular design and space provisions within the aircraft will permit retrofitting of alternative systems as and when required. All avionics/equipment packages are pallet-mounted to facilitate removal and replacement, and are positioned to allow rapid access for routine maintenance and change of configuration. Avionics are divided into six main subsystems: UHF and VHF com/IFF; autonomous (INS) and assisted (VOR) navigation; computer-based weapon aiming and delivery, incorporating a range-only radar and stores management subsystem; data display (head-up, multi-function head-down, and weapons/nav); data processing, with air data computer; and active and passive ECM.

ARMAMENT AND OPERATIONAL EQUIPMENT: One M61A1 multi-barrel 20 mm cannon in lower forward fuselage (two 30 mm DEFA 553 cannon in aircraft for Brazilian Air Force). Single twin-pylon stores attachment point under fuselage, on centreline, plus two attachments under each wing, and wingtip rails for two AIM-9L Sidewinder or similar infra-red air-to-air missiles. Fuselage and inboard underwing hardpoints each stressed for loads of up to 907 kg (2,000 lb), outboard underwing points for 454 kg (1,000 lb) each. Total external stores load 3,800 kg (8,377 lb). Attack weapons can include bombs, air-to-surface missiles (including anti-shipping weapons), and rocket launchers. Three alternative pallet-mounted photographic systems can be carried, installed internally in forward fuselage or in an external pod. Each of these systems is fully compatible with the aircraft, and will not affect operational capability; the aircraft will therefore be able to carry out reconnaissance missions without effect upon its normal navigation, attack, and self-defence capabilities. Camera bay is in lower starboard side of fuselage, forward of main-wheel bay. Provision is made to replace camera pallet with a laser ranger and marked target seeker module if required.

DIMENSIONS, EXTERNAL:

Wing span: over missiles	10.00 m (32 ft 9¾ in)
excl wingtip missiles and rails	8.88 m (29 ft 1½ in)
Wing area, gross	21.00 m² (226.04 sq ft)
Wing aspect ratio	3.75
Wing taper ratio	0.5
Length overall	13.57 m (44 ft 6¼ in)
Length of fuselage	12.55 m (41 ft 2 in)
Height overall	4.58 m (15 ft 0¼ in)
Tailplane span	approx 5.20 m (17 ft 0¾ in)
Wheel track	2.15 m (7 ft 0¾ in)
Wheelbase	approx 4.75 m (15 ft 7 in)

WEIGHTS:

Operating weight empty	6,500 kg (14,330 lb)
Max external stores load	3,800 kg (8,377 lb)
Normal T-O weight	10,500 kg (23,148 lb)
Max T-O weight	12,000 kg (26,455 lb)

PERFORMANCE (estimated):

Required runway length at normal T-O weight	915 m (3,000 ft)
Design radius for interdiction, lo-lo-lo with 1,360 kg (3,000 lb) of external weapons:	
with two 455 litre (100 Imp gallon) drop-tanks	180 nm (333 km; 205 miles)
with two 1,000 litre (220 Imp gallon) drop-tanks	520 nm (963 km; 598 miles)

FAC

FUERZA AÉREA CHILENA (Chilean Air Force); Headquarters: Av Bernardo O'Higgins 1170, 10° Piso, CC 1152, Correo 21, Santiago, Chile

In July 1981 Sequoia Aircraft Corporation of the United States announced delivery to the Chilean Air Force of an assembly kit for one F.8L Falco two-seat aerobatic trainer, and was preparing for anticipated production of this aircraft in Chile, both for the FAC and for civilian flying clubs.

The Ala de Mantenimiento (Maintenance Wing) of the FAC has also begun the licence assembly in Chile of the Piper PA-28 Dakota, of which it had completed 30 by mid-1981. Beginning in 1982 it will undertake the assembly for the FAC of up to 100 Pillan two-seat basic/intermediate trainers, derived from the Cherokee series. Prototypes of the latter have already been completed by Piper, as detailed in the following description.

PIPER PA-28R-300XBT

Chilean Air Force name: Pillan

To meet the requirements of the Chilean Air Force for a basic/intermediate trainer with full aerobatic capability, Piper has developed a derivative of the Cherokee series to fulfil this role. In order to keep costs as low as possible, this incorporates an optimum number of components from various models within the series. Two examples had been completed by the company by mid-1981, when an initial batch of three more was to be supplied in kit form for assembly in Chile.

TYPE: Two-seat basic/intermediate military trainer.

WINGS: Cantilever low-wing monoplane. Wing section NACA 65$_3$-415 on inboard panels, NACA 65$_3$-415 (modified) at tips. Dihedral 7°. Incidence 2° at root, −0° 30′ at tip. Single-spar structure of light alloy. Wingtips vacuum formed of Cycolac thermoplastics material. Slotted ailerons of light alloy construction, identical to those of the PA-32R-301 Saratoga. Single-slotted trailing-edge flaps of light alloy construction, identical to those of the PA-32-300 Lance.

FUSELAGE: Semi-monocoque structure of light alloy, based on that of PA-32R-301 Saratoga.

TAIL UNIT: Cantilever structure of light alloy with swept (38° 43′) vertical surfaces. One-piece all-moving horizontal surface with full-span anti-servo tab; this surface is a reduced-span version of the all-moving tailplane of the PA-28-236 Dakota.

LANDING GEAR: Hydraulically-retractable tricycle type, derived from PA-28R-200 Arrow and PA-32R-301 Saratoga landing gears, with single wheel on each unit. Main units retract inward, nosewheel rearward. All wheels enclosed by doors when retracted. Emergency free-fall extension system. Piper oleo-pneumatic shock-absorbers. Steerable nosewheel. High-capacity disc brakes. Parking brake.

POWER PLANT: One 224 kW (300 hp) Avco Lycoming AEIO-540 flat-six engine, driving a three-blade propeller with spinner. Fuel contained in integral wing tanks. Overwing gravity refuelling point on each wing. Fuel and oil systems suitable for inverted flight.

ACCOMMODATION: Two seats in tandem beneath sideways-opening (to starboard) one-piece transparent canopy. Dual controls standard. Accommodation is heated and ventilated.

SYSTEMS: Electrical system of 24V, powered by an engine-driven alternator. Hydraulic system powered by a self-contained unit incorporating an electric motor, gear pump, fluid reservoir, pressure regulator, flow control, and thermal expansion protection.

DIMENSIONS, EXTERNAL:

Wing span	8.81 m (28 ft 11 in)
Wing chord at root	1.88 m (6 ft 2 in)
Wing chord at tip	1.26 m (4 ft 1½ in)
Wing aspect ratio	5.69
Length overall	7.97 m (26 ft 1¾ in)
Height overall	2.34 m (7 ft 8½ in)
Tailplane span	3.05 m (10 ft 0 in)
Wheel track	3.02 m (9 ft 11 in)
Wheelbase	2.09 m (6 ft 10¼ in)

DIMENSIONS, INTERNAL:

Cockpit: Length	3.24 m (10 ft 7½ in)
Max width	1.04 m (3 ft 5 in)
Max height	1.48 m (4 ft 10¼ in)

AREAS:

Wings, gross	13.64 m² (146.8 sq ft)
Ailerons (total)	1.10 m² (11.84 sq ft)
Trailing-edge flaps (total)	1.36 m² (14.64 sq ft)
Fin	0.69 m² (7.43 sq ft)
Rudder	0.38 m² (4.09 sq ft)
Tailplane, incl tab	2.27 m² (24.43 sq ft)

Cherokee family ancestry is unmistakable in the Chilean Air Force's new PA-28R-300XBT Pillan trainer

PERFORMANCE (at AUW of 1,315 kg; 2,900 lb):

Max level speed at S/L
173 knots (321 km/h; 199 mph)

Cruising speed:

75% power at 2,320 m (7,600 ft)
166 knots (308 km/h; 191 mph)

65% power at 3,450 m (11,300 ft)
161 knots (298 km/h; 185 mph)

55% power at 4,630 m (15,200 ft)
153 knots (284 km/h; 176 mph)

Stalling speed:

flaps up 66 knots (123 km/h; 76 mph)

flaps down 60 knots (111 km/h; 69 mph)

Max rate of climb at S/L 378 m (1,240 ft)/min

Service ceiling 5,610 m (18,400 ft)

Absolute ceiling 6,100 m (20,000 ft)

T-O run 229 m (750 ft)

T-O to 15 m (50 ft) 408 m (1,340 ft)

Landing from 15 m (50 ft) 433 m (1,420 ft)

Landing run 207 m (680 ft)

Range with 45 min reserves:

75% power at 2,500 m (8,200 ft)
610 nm (1,130 km; 702 miles)

econ cruising power at 4,000 m (13,100 ft)
700 nm (1,297 km; 806 miles)

Range, no reserves:

75% power at 2,500 m (8,200 ft)
740 nm (1,371 km; 852 miles)

econ cruising power at 4,000 m (13,100 ft)
830 nm (1,538 km; 956 miles)

FAIRCHILD

FAIRCHILD INDUSTRIES INC; Corporate Offices: 20301 Century Boulevard, Germantown, Maryland 20767, USA

FAIRCHILD NEXT GENERATION TRAINER (NGT)

Fairchild Industries has built a full-scale mockup of its NGT design, and will take this on a tour of US Air Force bases as part of the company's campaign to win an estimated $2,300 million contract for a Cessna T-37 replacement. Pilot and engineering reactions gained during this tour will assist the company in finalising its submission, which will compete against proposals from Cessna, General Dynamics, Rockwell International, and Vought teamed with MBB of West Germany.

Fairchild's NGT mockup has a wing span of 9.80 m (32 ft 2 in), and overall length of 9.17 m (30 ft 1 in); the estimated maximum take-off weight of a production example is 2,540 kg (5,600 lb). Although no decision has yet been made regarding the twin-engine power plant of this aircraft, it is believed that the company favours the Garrett TFE76-1075-4 turbofan. The NGT's McDonnell Douglas ACES II ejection seats are similar to those fitted in the F-15, F-16, and A-10.

FAIRCHILD/AMES SCALE NGT

Completion of the detailed mockup represents only one aspect of the considerable efforts being made by Fairchild to secure this contract. More significant, perhaps, is the 62% scale version of the NGT which was rolled out on August 28, 1981, prior to instrumentation and flight testing at Mojave Airport, California. The data recorded in these

First flight of the Fairchild/Ames 62% scale version of the Next Generation Trainer (NGT), on September 10 at Mojave Airport, California *(Photograph via Howard Levy)*

tests was to be incorporated in Fairchild's submission for the NGT contract.

The scaled NGT was constructed with the assistance of Mr Burt Rutan, who completed the detailed scaling from Fairchild's NGT lofting drawings, provided technical details for the aircraft's composite construction, and was also to carry out the initial flight tests. The scaled NGT was constructed by Ames Industrial Corporation of Bohemia, New York, and all available details follow:

TYPE: Scale version of projected two-seat military training aircraft.

WINGS: Cantilever shoulder-wing monoplane of all-composite construction. Anhedral 4°. One-piece structure comprises a foam core, with top and bottom channels for inset spars of graphite fibres at 67% chord, and is skinned with two plies of unidirectional glassfibre cloth and two plies of unidirectional graphite cloth. In addition, the centre-section has five plies of bidirectional glassfibre cloth, for strength as well as to provide a means of contouring. Training-edge flaps and ailerons. No tabs.

FUSELAGE: A load-carrying plywood bulkhead, glassfibre-covered on each side, carries the wing, main landing gear units, and engines. Eight additional frames of urethane foam, each glassfibre-covered on both sides, are retained in place by foam planking, also with glassfibre-covering on both sides. This forms a longitudinal series of glassfibre-covered foam boxes, epoxied together and strengthened by two glassfibre-covered foam longerons at cockpit sill height. Urethane foam surrounds this box-like fuselage, shaped and sanded to provide the desired contours.

TAIL UNIT: Cantilever tailplane with elevators, and endplate fins and rudders, of similar construction to wing. Small anti-balance tab in starboard elevator.

LANDING GEAR: Retractable tricycle type. Nose unit retracts rearward manually; main units retract inward electrically, with manual backup.

POWER PLANT: Two 0.98 kN (220 lb st) Microturbo TRS 18-046 turbojet engines, mounted within ducts beneath the wing roots.

ACCOMMODATION: Pilot only, beneath transparent canopy, which is hinged to open upward and rearward. Pilot's feet protrude through cut-out in forward bulkhead to reach rudder pedals in nose.

DIMENSIONS, EXTERNAL:

Wing span	6.66 m (21 ft 10¼ in)
Wing chord at root	1.08 m (3 ft 6½ in)
Wing chord at tip	0.60 m (1 ft 11¾ in)
Length overall	5.42 m (17 ft 9½ in)
Height overall	1.73 m (5 ft 8¼ in)
Tailplane span	2.49 m (8 ft 2 in)
Wheel track	1.54 m (5 ft 0¾ in)
Wheelbase	2.18 m (7 ft 2 in)

DIMENSIONS, INTERNAL:

Cockpit: Length (to fwd bulkhead)	0.83 m (2 ft 8½ in)
Max width	0.83 m (2 ft 8½ in)
Max height	0.99 m (3 ft 3 in)

WEIGHTS:

Weight empty, approx	408 kg (900 lb)
Max T-O weight	680 kg (1,500 lb)

PERFORMANCE (estimated):

Never-exceed speed 250 knots (463 km/h; 288 mph)

Max cruising speed 217 knots (402 km/h; 250 mph)

HUGHES

HUGHES HELICOPTERS, INC (Subsidiary of The Hughes Corporation); Head Office and Works: Centinela and Teale Streets, Culver City, California 90230, USA

In 1981, nearly 4,500 Hughes helicopters were serving with civil and military operators in more than 100 countries worldwide. A substantial proportion of these are Hughes Model 500s, developed from the US Army's OH-6A Cayuse light observation helicopter.

HUGHES MODEL 500 (CIVIL VERSIONS)

The Model 500, which entered full-scale production in November 1968, originated as a civil development of the OH-6A Cayuse military helicopter last described in the 1977–78 *Jane's*. From it have since been developed several new military export versions; these are described separately.

Full-scale non-flying mockup of the Fairchild NGT. Hinged nose provides easy access to the avionics *(Howard Levy)*

Civil versions of the Model 500 so far announced are as follows:

Model 500. Initial basic production version, with Allison 250-C18A turboshaft engine.

Model 500C. Similar to Model 500, but with Allison 250-C20 engine and improved 'hot and high' performance. Licence manufacture also undertaken by RACA (Argentina) and Kawasaki (Japan).

Model 500D. Announced in February 1975, the 500D is similar in size and general appearance to the Model 500C. It differs in having a 313 kW (420 shp) Allison 250-C20B engine; a five-blade main rotor, four-blade tail rotor, and engine exhaust muffler; sound blanketing of the complete power plant assembly, including the engine air intake; and reshaping of the tips of the main rotor blades. It introduced also a small T tail which gives greater flight stability in both high and low speed regimes, as well as better handling characteristics in abnormal manoeuvres. Construction of the prototype and its first flight took place in August 1974, and the first flight of a production aircraft was made on October 9, 1975. The 500D was certificated by the FAA on December 8, 1976, and the 1,000th Model 500D was delivered in July 1981. Licence manufacture also undertaken by BredaNardi (Italy), Kawasaki (Japan), and KAL (Korea). Supplied also for training to the air forces of Jordan (eight) and Kenya (two).

TYPE: Turbine-powered civil light helicopter.

ROTOR SYSTEM: Four-blade fully-articulated main rotor (five-blade on 500D), with blades attached to laminated strap retention system by means of folding quick-disconnect pins. Each blade consists of an extruded aluminium spar hot-bonded to one-piece wraparound aluminium skin. Trim tab outboard on each blade. Main rotor blades can be folded. Two-blade tail rotor (four-blade on 500D), each blade comprising a swaged steel tube spar and glassfibre skin covering. Rotor brake optional.

ROTOR DRIVE: Three sets of bevel gears, three driveshafts, and one overrunning clutch. Strengthened transmission on 500D. Main rotor/engine rpm ratio 1:12.806 on 500/500C, 1:12.594 on 500D. Tail rotor/engine rpm ratio 1:1.987 on 500/500C, 1:1.956 on 500D.

FUSELAGE: Aluminium semi-monocoque structure of pod and boom type. Clamshell doors at rear of pod give access to engine and accessories.

TAIL UNIT: Fixed fin, horizontal stabiliser, and ventral fin on Models 500/500C. Model 500D has T tail, with horizontal stabiliser at tip of narrow-chord sweptback fin; small auxiliary fin at tip of tailplane on each side; and narrow-chord sweptback ventral fin, with integral tailskid to protect tail rotor in tail-down attitude near ground.

LANDING GEAR: Tubular skids carried on Hughes single-acting (oleo-pneumatic on 500D) shock-absorbers. Utility floats, snow skis, and emergency inflatable floats optional.

POWER PLANT: The 236.5 kW (317 shp) Allison 250-C18A turboshaft engine installed in the 500 is derated to 207 kW (278 shp) for T-O and has a max continuous rating of 181 kW (243 shp). Model 500C is powered by a 298 kW (400 shp) Allison 250-C20 turboshaft engine; this also is derated to 207 kW (278 shp) for T-O and has a max continuous rating of 181 kW (243 shp). Model 500D powered by a 313 kW (420 shp) Allison 250-C20B turboshaft engine. Two interconnected bladder fuel tanks with combined usable capacity of 240 litres (63.4 US gallons). Self-sealing fuel tanks optional in 500D. Refuelling point on starboard side of fuselage. Auxiliary fuel system with 132 litre (35 US gallon) crashworthy internal fuel tank, or two external glassfibre fuel cells with combined capacity of 167 litres (44 US gallons), optional. Oil capacity 5.7 litres (1.5 US gallons).

ACCOMMODATION: Pilot and four passengers or equivalent freight in 500/500C. Optional accommodation for seven with litter kit in use or with four in passenger compartment. Model 500D has forward bench seat for pilot and two passengers, with two or four passengers, or two litter patients and two medical attendants, in rear portion of cabin. Baggage space, capacity 0.31 m³ (11 cu ft), under and behind rear seat in five-seat form. Clear space for 1.19 m³ (42 cu ft) of cargo or baggage with only three front seats in place. Two doors on each side.

SYSTEM: Electrical system in 500D includes a 150A engine-driven generator and a nickel-cadmium battery.

AVIONICS AND EQUIPMENT: Optional avionics for 500D include dual King KY 195 com, KX 175 nav/com, KR 85 ADF, and KT 76 transponder; dual Collins VHF-251 com, VHF-251/351 nav/com, IND-350 nav indicator, ADF-650 ADF, and TDR-950 transponder; SunAir ASB 125; intercom system, headsets, microphones; public address system; stereo tape system; and flight management computer system. Standard equipment includes outside air temperature gauge, eight-day clock, engine hour meter, five sets of inertia-reel shoulder harness, cargo tiedown fittings, fire extinguisher, first aid kit, passenger steps, external power socket, landing light, skid-tip position light, anti-collision strobe lights, cockpit utility light, aft cabin light, and instrument lights. Optional equipment includes dual controls, blind-flying instrumentation, electric hoist, cargo hook, external baggage pods, cargo racks, underfuselage cargo pod, nylon mesh seats, dual-strap shoulder harnesses, and heating/demisting system.

EQUIPMENT (500/500C): Standard equipment includes engine hour meter, navigation lights, clock, and ground handling wheels. Optional equipment includes shatterproof glass, heating sys-

tem, radios and intercom, attitude and directional gyros, rate of climb indicator, inertia reels and shoulder harnesses for pilot and co-pilot, dual controls, cargo hook, hoist, auxiliary fuel system, fire extinguisher, heated pitot tube, extended landing gear, blade storage rack, litter kit, emergency inflatable floats, inflated utility floats, rotor brake, seating for four in passenger compartment, and first aid kit.

DIMENSIONS, EXTERNAL:
- Diameter of main rotor:
  - 500/500C: 8.03 m (26 ft 4 in)
  - 500D: 8.08 m (26 ft 6 in)
- Main rotor blade chord: 0.171 m (6¾ in)
- Diameter of tail rotor: 1.30 m (4 ft 3 in)
- Distance between rotor centres:
  - 500/500C: 4.58 m (15 ft 0¼ in)
  - 500D: 4.62 m (15 ft 2 in)
- Length overall, rotors fore and aft:
  - 500/500C: 9.24 m (30 ft 3¾ in)
  - 500D: 9.30 m (30 ft 6 in)
- Length of fuselage: 7.01 m (23 ft 0 in)
- Height to top of rotor hub:
  - 500/500C: 2.48 m (8 ft 1½ in)
  - 500D: 2.59 m (8 ft 6 in)
- Skid track: 2.06 m (6 ft 9 in)
- Cabin doors (500/500C, fwd, each):
  - Height: 1.19 m (3 ft 11 in)
  - Width: 0.89 m (2 ft 11 in)
- Cabin doors (500D, each):
  - Height: 1.16 m (3 ft 9½ in)
  - Max width: 0.76 m (2 ft 6 in)
  - Height to sill: 0.76 m (2 ft 6 in)
- Cargo compartment doors (each):
  - Height: 1.04 m (3 ft 5 in)
  - Width: 0.88 m (2 ft 10½ in)
  - Height to sill: 0.57 m (1 ft 10½ in)

DIMENSIONS, INTERNAL:
- Cabin: Length: 2.44 m (8 ft 0 in)
  - Max width: 500/500C: 1.37 m (4 ft 6 in)
  - 500D: 1.31 m (4 ft 3½ in)
  - Max height: 500/500C: 1.31 m (4 ft 3½ in)
  - 500D: 1.52 m (5 ft 0 in)

AREAS:
- Main rotor blades (each):
  - 500/500C: 0.688 m² (7.41 sq ft)
  - 500D: 0.690 m² (7.43 sq ft)
- Tail rotor blades (each):
  - 500/500C: 0.079 m² (0.85 sq ft)
  - 500D: 0.09 m² (0.94 sq ft)
- Main rotor disc:
  - 500/500C: 50.60 m² (544.63 sq ft)
  - 500D: 50.89 m² (547.81 sq ft)
- Tail rotor disc (all versions): 1.32 m² (14.19 sq ft)
- Fin: 500/500C: 0.52 m² (5.65 sq ft)
  - 500D: 0.56 m² (6.05 sq ft)
- Horizontal stabiliser:
  - 500/500C: 0.72 m² (7.70 sq ft)
  - 500D: 0.61 m² (6.52 sq ft)

WEIGHTS:
- Weight empty: 500: 493 kg (1,088 lb)
  - 500C: 501 kg (1,105 lb)
  - 500D: 598 kg (1,320 lb)
- Fuel load: 500D: 181 kg (400 lb)
- Max normal T-O weight:
  - 500/500C: 1,157 kg (2,550 lb)
- Max overload T-O weight:
  - 500/500C: 1,360 kg (3,000 lb)
- Max T-O and landing weight:
  - 500D: 1,360 kg (3,000 lb)
- Max disc loading:
  - 500D: 26.76 kg/m² (5.48 lb/sq ft)
- Max power loading:
  - 500D: 4.35 kg/kW (7.14 lb/shp)

PERFORMANCE (500/500C at max T-O weight):
- Max level speed at 305 m (1,000 ft):
  - 500: 132 knots (244 km/h; 152 mph)
- Max cruising speed at S/L:
  - 500C: 125 knots (232 km/h; 144 mph)
- Max cruising speed at 1,220 m (4,000 ft):
  - 500C: 126 knots (233 km/h; 145 mph)
- Cruising speed for max range at S/L:
  - 500: 117 knots (217 km/h; 135 mph)
  - 500C: 124 knots (230 km/h; 143 mph)
- Max rate of climb at S/L:
  - 500/500C: 518 m (1,700 ft)/min
- Service ceiling: 500: 4,390 m (14,400 ft)
  - 500C: 4,420 m (14,500 ft)
- Hovering ceiling IGE: 500: 2,500 m (8,200 ft)
  - 500C: 3,960 m (13,000 ft)
- Hovering ceiling OGE: 500: 1,615 m (5,300 ft)
  - 500C: 2,040 m (6,700 ft)
- Range at 1,220 m (4,000 ft):
  - 500: 327 nm (606 km; 377 miles)
- Range at 1,220 m (4,000 ft), 2 min warm-up with max fuel, no reserves:
  - 500C: 325 nm (603 km; 375 miles)

PERFORMANCE (500D at max T-O weight, ISA):
- Never-exceed speed: 152 knots (282 km/h; 175 mph)
- Max cruising speed at S/L: 139 knots (258 km/h; 160 mph)
- Max cruising speed at 1,525 m (5,000 ft): 135 knots (249 km/h; 155 mph)
- Econ cruising speed at S/L: 130 knots (241 km/h; 150 mph)
- Econ cruising speed at 1,525 m (5,000 ft): 126 knots (233 km/h; 145 mph)
- Max rate of climb at S/L: 579 m (1,900 ft)/min
- Service ceiling: 4,570 m (15,000 ft)
- Hovering ceiling IGE: ISA: 2,590 m (8,500 ft)
  - ISA + 20°C: 1,830 m (6,000 ft)
- Hovering ceiling OGE: ISA: 2,285 m (7,500 ft)
  - ISA + 20°C: 1,370 m (4,500 ft)
- Range, 2 min warm-up, standard fuel, no reserves:
  - at S/L: 260 nm (482 km; 300 miles)
  - at 1,525 m (5,000 ft): 287 nm (531 km; 330 miles)

Hughes Model 500MD/MMS-TOW, with mast-mounted sight and TOW anti-tank missiles

HUGHES MODEL 500 (MILITARY VERSIONS)

Foreign military versions of the Hughes Model 500 so far announced are as follows:

Model 500M. Initial uprated version of OH-6A. Power plant as for civil Model 500, but fuel capacity of 227 litres (60 US gallons). First deliveries to Colombian Air Force in April 1968. Now in service also in Japan (JGSDF and JMSDF), Argentina, Bolivia, Denmark (Navy), Spain (Navy), Mexico, and the Philippines. The Model 500Ms delivered to the Spanish Navy for ASW duties have an AN/ASQ-81 magnetic anomaly detector installed on the starboard side of the fuselage, and can carry two Mk 44 torpedoes beneath the fuselage. Control boxes for the MAD equipment are mounted on the instrument panel and centre pedestal, and special instrumentation includes a 6 in attitude indicator and radar altimeter. Licence manufacture also undertaken by RACA (Argentina), and by Kawasaki in Japan as the Models 369HM/OH-6J (now ended) and 369D/OH-6D.

Model 500MD Defender. Multi-role military version. Structurally similar to civil Model 500D, from which it differs in having as standard or optional equipment self-sealing fuel cells, engine inlet particle separator, armour protection, Hughes 'Black Hole Ocarina' infra-red suppressor, and provisions for the carriage and deployment of a variety of weapons, including TOW missiles. Its diverse capabilities include training, command and control, scout, light attack, ASW, troop lift, and logistical support duties. It can carry up to seven people, including the pilot; or, in ambulance configuration, two litter patients with attendants in addition to a flight crew of two. Licence manufacture also undertaken by BredaNardi in Italy and (Scout and TOW versions) by KAL in Republic of Korea.

The versions available or proposed in 1981 were as follows:

500MD Scout Defender. Basic military version, able to carry a variety of alternative weapons, including fourteen 2.75 in rockets and either a 7.62 mm Minigun with 2,000 rounds of ammunition, a 40 mm grenade launcher, a 7.62 mm Chain Gun with 2,000 rounds of ammunition, or a 30 mm Chain Gun with 600 rounds. Operators include Kenyan Army (15), Republic of Korea Air Force (over 100), and Royal Moroccan Air Force (24).

500MD Quiet Advanced Scout Defender. Basically similar to Scout Defender, but with added quietening kit and Hughes Aircraft mast-mounted sight (MMS). Quietening kit features a slower-turning four-blade tail rotor, which imposes no reduction of performance. The MMS is mounted on a static mast 61 cm (2 ft) above the main rotor, and enables the aircraft to hover behind cover, using the small sight as a periscope to scan a large area out to a range of 3,000 m (9,845 ft). If employed to spot enemy armour, it is envisaged that Scouts would call in 500MD/TOW Defenders to attack the targets.

500MD/TOW Defender. Anti-tank version armed with four TOW air-to-ground missiles. The TOW installation comprises four weapon pods, mounted two each side on a tubular mount carried through the lower aft fuselage, a stabilised telescopic sight mounted on the port side of the nose, sight control and armrest for the gunner, and a steering indicator for the pilot. Max T-O weight with four TOW missiles 1,360 kg (3,000 lb). In service with air forces of Israel (30), Kenya (15 ordered, of which six delivered by mid-1981), and Republic of Korea (25). Available also in **500MD/MMS-TOW** version, with Hughes Aircraft mast-mounted sight; empty weight of this version is reduced by 27 kg (60 lb).

500MD/ASW Defender. Version for anti-submarine warfare and surface search missions, with two crew, search radar on nose, AN/ASQ-81 towed MAD, smoke marker launchers, hauldown gear, emergency 'popout' floats, and armament of two Mk 44 or Mk 46 homing torpedoes. Max T-O weight 1,610 kg (3,550 lb). Can remain on station for 1 h 48 min when operated at a typical ASW mission radius of 22–87 nm (40–160 km; 25–100 miles) from ship or shore base. Using its radar, the 500MD/ASW could locate enemy destroyers and gunboats

Mast-mounted sight of the Hughes 500MD/ TOW in close-up

up to 150 nm (275 km; 172 miles) from its base-ship during a two-hour patrol. Twelve delivered to Taiwanese Navy.

500MD Defender II. Multi-mission version, introduced in Summer of 1980; available for delivery within two years. Five-blade main rotor standard; four-blade 'quiet' tail rotor optional; this turns at a rate 25% slower than the standard two-blade rotor and is reported to be 47% quieter in operation. Other options include Hughes Aircraft mast-mounted sight (MMS), Hughes 30 mm Chain Gun (with firing rate reduced to 350 rds/min), Hughes 'Black Hole' IR suppression system, TOW missiles, pod containing two Stinger air-to-air missiles, pilot's FLIR night vision system, AN/APR-39(V-1) equipment to give warning that the helicopter is being tracked by hostile radar-directed weapon systems, self-sealing fuel tanks, auxiliary fuel tanks, and an advanced avionics/mission equipment package. Martin Marietta's MMS, fitted to prototype, consists of a silicon vidicon TV, with primary display and controls mounted in the co-pilot's position; a laser rangefinder/designator; and a precise stabilisation system. Use of an MMS enables the Defender II to hover virtually out of sight behind trees or natural terrain, while the crew surveys the battlefield over extended ranges.

Standard lightweight avionics equipment (SLAE) as developed for the OH-6A has been adapted for the 500MD with minimal changes. This equipment comprises AN/ARC-164 UHF/AM, AN/ARC-115 UHF/AM, AN/ARC-114 VHF/FM, ARN-89 ADF, APX-72 IFF transponder, AN/ASN-43 directional gyro, ID-1351 heading and bearing indicator, and C-6533/ARC intercom.

In addition to these export models, Hughes submitted to the US Army in 1981 a proposal, provisionally designated **OH-6D,** for consideration with the Bell Model 406 in the AHIP (Army Helicopter Improvement Program) competition for a 'near-term' scout helicopter. Basically, the OH-6D comprises an OH-6A airframe, upgraded with FAA-certificated components from the Model 500D, and fitted with graphite/Kevlar epoxy composite main rotor blades. First flight of the OH-6D took place in March 1981. Bell won the AHIP competition.

DIMENSIONS, EXTERNAL (500MD/TOW):

Diameter of main rotor	8.05 m (26 ft 4¼ in)
Diameter of tail rotor	1.40 m (4 ft 7¼ in)
Distance between rotor centres	4.63 m (15 ft 2½ in)
Length overall, rotors turning	9.39 m (30 ft 9½ in)
Length of fuselage	7.01 m (23 ft 0 in)
Height to top of rotor hub	2.65 m (8 ft 8½ in)
Height over tail (endplate fins)	2.71 m (8 ft 10¾ in)
Fuselage: Max width	1.40 m (4 ft 7¼ in)
Width over skids	1.95 m (6 ft 4¼ in)
Width over TOW pods	3.23 m (10 ft 7¼ in)
Tailplane span	1.68 m (5 ft 6 in)
Ventral fin ground clearance	0.67 m (2 ft 2½ in)

WEIGHTS (500M):

Weight empty	512 kg (1,130 lb)
Max normal T-O weight	1,157 kg (2,550 lb)
Max overload T-O weight	1,360 kg (3,000 lb)

PERFORMANCE (500M at max normal T-O weight):

Max level speed at 305 m (1,000 ft)	132 knots (244 km/h; 152 mph)
Cruising speed for max range at S/L	117 knots (217 km/h; 135 mph)
Max rate of climb at S/L	518 (1,700 ft)/min
Service ceiling	4,390 m (14,400 ft)
Hovering ceiling IGE	2,500 m (8,200 ft)
Hovering ceiling OGE	1,615 m (5,300 ft)
Range at 1,220 m (4,000 ft)	318 nm (589 km; 366 miles)

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MCDONNELL DOUGLAS/BAe AV-8B Harrier II

As widely expected, the McDonnell Douglas AV-8B is now certain to enter service with the US Marine Corps, and has been chosen also for the Royal Air Force. Requirements total 400 or more aircraft, more than doubling the number of Harriers ordered during the past 15 years.

Announcing the decision on August 24, 1981, the British Ministry of Defence and the main industrial partners in the programme indicated initial requirements of 257 for the USMC and 60 for the RAF, the latter to be designated **Harrier GR. Mk 5.** The longer-term Marine Corps requirement is for up to 336 AV-8Bs, in addition to the two YAV-8B prototypes and four full-scale development (FSD) aircraft already funded, and it has been widely suggested that the RAF may require 100 or more. To support the AV-8B training requirement the Marine Corps may also require, in the mid-1980s, a further 18 two-seat TAV-8s.

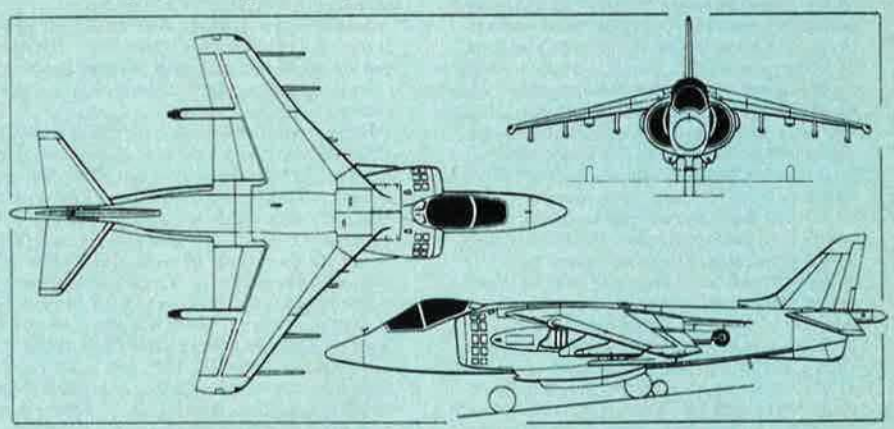
Meanwhile, the first two FSD aircraft should have flown by the end of 1981 (October and December), and the pilot production contract, for 12 AV-8Bs, is expected to be confirmed officially in the Spring of 1982. Deliveries are scheduled to begin in October 1983 to the Marine Corps and in mid-1986 to the RAF. The AV-8B will replace another McDonnell Douglas aircraft, the A-4 Skyhawk, in Marine Corps service: initial operational capability (IOC) is scheduled for mid-1985, and the service plans to have an all-AV-8B attack force by the end of the 1980s.

The initial enthusiasm of the USMC for the Harrier was intensified after the evolution of successful ACM (air combat manoeuvring) techniques, using VIFF (vectoring in forward flight)—an early USMC priority—and its efforts to secure an enhanced version resulted in the first Anglo-American studies for an Advanced Harrier as long ago as 1973. Then referred to popularly by the invented designation AV-16 (implying twice the capability of the AV-8), these foundered when, in March 1975, the British government opted out of a joint programme, declaring that there was "not enough common ground" between the US and UK requirements. Subsequently, McDonnell Douglas and Hawker Siddeley/British Aerospace each pursued their separate lines of development, both aimed broadly at doubling the payload/radius capability of the Harrier/AV-8A without departing too radically (or expensively) from the existing airframe/engine combination.

Both the American proposal and BAe Kingston's Big Wing Harrier (see 1980–81 *Jane's*) involved the use of a brand-new supercritical wing, and underfuselage lift-augmenting devices, plus a redesigned forward fuselage, cockpit, and tail unit. The British wing could have been retrofitted, with very little modification, to existing Harriers. However, the British government decided to order instead the AV-8B, improved by the addition of British-designed, manoeuvrability-increasing LERX (leading-edge root extensions). Features of the American design are the use of graphite epoxy (carbonfibre) composite materials for the wings, outrigger fairings, and tailplane; redesigned air intakes, to provide more VTO/STO thrust and more efficient cruise; and the Hughes Angle Rate Bombing System developed for the A-4M Skyhawk.

Development of the AV-8B has been a collaborative venture since it received US government go-ahead in 1976. It has benefited from exchanges of information on the AV-8B and Sea Harrier; it was BAe which devised the kits for upgrading existing AV-8As to interim AV-8C standard, as described in the current edition of *Jane's*; BAe has already delivered fuselages for six AV-8Bs (the four FSD aircraft plus structural and fatigue test airframes); and addition of British LERX to the McDonnell Douglas wing will add another four degrees or so per second to the AV-8B's turn rate, enabling it to meet the RAF's requirement for about 20°/s and enhancing still further its air combat capability for the American service. For the RAF programme, there are to be two FSD aircraft for weapons system certification flying, plus—since most GR. Mk 5s are expected to be based in RAF Germany—a fatigue test airframe to clear the aircraft for the rigorous central European low-level operating environment.

Work-split on the airframe for the joint USMC/RAF order will be 60% to McDonnell Douglas and 40% to British Aerospace. On any future third-party orders it would be divided 75/25% respectively. Each manufacturer will be responsible for the systems in those parts of the airframe which are its concern, and for their installation. British Aerospace will provide the complete reaction control system for all aircraft in the programme, and undertake final assembly of aircraft for the RAF; McDonnell Douglas will assemble aircraft for the USMC.



McDonnell Douglas/BAe AV-8B Harrier II V/STOL close support and reconnaissance aircraft *(Pilot Press)*

Rolls-Royce has an agreement with Pratt & Whitney under which the American company will manufacture up to 25% by value of the engines for the USMC aircraft; Rolls-Royce will build the remainder. Initial production engine is the 11-21E, an improved version of the Pegasus 11 with three main features designed to offer substantially increased engine life and reduced peacetime operating costs. Zero-scarf (non-slanted) front nozzles direct the airflow more efficiently, especially when the aircraft is operating within ground effect; a revised swan-neck intermediate casing improves airflow from the fan to the HP compressor and reduces pressure losses; and a shrouded LP turbine improves specific fuel consumption. Beyond this engine is the Pegasus 11F-35, designed to offer some 8.9 kN (2,000 lb static thrust) more than the existing production engine, and envisaged for future developments of the Harrier, Sea Harrier, and AV-8B. The 11F-35 will also form the basis of a supersonic engine using plenum chamber burning (PCB), and all four major airframe/engine partners are already engaged in a jointly funded R&D programme for the eventual development of a supersonic V/STOL combat aircraft.

The following description applies to the full-scale development and initial production AV-8B:

TYPE: V/STOL close support and reconnaissance aircraft.

WINGS: Cantilever shoulder-wing monoplane. Low aspect ratio sweptback wings, with non-swept inboard trailing-edges and curved leading-edge root extensions (LERX). Span and area increased by approx 20% and 14.5% respectively compared with AV-8A. Supercritical aerofoil section, with thickness/chord ratio of 11.5% at root, 7.5% at tip. Leading-edge sweep 10° less than that of AV-8A. Marked anhedral. One-piece structure, of mixed construction, with extensive use of graphite epoxy and other composites in the main multi-spar torsion box, ribs, skins, flaps, ailerons, LERX, and outrigger pods and fairings. Leading-edges and wingtips of aluminium alloy. Wide-chord single-slotted trailing-edge flaps, with flap slot closure doors. Hydraulically actuated drooping ailerons. Jet reaction control valve at each wingtip. LERX for RAF aircraft manufactured by BAe; all other wing manufacture and assembly by McDonnell Douglas.

FUSELAGE: Conventional semi-monocoque safe-life structure of frames and stringers, generally similar to that of AV-8A, but longer, due to provision of a new forward fuselage built largely of graphite epoxy composite material. Centre and rear fuselage mainly of aluminium alloy, except for forward and rear underfuselage heat shields, and small area immediately forward of windscreen, which are of titanium. Lift-augmenting underfuselage devices consist of a fixed strake on each of the two ventral gun packs, plus a retractable fence between forward edges of gun packs, just aft of forward main landing gear unit. During VTOL modes the 'box' formed by these surfaces, which are made of composite materials, traps the cushion of air bounced off the ground by the engine exhaust, providing sufficient additional lift to enable the AV-8B to take off vertically at a gross weight equal to its maximum hovering gross weight. Access to engine through top of fuselage, immediately ahead of wing. Large forward-hinged airbrake beneath fuselage, aft of rear main landing gear bay. Jet reaction control valves in nose and tailcone. McDonnell Douglas is responsible for manufacture of all forward and forward centre fuselages, including nosecones, air intakes, heat shields, engine access doors, and forward fuel tanks; and for the underfuselage fences and strakes. British Aerospace builds, for all aircraft, the rear centre and rear fuselages; including blast and heat shields, centre and rear fuel tanks, dorsal air intakes, and tail bullets. Fuselage assembly is by McDonnell Douglas for USMC and by BAe for RAF aircraft.

TAIL UNIT: One-piece variable-incidence tailplane, with marked anhedral, differing in planform from that of AV-8A in having constant sweep on leading-edges and reduced sweep on trailing-edges. Tailplane is built mainly of graphite epoxy, with aluminium alloy tips and leading-edges, and is irreversibly operated by tandem hydraulic jack. Aluminium alloy fin, with dielectric tip; manually operated graphite epoxy composite rudder, with inset trim tab. Dorsal airscoop, at base of fin, for equipment bay cooling system. Ventral fin under rear fuselage. Fins and rudders for all aircraft, and tailplanes for RAF aircraft, built by BAe; tailplanes for USMC aircraft built by McDonnell Douglas.

First prototype YAV-8B fitted with wing leading-edge root extensions (LERX) to enhance manoeuvrability

LANDING GEAR: Retractable bicycle type of Dowty Rotol design, permitting operation from rough unprepared surfaces of very low CBR. Hydraulic actuation, with nitrogen bottle for emergency extension. Single steerable nosewheel retracts forward, twin coupled main-wheels rearward, into fuselage. Small outrigger units, at approx mid-span between flaps and ailerons, retract rearward into streamline pods. Telescopic oleo-pneumatic main and outrigger gear; levered-suspension nosewheel leg. Dunlop wheels, tyres, multi-disc brakes, and anti-skid system. British Aerospace responsible for rear main gear and doors of all aircraft, and forward main gear of RAF aircraft; McDonnell Douglas responsible for remainder.

POWER PLANT: One Rolls-Royce Pegasus 11-21E (F402-RR-404) vectored-thrust turbofan engine, rated at 95.64 kN (21,500 lb st), with zero-scarf front nozzles. Redesigned air intakes, with elliptical lip shape and double row of suction relief doors. Enlarged integral fuel tanks in wings, increasing total internal fuel capacity (fuselage and wing tanks) to 3,402 kg (7,500 lb). Retractable in-flight refuelling probe. Each of the four inner underwing stations is capable of carrying a 1,135 litre (300 US gallon; 250 Imp gallon) auxiliary fuel tank.

ACCOMMODATION: Pilot only, on zero-zero ejection seat in pressurised, heated, and air-conditioned cockpit. Cockpit of AV-8B raised by comparison with AV-8A/YAV-8B, with redesigned wraparound windscreen and rearward-sliding bubble canopy, to improve all-round field of view. Windscreen de-icing and windscreen wiper. Windscreens and canopies for all aircraft manufactured by McDonnell Douglas.

SYSTEMS: Not yet announced in detail, but generally similar to those of Harrier/Sea Harrier; include duplicated hydraulic system, electrical system, environmental control system, oxygen system, and APU.

AVIONICS AND EQUIPMENT: Include dual AN/ARC-159 UHF com, improved attitude and heading reference system, laser gyro inertial navigation system, AN/ARN-84 Tacan, Garrett AiResearch digital air data computer, radar altimeter, forward/rearward-looking radar warning receiver, Goodyear flare/chaff dispenser, AN/APX-100 IFF, visual landing aids, Marconi dual combining glass head-up display, and CRT multi-purpose display. Main weapon delivery by Hughes Aircraft Angle Rate Bombing System (ARBS), comprising a dual-mode (TV and laser) target seeker/tracker linked to the head-up display via an IBM digital computer. Marconi Avionics self-contained pitch and roll autostabilisation computer, with built-in rate gyroscopes and added electronic package to interface with forward reaction control nozzle. Instrumentation includes airspeed indicator, altimeter, angle of attack indicator, attitude indicator, cabin pressure altitude indicator, clock, flap position indicator, horizontal situation indicator, standby compass, turn and slip indicator, and vertical speed indicator. Other equipment includes anti-collision, approach, formation, in-flight refuelling, landing gear position, position, and auxiliary exterior lights; and console, instrument panel, and other internal lights.

ARMAMENT AND OPERATIONAL EQUIPMENT: Two underfuselage gun/ammunition packs, mounting a General Electric GAU-12/U five-barrel 25 mm cannon (AV-8B) or two 30 mm Aden cannon (GR. Mk 5). Single 454 kg (1,000 lb) stores point on fuselage centreline, between gun packs. Three stores stations under each wing, the inner one capable of carrying a 907 kg (2,000 lb) store, the centre one 454 kg (1,000 lb), and the outer one 286 kg (630 lb). The four inner wing stations are 'wet', permitting the carriage of auxiliary fuel tanks. Including fuel, stores, weapons and ammunition, and water injection for the engine, the maximum useful load for vertical take-off is approximately 3,175 kg (7,000 lb), and for short take-off nearly 7,710 kg (17,000 lb). Typical weapons include two or four AIM-9L Sidewinder air-to-air or AGM-65E Maverick air-to-surface missiles, up to 16 general-purpose bombs, 12 cluster bombs, ten Paveway laser-guided bombs, ten fire bombs, ten rocket pods, four chaff or flare pods, or (in addition to the underfuselage gun packs) two underwing gun pods. Provision for AN/ALQ-164 defensive ECM pod on centreline pylon.

DIMENSIONS, EXTERNAL:

Wing span	9.25 m (30 ft 4 in)
Wing area, gross	21.37 m² (230 sq ft)
Length overall	14.12 m (46 ft 4 in)
Height overall	3.56 m (11 ft 8 in)

WEIGHTS:

Basic operating weight empty	5,783 kg (12,750 lb)
Max fuel: internal only	3,402 kg (7,500 lb)
internal and external	7,180 kg (15,829 lb)
Max external stores load	4,173 kg (9,200 lb)
Basic flight design gross weight for 7g operation	10,410 kg (22,950 lb)
Max T-O weight:	
S/L VTO, 32°C	8,702 kg (19,185 lb)
S/L VTO, ISA	8,867 kg (19,550 lb)
STO (366 m; 1,200 ft)	13,494 kg (29,750 lb)
Design max landing weight	8,799 kg (19,400 lb)
Max vertical landing weight	8,096 kg (17,850 lb)

PERFORMANCE (estimated):

Max Mach No. in level flight	0.91
T-O run at max T-O weight	less than 335 m (1,100 ft)
Operational radius with external loads shown:	
short T-O (305 m; 1,000 ft), twelve Mk 82 Snakeye bombs, internal fuel, 1 h loiter	more than 150 nm (278 km; 172 miles)
short T-O (305 m; 1,000 ft), seven Mk 82 Snakeye bombs, external tanks, no loiter	more than 650 nm (1,204 km; 748 miles)
Unrefuelled ferry range with external tanks	2,060 nm (3,817 km; 2,372 miles)

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AIRMAN'S BOOKSHELF

The Eisenhower Saga

Following are reviews of three current books concerned with the Eisenhower years.

Ike's Spies—Eisenhower and the Espionage Establishment, by Stephen E. Ambrose, with research by Richard H. Immerman. Doubleday & Co., Inc., New York, N. Y., 1981. 357 pages, with appendices and photographs. $14.95.

Stephen Ambrose quickly captures reader interest and holds it in the story of how first General and then President Dwight D. Eisenhower used intelligence and espionage forces in an effort to keep the free world free.

The author researched 115 published and unpublished sources and conducted many interviews, including sessions with Eisenhower himself, his brother Milton, and son John. Omar Bradley, Andrew Goodpaster, Richard Bissell, Howard Hunt, William B. Macomber, Jr., and Sir Kenneth Strong were also among those sought out.

The story began in 1942 at Chequers, Winston Churchill's weekend retreat. It was there that Eisenhower was introduced to Ultra, developed by the British to decode systematically German radio transmissions during the war. For the first ten chapters, almost half the book, Ambrose surveys the major events of the war and how they were influenced by the Allies' use of Ultra.

Through a skillful blending of facts, other impressions about intelligence gathering and covert operations in the war emerge. One is the Allied effort to assure Free French support for the invasion of North Africa. Here, State Department veteran Robert Murphy is introduced as the first of Ike's spies. A picture is painted of the opportunistic French factions and the duplicity they practiced toward each other and the Allies.

Next come the Allied moves into Africa, Sicily, and Italy, and then into France and across Europe. Intelligence successes such as the Overlord invasion are described in detail as are such intelligence failures as the Battle of Kasserine Pass and the Battle of the Bulge.

It takes only two chapters to transition to Ike's Presidency. The author uses these to describe the perspective that guided many of the intelligence decisions made by the President. Most important was Ike's anticommunism, what might be considered an obsession by those who didn't witness the fall of Eastern European and Asian countries to the Communist sphere of influence:

"The facts spoke for themselves—Poland, East Germany, Romania, Bulgaria, Estonia, Latvia, Albania, Yugoslavia, Czechoslovakia, North Korea, and China, all taken over by the Communists in the first half-decade following Hitler's death. In every instance, Communist dictatorships suppressed precisely those freedoms Ike and his comrades in arms had fought to defend—freedom of speech, of the press, of religion, of economic enterprise, and of personal movement. In the process, Stalin brought all these countries (except for China, Albania, and Yugoslavia) under his direct control, thereby adding enormously to the military potential of the Soviet Union. Thus, by the early fifties, as Eisenhower and his friends saw it, Stalin had clearly demonstrated that he had the will to conquer, the ideology with which to do so, and the military strength to make world conquest conceivable."

Also surveyed are the beginnings of the CIA and its precarious start in the face of such imposing obstacles as J. Edgar Hoover.

What dark secret acts did Ike allow the US to become involved in? They are addressed in this order: returning the Shah to power in Iran in the 1950s; Hungary in 1956; Vietnam and Indonesia; the U-2 program and Francis Gary Powers; assassination plots; and the Bay of Pigs. Some of the descriptions are sketchy; and, very subtly, in contrast to the first half of the book, a negative, disapproving attitude creeps in. Even those operations in which the CIA claimed success are demonstrated to be long-term failures. Readers, of course, may draw their own conclusions.

—Reviewed by Maj. Thomas L. Sack, USAF.

The Allies Invade Europe

Eisenhower's Lieutenants, the Campaigns of France and Germany, 1944–45, by Russell F. Weigley. Indiana University Press, Bloomington, Ind., 1981. 800 pages, with maps and index. $22.50.

The title of this book tends to mislead. A reader might expect a probing analysis of the personalities and character traits of the war leader's key subordinates—and therefore yet another account of how they interacted with, and sometimes rivaled, each other in the conduct of the war.

There is some of that, to be sure. But mainly the book is an exhaustive study of the strategy and tactics that propelled the Allied invasion forces across the Channel to a bridgehead at Normandy and then through France and into Germany to end the war. In short, a well-documented history (the Notes and Sources section alone runs to forty-three pages of fine print).

The author, a professor of history at Temple University, describes in detail the events that transpired in the succeeding stages of the climactic campaign in northwestern Europe.

Many books have dealt with the battles fought in the concluding months of the European conflict. This is one touted for tracing the entire period from D-Day to the German capitulation.

To use the word "exhaustive" in reference to *Eisenhower's Lieutenants* is not extreme. Part One alone consists of four chapters detailing the US forces and the evolution of their major weaponry and doctrine, the preparations of the enemy to thwart an invasion, the planning of Overlord, and the rationale for the airborne assault that preceded the beach landings. Part One even stresses the

importance of Ultra, an historic intelligence triumph that enabled the Allies to decipher the Germans' highest-level military radio communications.

Part Two is labeled "Normandy" and consists of five chapters. Part Three concerns "France." In all, five sections totaling forty chapters constitute this 800-page book.

As an indication of the scope of the author's research, he gives details of the pre-invasion aerial interdiction campaign in which the Allied leaders initially sought to curtail enemy reinforcements moving to the West by destroying the rail transport system:

"A week before D-Day, SHAEF intelligence reported that the Germans still had three times the rail capacity needed for military traffic, four times the required number of cars, eight times the required locomotives, and ten times the required servicing facilities. The postwar United States Strategic Bombing Survey reached similar conclusions. Along with General Spaatz, these investigators maintained that the decisive blow against enemy communications in support of Overlord was the interdiction campaign, particularly against the bridges, which Spaatz had favored all along."

Since the Germans "had been repairing their rail centers with remarkable efficiency," the Allies switched the emphasis of aerial attacks to bridges and reaped much more favorable results.

While the air war is mentioned in passing, such as the bombardment preceding the breakout at St. Lô and occasional references to the Combined Bomber Offensive, the book is essentially a summation of the ground fighting.

Professor Weigley is evenhanded in his appraisal of the Allied leaders and the forces they commanded, meting out credit—and censure—where due. His comments on the Allies' eventual victory in the Battle of the Bulge:

"The victory in the Ardennes belonged preeminently to the American soldier. The generals failed to foresee the German counteroffensive, did not prepare for it as a contingency . . . and . . . were able eventually to regain control because their soldiers' stubbornness and bravery did most of the job for them. . . . " (He might be exaggerating here. It has been noted in other histories that Patton astounded the other Allied leaders—and the Germans—with the rapidity with which he disengaged three divisions already in combat and pivoted them to deal with the German thrust. His staff had prepared a plan to meet just such a contingency.)

In the book's epilogue, the author issues a warning when he concludes: " . . . In the end, it was [the US Army's] preponderance of material resources that carried [it] through to victory in World War II. That preponderance, however, cannot be counted on again." This opinion, far from exclusive to the author, is one that can't be stressed too heavily.

—Reviewed by William P. Schlitz, Senior Editor.

Ike and His Times

The Eisenhower Diaries, edited by Robert H. Ferrell. W. W. Norton & Co., New York, N. Y., 1981. 445 pages with index, notes, and introduction. $19.95.

This is a book for the reader looking not for the complete story but for additional insight into the life of our thirty-fourth President.

This compilation of Eisenhower's diaries begins when he was a major serving in the Philippines under Gen. Douglas MacArthur. The early years are sparsely covered and give little insight into the character and personal feelings of the author. On the other hand, the World War II years suffer from overwriting and show obvious input from such other sources as Ike's aides and the secretaries to whom he dictated comments.

Overall, this collection reads as might the diary of someone who never expected to attain such heights and thus never bothered to include personal thoughts and insights that would have been rewarding to historians. Conversely, later entries, particularly during the Presidential years, seem inhibited and lacking in personal thoughts, as though Eisenhower knew that his comments would be scrutinized and didn't want to lay bare his innermost feelings.

Indeed, truly personal comments are rare throughout the book. His family life is mentioned only briefly and his opinions about his superiors and subordinates are either lacking or overlaid with ambiguity.

Having said this, the book can be recommended to those who seek another view of the man. For interspersed throughout are some philosophical gems that are riveting in impact.

For example, the diaries contain an excellent summation of Ike's thoughts about government that read like a blueprint for moderate Republicanism.

Likewise, bits and pieces throughout confirm that he was dedicated to his country and that America was fortunate that he was persuaded to seek its highest office. One can only conclude that he was truly sincere in his lack of political ambition and finally agreed to run for President only when convinced that duty superseded his fervent desire to remain in private life. The diaries confirm that he was, in every sense, a "good man."

Finally, the careful reader will find intriguing, if short, evaluations of a number of Eisenhower's contemporaries such as Douglas MacArthur, George Patton, and Presidents and yet-to-be Presidents whom he knew.

—Reviewed by James A. McDonnell, Jr., Military Relations Editor.

New Books in Brief

Architects of Air Power, by David Nevin and the Editors of *Time-Life* Books. Volume Nine in *Time-Life* Books' Epic of Flight series, this handsome book may prove somewhat of a disappointment for the historian of airpower; the narrative lacks depth, but it does furnish for the general reader an overview of the major milestones and players in the development and use of the airplane as a military weapon. The book's real value lies in its superb collection of photographs, which includes a special section of recently unearthed photos of Germany's Hermann Göring seized by American soldiers from his country estate at the end of World War II. With bibliography and index. *Time-Life* Books, distributed by Little, Brown & Co., 34 Beacon St., Boston, Mass. 02106, 1981. 176 pages. $13.95.

Stuka at War, by Peter C. Smith. Achieving almost legendary status for its role in the opening blitzkriegs of World War II, the Ju 87 Stuka (Stuka being a contraction of the German *Sturzkampfflugzeug,* a generic term for dive bombers, but which has come since to mean the Ju 87) later gained a reputation as being a sitting duck for Allied fighters. However, this reputation simplifies the story of the Stuka, which served also as an anti-shipping bomber and notably as a tank-busting weapon on the Eastern Front. Author Smith traces the development and use of the Stuka, which served in the Luftwaffe until the end of the war, with special emphasis on the lesser-known roles in which the Stuka was used. With a foreword by Hans-Ulrich Rudel, noted Stuka pilot, and many photos and appendices. Charles Scribner's Sons, New York, N. Y., 1981. 128 pages. $19.95. —H. W.

Continuing recognition of the contributions of the Air National Guard and the Air Force Reserve to the Total Force, this article focuses on the people, exploring . . .

WHY THEY SERVE

BY JAMES A. McDONNELL, JR.
MILITARY RELATIONS EDITOR

"TO BE a reservist is to be, indeed, twice a citizen." These words of Winston Churchill, from another time and place, are right on the target in describing the people in today's Air National Guard and Air Force Reserve. For it *is* the people—citizens twice over—who make it all work so well.

Some twenty years ago, AIR FORCE Magazine readers were told of a new management plan for the air reserve forces aimed at a closer integration of the reserves into the active establishment.

The then-Assistant Chief of Staff for Reserve Forces, primarily responsible for all matters pertaining to the Air National Guard and the Air Force Reserve, writing for this magazine, proclaimed a key point of the new plan. This would be the assignment of a more substantial role to the air reserve forces.

Gen. Thomas D. White, then-USAF Chief of Staff, noted in the same issue, that "as fine as the record of the air reserve forces has been, the Air Force and . . . reserve forces must *jointly* continue to exert every effort toward improving the value and usefulness of the reserves."

All of this was a recognition that the reserve forces were ready and eager to assume greater responsibilities and that it made sense, both economically and operationally, to integrate the reserve forces more fully with using commands.

That was a milestone on the road to where we are today—wherein the reserve forces are indeed on the first team, providing operational missions such as refueling, airlift, resupply, and tactical fighter sorties. They are truly part of the Total Force. And it takes uncommon people to perform this mission.

Articles in the October issue of AIR FORCE Magazine explored the deeper significance of this metamorphosis and examined the operational impact of this resource on our nation's readiness. This article, in a different view, takes a brief look at some of the people involved in the "new force." Who are these men and women who make this approach work by their willingness to be "full-time part-timers" in the reserve while still full-time civilians? Each and every one of the 97,700 Air National Guard and 59,542 Air Force Reserve people has a story to tell about why they serve. Here are just a few.

The People Who Serve

For example, there's the civilian dentist in Maryland who, as often as he can, trades his daily dental "drilling" for Air National Guard "drilling" as an A-10 pilot. Then there's the District Fire Chief of the Mobile, Ala., Fire Department, Frank Davis, who, as a senior master sergeant with the 920th Weather Reconnaissance Group at Keesler AFB, is a flight engineer on the WC-130H. He's been with the Reserve for twenty years and with the fire department for nineteen. As he told AIR FORCE Magazine, "I love both of them. I started flying in the Reserve as a one-striper and haven't stopped. I've been through three or four different kinds of aircraft, and each one gets better. It's great!"

Educators fill many slots in reserve units. For instance, in the 926th Tac Fighter Group at New Orleans Naval Air Station, MSgt. Bruce Payne is an enlisted procurement specialist. In his classroom at the University of Southwestern Louisiana, Dr. Payne is a Professor of Finance. He's spent twenty-eight years with the Reserve, switching to AFRES after an initial draftee tour with the US Army in 1953. He stays because of the "esprit de corps we have in our unit. We call ourselves the 926th Cajuns," he says, "and it's just a good feeling to know that all of these people can come together on duty and perform a job that's so important. We've won a lot of awards because we like what we do and we've gotten pretty good at it."

In the public schools of Mobile, Ala., Zach Lee is known for his work as a teacher involved with children with learning disabilities. As a staff sergeant with the 920th—the Hurricane Hunters—he's a dropsonde operator. He put Reserve service in a unique perspective. "As a teacher," he said, "I have three summer months to do something else. To me, this duty at Keesler is a real meaningful job. Just like teaching, I feel that I'm doing a humanitarian service." He told AIR FORCE Magazine that he spends most of his summer—the hurricane season—on duty.

On the other side of the country, the Chairman of Eastern Washington University's Department of Music, Dr. William L. Maxson, became, in August, the first Air National Guardsman to conduct the United States Air Force Band in formal concert. He put them through their paces at a concert at the Jefferson Memorial in Washington, D. C., as Major Maxson, serving his Guard assignment with the Air Force Bands Branch.

Untypically Typical

Nothing is "typical" about these thousands of people who give double duty for the tax dollar, except, perhaps, their dedication. Each one is different. But a look at just one "typical" unit, selected at random, might be of interest. This is the 507th Tac Fighter Group, at Tinker AFB, Okla., commanded by Col. Jervis W. McEntee.

In 1972, this was the first reserve unit to convert to fighters, after an almost twenty-year hiatus for the fighter role in AFRES. It flies F-4s. In this unit, the pilot-reservists hail from fourteen states, with homes ranging from California and Washington in the West, to New York and Georgia in the East. The enlisted contingent arrive for duty from seven states. It's easy to see that a good many members of this organization work for civilian airlines.

The average age of the pilots in the 507th is thirty-eight. The average age of the "Whizzos" (Weapon Sys-

tems Officers) is thirty-three. This compares to an average age for Tactical Air Command pilots of thirty-four (thirty-five for its Whizzos). The average age of the enlisted members of the 507th is thirty-three, compared with an overall Air Force average of twenty-seven. Almost ten percent of the enlisted men and women have college degrees, with one percent holding a master's. This represents a lot of experience.

The average flying time for the 507th pilots is 3,134 hours, with an average of 444 hours in the F-4. For the real jolt, consider that almost seventy percent of the pilots (and almost forty percent of the Whizzos) have flown in combat. Only about a fourth of TAC pilots have combat time.

As already noted, the civilian occupations of reservists cover a broad span. The 507th is no exception. For example, a civilian prison guard is also a military maintenance specialist; among the military pilots are a law student, steakhouse owner, horse breeder, corporation lawyer, and oil field worker—as well as three elected officials, one an Oklahoma State Representative. So much for a "typical" unit.

Individually, around the country, we find that reserve service is many times a family affair. The 914th Civil Engineering Squadron (a subordinate unit of the 914th Tactical Airlift Group, Niagara Falls International Airport, N. Y.) has five brothers in the unit.

Within the 77th Mobile Aerial Port Squadron, Richards-Gebaur AFB, Mo., are: a pair of cousins, a husband-wife team, three sets of fathers and sons, an uncle and nephew team—and four unrelated people named "Morgan."

The 919th Special Operations Group, Eglin Auxiliary Field No. 3, Fla., has two father-and-son teams who are all "illuminating operators" on AC-130 gunships. They're the ones who are tethered on the aircraft's open ramp and drop flares out the back end. Both sons are college students. These reservists give extra meaning to the term "Air Force family."

In another vein, Missouri truckers with their "ears" on can hear the Rev. Lester Arnold invite them, by way of their CB radios, to stop for roadside or truck-stop services. This is how the Reverend Arnold, a Home Missionary with the Southern Baptist Convention, spends his spare time. In the rest of his "spare time" he is a tech sergeant in the Wing Safety Office of the 442d Tac Airlift Wing at Richards-Gebaur. Sergeant—or Reverend—Arnold's "handle" is—what else—"Samaritan Base." He is involved with a variety of efforts aimed at providing not only spiritual assistance to truckers, but other counseling as well. His next Air Force goal, he told AIR FORCE Magazine, is the chaplaincy.

Community Service

Other community service activities play an important part in the civilian lives of reservists, lending extra emphasis to Winston Churchill's words. For example, an aircraft mechanic with the 301st Tactical Fighter Wing, Carswell AFB, Tex., is deeply involved as a volunteer in the state drug and alcohol-abuse program in Texas. He speaks to youth groups throughout Texas and is certified by the state to provide instruction to DWI violators.

A member of the 935th Civil Engineering Squadron, Kansas City, Kan., helps finance and grow a vegetable garden for local senior citizens. He's truly a force for good in his community.

Community service, volunteerism, dedication to duty—hallmarks of the reserves. These are all exemplified by perhaps one of the more unusual Reserve organizations—the Air Force Intelligence Reserve (AFIR) program, which serves to develop a combat-ready Reserve for augmenting active-force intelligence operations during peacetime contingencies or wartime mobilization.

This operation functions through training sites around the country, includes a variety of skills, and supports several commands. It's managed by the Directorate, Intelligence Reserve Forces, Air Force Intelligence Service, at Fort Belvoir, Va.

Many AFIR members travel 300 to 400 miles to participate in training weekends at their training sites. They enjoy their assignments. Seventy-five Intelligence debriefers were on twenty-four-hour alert for one year prior to Operation Homecoming, the Vietnam War American POW repatriation. They volunteer routinely for holiday duty on the Air Staff and at major commands, and thirty-five qualified Reserve interrogators volunteered for duty in Southeast Asia during the conflict. The AFIR was performing as part of the Total Force almost ten years before DoD officially proclaimed this policy.

The "professional profile" of AFIR is a microcosm of the community and includes lawyers, college professors and deans, engineers and scientists, aerospace industry and airline executives, bank vice presidents, economists, sociologists, and psychologists.

A look at just two of the AFIR people points to the tremendous diversity among those who serve in this unique outfit. For example, MSgt. Maurits Swabb, born in Amsterdam, Holland, is a survivor of nine different World War II concentration camps, including Auschwitz. He escaped three times, finally making it out for good during 1945. Joining the US Army, he later switched to the Air Force and is presently serving his reserve assignment with the US Readiness Command at MacDill AFB, Fla.

SMSgt. James M. McConnell is another World War II Army veteran, who served with the 82d Airborne Division, and was heavily decorated for actions in Normandy, the Ardennes, and the Battle of the Bulge. As a civilian he is a financial consultant and, in his AFIR assignment, serves as an intelligence operations NCO.

Finally, in considering dedication to duty and devotion to reserve service, we salute CMSgt. Edward Rudden, a C-141 flight engineer with the 335th Military Airlift Squadron, McGuire AFB, N. J. Chief Rudden, a civilian quality insurance specialist for the GSA, likes what he does in the Air Force Reserve. He told AIR FORCE Magazine that he intends to stay with it for some time yet. What's unusual about that? Well, he was recently selected as the million dollar winner in the New Jersey State Lottery. This might cause some of us to consider extensive travel plans. Chief Rudden says he, too, is considering travel—"I've got a weekend flight at McGuire," he says. "The other doesn't change that."

To these people, the Air Force is truly more than a job. It's a way of—another—life. ■

THE BULLETIN BOARD

By James A. McDonnell, Jr., MILITARY RELATIONS EDITOR

Leaders Laud New Military Pay Rates

"This increase will bring us up to the target that was set in 1973 for comparative wages for an All-Volunteer Force. We aim to keep it at a level that is competitive with the outside world. . . ."

That's how Secretary of the Air Force Verne Orr summed up his reaction to the October passage of the 1981 Military Pay Bill. AIR FORCE Magazine captured his and other comments on this landmark legislation shortly after President Reagan signed it on October 15.

The bill, with an estimated price tag of some $4.5 billion, provides for targeted pay increases of ten to seventeen percent for enlisted people and an across-the-board hike for officers of 14.3 percent. *(See p. 156 for the new pay table and selected bill highlights.)*

In signing the bill, whose provisions are retroactive to October 1, President Reagan emphasized that a motivated, high-quality military is "a critical element of my commitment to strengthen America's defenses." He added that "for too long, our dedicated military personnel have been undercompensated. . . ."

The bill enjoyed unusual bipartisan congressional support, passing the House 417 to one and unanimously in the Senate. Two key congressional sparkplugs of the legislation shared their views with AIR FORCE Magazine. Sen. Roger Jepsen (R-Iowa), Chairman of the Armed Services Manpower and Personnel Subcommittee, said, "Enactment of enhanced pay rates for middle and senior enlisted grades will provide greater incentives for promotion, career advancement, and retention. In addition, they will help build a positive attitude toward a military career among service-eligible youth and junior enlisted personnel considering their career opportunities."

Rep. Bill Nichols (D-Ala.), HASC Chairman, who shepherded the bill through the House, said that it "demonstrates the continued resolve of Congress to ensure that military pay does not experience the neglect it suffered in the past." At an earlier AFA event, and speaking of the climate in the nation that paved the way for this increase, he noted, "I sense a change. I believe we have turned a corner in the aftermath of Vietnam. I sense a great deal of pride in the uniform."

An excellent summation of both the bill and its probable effects came from Lt. Gen. Andrew P. Iosue, Air Force Deputy Chief of Staff, Manpower and Personnel. He told AIR FORCE Magazine, "This is a good pay bill. It's long overdue, much needed, and it's one that will give us some real ammunition for recruiting and keeping top-caliber people."

General Iosue singled out not only government leaders but also the many staff experts who played a large role in shaping this action. "They all worked hard on it," he said. "My action people, Pentagon staffers across the board, and Administration and congressional staff people put in a lot of overtime. It was a true team effort, and everyone concerned can be proud of what they achieved.

"Finally," he said, "I can't say enough for the absolutely vital support that the Air Force Association has given this pay increase. Your Policy Statements, your speeches by AFA leaders at all levels, the many stories in AIR FORCE Magazine—which, incidentally, I know were read with interest by a lot of the congressional members, because they told me so—all of this meant a great deal."

The new officer aide to Maj. Gen. Robert F. McCarthy, Commander, AFCC, brings a wealth of experience to his job. Capt. Jimmie A. Blackwell has fifteen years of enlisted service and a master's in business administration. (USAF photo by TSgt. Ed Nightingale)

Second Chance for SBP Participation

Military retirees who never elected to participate in the Survivors Benefit Plan, or who now wish to increase their annuities, have a chance to do so under the provisions of a new law.

Public Law 97-35 allows retirees with no coverage to enroll in the SBP through September 30, 1982. Those now carrying reduced or "child only" coverage also will be able to increase their level of participation and add a spouse. However, those currently participating cannot reduce their annuity or withdraw from the program. Eligible retirees have been sent a fact sheet on the new program from the Air Force Military Personnel Center. If none was received, local bases have information, or, as an alternative, Hq. AFMPC (MPCARS), Randolph AFB, Tex. 78105 has answers. Their toll-free number is 1-800-531-7502.

Sen. Strom Thurmond (R-S. C.), originator of the bill, noted that the original 1972 SBP legislation "had so many inequities that the majority of retirees declined to participate." Since later changes to the law have improved the program, he believes that this open enrollment period is an equitable option for those originally declining to sign up. The new law also provides a penalty for those new participants. They must pay into the plan for two years before coverage begins for beneficiaries. If the enrollee should die during that time, paid premiums will be refunded to the estate.

Senator Thurmond, meanwhile, has introduced further legislation aimed at correcting what he describes as

"remaining inequities." In stressing the need for this, he said "the basic objective of the SBP is to prevent any widow of a military retiree from ever being without a source of income. The Congress has finally come to grips with this issue after a waiting period of eight years."

VA Reduces Programs

A Veterans Administration announcement that it estimates some $110 million will be saved by the October 1 termination or reduction in programs it says "failed to achieve their original objectives" has stirred mixed feelings. Some observers speculate that the budget crunch had more to do with paring these programs than a failure of objectives, despite VA's assurance that it will carry out "the pledge of Congress and the President that important veterans benefits will not be curtailed."

The programs and savings involved are:

• *Flight Training.* Flight training payments have ended for all those not participating in the program on August 31. In July, 5,840 veterans were receiving benefits for flight training. VA estimates that elimination of the program will save $14.1 million in Fiscal Year 1982.

The rationale for ending the program was based on General Accounting Office and VA studies that showed that most trainees used the skill only for avocational purposes. The GAO said that only sixteen percent of the graduates had full-time jobs related to the training.

• *Correspondence Training.* VA claims that a number of studies show an extremely high dropout rate among trainees enrolled in correspondence training programs and a high incidence of fraud and abuse. The law now requires veterans to share a larger part of the cost—forty-five percent, as opposed to the previous thirty percent. Estimated savings in FY '82 are $3.2 million. The end of July enrollment in such programs totaled 25,615.

• *Educational Loans.* Ending for most veterans on October 1 was a special program through which GI Bill students could receive low interest loans from VA in addition to their GI Bill payments. Savings of approximately $6 million are expected from sharply curtailing this program in FY '82 and avoiding the losses from the high default rate in the loan program.

• *Dental Care.* Formerly, ex-servicemen could get free VA dental care for up to a year after leaving military service. This has now been reduced to ninety days. This reduction will save an estimated $17.7 million.

Displaying the certificate that accompanied the award of the Air Force Outstanding Unit Award to the Air Force Management Engineering Agency are Lt. Gen. Andrew P. Iosue, left, and Col. Robert E. Edgell, AFMEA Commander. General Iosue, Deputy Chief of Staff/Manpower and Personnel, Hq. USAF, presented the award, the first such to AFMEA. AFMEA is focal point for the development and maintenance of manpower standards, productivity enhancements, manpower requirements determination, and technical guidance on management engineering.

• *Burial Benefits.* The cutback that might prove most controversial is that of the burial allowance of $300 previously available to all war veterans. It is now limited to veterans eligible for VA pension or compensation and those who die in VA medical facilities. Estimated savings are $75.2 million.

VA regulations to implement these changes are now being written and should be in the field soon.

In a related issue, Veterans Administration head Robert Nimmo denied published reports that VA is about to impose an income test for care to eligible veterans.

According to the Administrator, the VA is only studying ways of finding an equitable means of complying with a congressional mandate that veterans with nonservice-related conditions not be given full medical care unless they are clearly unable to pay for such care themselves.

"Thus far," he stressed, "no final income limitations have been determined, no final guidelines established, and no final decisions" reached. "It is clear," he pointed out, however, "that under today's budget constraints and the soaring cost of medical care the VA cannot continue to provide full medical care to all veterans, regardless of eligibility. Whatever steps we ultimately take to contain costs will be carefully designed to ensure that no veteran with a service-related condition or any veteran in dire financial straits will be denied quality health care by the VA."

Guard and Reserve Job Rights Affirmed

The US Supreme Court recently reaffirmed the right of members of the National Guard and Reserve to take time off from their civilian jobs to attend military training. But in so doing, the Court clarified a disputed portion of the law in favor of the employer in the case. This had led many Guard and Reserve members—and some employers—to assume that the Court had struck down the basic right to take time off from work for military duties. This is not so.

The Court ruled that the employer of a Guard or a Reserve person who misses work to attend military training is not required to provide the employee an opportunity to make up the lost time unless similar scheduling adjustments are made for all employees. However, though the Court decision ruled out rescheduling, it left intact the basic entitlements of the law.

DoD has emphasized that the vast majority of National Guardsmen and Reservists are not affected by the decision. A DoD General Counsel evaluation notes that the decision reaffirmed that employee-reservists are protected against discrimination by employers or other adverse treatment resulting solely from the performance of their military obligations. The evaluation points out " . . . because of the very unusual fact situation the case is not to be regarded as a precedent that is prejudicial to

the retention-reemployment rights of reservists generally. . . . The reservist involved in the subject case lost work time (and hence pay) not because of discrimination by the refinery but because his fellow-workers were not willing to trade weekday for weekend work tours. The Supreme Court merely held that the employer here was not required to give preferential treatment to the reservist by providing special work scheduling that excluded weekend workdays when that arrangement was not provided for other employees."

The law in question, the Veteran's Reemployment Rights Statute, prescribes responsibilities for Guard and Reserve members as well as rights; the most important of the former is that members must keep their employers informed of military training requirements, and they must request the necessary time off. The law assures them they can train without losing their annual leave or paid vacation. It also protects members by prohibiting employers from denying them promotions, seniority, pension participation, and other benefits because of their military duties. But, of course, it cannot assure them of their bosses' good will.

It's a two-way street. Reservists are protected, but, in turn, they owe it to their employer to work within the established company personnel framework.

Veterans Health Care and Training Opportunities Improve

At press time, the Veteran's Health Care, Training and Small Business Loan Act of 1981 had passed both Houses of Congress and was awaiting President Reagan's signature. Rep. G. V. (Sonny) Montgomery (D-Miss.), Chairman of the House Committee on Veteran's Affairs, noted that the legislation will greatly enhance the benefits due Vietnam-era veterans.

A major provision gives priority hospital and outpatient care to Vietnam veterans whose current medical conditions may be the result of exposure to Agent Orange or other defoliants used in Vietnam.

Also, it extends the Vietnam Veterans Readjustment Counseling Program by three years. The legislation also requires the VA to operate and maintain a minimum of 90,000 hospital and nursing home beds and to maintain the number of additional beds necessary to fulfill VA's contingency responsibility as a backup to the Defense Department during time of war or national emergency.

Chairman Montgomery stressed the significance of a provision aimed at assisting those Vietnam-era veterans still experiencing problems adjusting to civilian life. "The Congress has taken note of this by extending for two years the period of time a Vietnam-era veteran may use his GI Bill education benefits to pursue on-the-job or vocational training," he stated. Another provision geared toward the same group would extend by three years the authority for veterans' readjustment appointments under which eligible disabled and Vietnam-era veterans may receive noncompetitive appointments in the federal Civil Service.

The bill also contains a major new initiative to benefit young veterans in the business world. Vietnam-era and certain service-connected disabled veterans would be eligible for loan guarantees and direct loan assistance for five years in order to acquire, expand, or start a business. Administered by the VA, with a one-time appropriation of $25 million, "this program," Chairman Montgomery noted, "is similar to business loan programs provided to veterans of previous wars and should provide valuable aid in these economically hard times."

THE BULLETIN BOARD

Air Force Teams Win One, Lose One

Twelve of the Air Force's top tennis players teamed up to capture the 1981 Interservice Championship at Little Creek Naval Base, Va., in September.

The Air Force team brought home the Leech Cup, first presented in interservice competition in 1924. Engraved with the names of the winning services for the past fifty-seven years, the cherished silver trophy symbolizing the best in military tennis will be retired this year and will be on permanent display in the Pentagon.

Two Air Force women, 1st Lt. Beverly Knott, Whiteman AFB, Mo., and SSgt. Gail Gilmore, Brooks AFB, Tex., led the team to victory as they swept both the singles and doubles championships.

The team amassed twenty-four points, far ahead of the second-place Army group's sixteen points. Third place Navy had eleven points, and the Marines, one point.

Meanwhile, in other competition, a Sea Services chess team representing the Navy, Marine Corps, and Coast Guard won the Twenty-second Annual Armed Forces Chess Championship tournament by a half point, over the Air Force, in Washington, D. C. Air Force's A1C Timothy G. Brown, George AFB, Calif., was the individual champion, gaining nine of a possible twelve points. In the eighteen years of the competition, Air Force has won eight times, Army, seven, and Sea Services only three.

USAFA Cadet Commander Attends Joint Service Conference

Cadet Col. Timothy J. Collins, USAFA Wing Commander, was one of twenty-three cadets and midshipmen participants from the four US service academies at the first annual Service Academies Leaders' Conference at West Point *(see photo)*. The conference, made possible by a gift from the J. P. Stevens Foundation, included seminars concentrating on practical leadership skills in three basic areas: decision-making, management of time, and conflict resolution.

The conference was the first time the top-ranking cadets and midshipmen from all four US service academies had met. Cadet Colonel Collins noted "we had the opportunity to really see that the 'US' we all share equates to 'us' and to examine how we handle similar command experiences. Also we developed a better working relationship among academies that can be used for interservice projects."

Short Bursts

Travis and McGuire Air Force Bases will phase out their overseas passenger terminals the first part of next year. Travelers will be routed through "commercial gateways," where MAC contingents will operate. Civilian airports slated as gateways include **Los Angeles, Oakland, San Francisco, Philadelphia, Newark,** and, interestingly, **St. Louis** for Korea and Japan-assigned travelers. Studies are still under way on naming **Atlanta** the commercial gateway for the Charleston AFB aerial port.

Mississippi now exempts the first $5,000 a year received by RSFPP or SBP beneficiaries from state income tax.

Informed sources speculate that the Administration will try to **delay the retiree COLA** scheduled for next April to October 1982. This catch-up was already skipped this past October as a cost-cutting measure. Congress would have to approve any such move.

Since its inception in 1955, twenty-three USAFA graduates have been

named **Rhodes Scholars.** There are now more than 14,000 alumni of the Colorado school. Almost 10,000 are still on active duty. A total of 355 are deceased.

In the 1980 elections, **military voter participation** increased significantly. Air Force members chalked up the best rate among the services, with more than fifty-two percent casting ballots.

VA wants veterans to know that they have **relaxed requirements** for formal documents to support claims. If original paperwork has been lost or is otherwise unavailable, VA will consider certified statements in many cases. Its advice is not to let missing documents influence vets to put off filing claims.

The **best Air Force commissaries** of 1981 are Eglin AFB, Fla.,Stateside, and Yokota AB, Japan. They received the L. Mendel Rivers Award, named in honor of the late Chairman of the House Armed Services Committee, who was a big booster of commissaries for troop morale. Judging was based on twelve categories, foremost among them being patron service, patron savings, and troop support.

Senior Staff Changes

PROMOTIONS: To be **Lieutenant General:** James H. **Ahmann.**

RETIREMENTS: B/G Billy B. **Forsman;** M/G Donald T. **Schweitzer;** M/G Howard R. **Unger.**

CHANGES: M/G James A. Abrahamson, from DCS/Systems, Hq. AFSC, Andrews AFB, Md., to Assoc. Administrator, Space Transportation System, NASA, Washington, D. C. . . . **M/G (L/G selectee) James H. Ahmann,** from Ass't C/S, Ops., SHAPE, Casteau, Belgium, to Mil. Dep. Dir., Defense Security Assistance Agency, Washington, D. C. . . . **M/G Bruce K. Brown,** from DCS/Ops., ADCOM, & DCS/Ops., J-3, NORAD, Peterson AFB, Colo., to Vice CINC, ADCOM, & Vice Cmdr., ADC, Peterson AFB, Colo. . . . **M/G James R. Brown,** from DCS/Ops., Hq. USAFE, Ramstein AB, Germany, to Ass't C/S, SHAPE, Casteau, Belgium, replacing M/G (L/G selectee) James H. Ahmann.

B/G Rano E. Lueker, from Vice Cmdr., 21st AF, MAC, McGuire AFB, N. J., to Cmdr., Defense Industrial Supply Center, DLA, Philadelphia, Pa. . . . **B/G John D. Moore,** from Vice Cmdr., 10th AF (AFRES), Bergstrom AFB, Tex., to MA to Cmdr., 15th AF, SAC, March AFB, Calif. . . . **B/G Joseph D. Moore,** from Ass't DCS/Ops., Hq. USAFE, Ramstein AB, Germany, to DCS/Ops., Hq. USAFE, Ramstein AB, Germany, replacing M/G James R. Brown . . . **B/G Allen K. Rachel,** from Ass't DCS/Intelligence, Hq. SAC, Offutt AFB, Neb., to Dep. Dir., Defense Mapping Agency, Washington, D. C., replacing B/G Donald O. Aldridge.

SENIOR ENLISTED ADVISOR CHANGES: CMSgt. Sam E. Parish, from 40th AD/CMS, SAC, Wurtsmith AFB, Mich., to SEA, Hq. SAC, Offutt AFB, Neb., replacing CMSgt. Charles L. Reynolds. ■

Retired Army Col. D. M. "Mike" Malone discusses leadership skills with the top-ranking cadets and midshipmen from the four US service academies during the first Service Academies Leaders' Conference conducted at the US Military Academy, West Point, N. Y., this past September. (US Army photo by Sal Palazzo)

INTERCOM

Season's Greetings

from the Staffs of the Air Force Association and the Aerospace Education Foundation

We want to wish every member, patron, and supporter of the Air Force Association and their families a joyous and cheerful Holiday Season and a prosperous and healthy New Year.

We are taking this opportunity to send a personal Holiday greeting from us to each of you; and to assure you that we of the staff are dedicated to AFA's professional concern for and support of the people and the technology that provide our nation's aerospace power — power that serves to keep our nation strong, the world at peace, and our fellow Americans free.

Andy Anderson, Dottie Barnes, Bill Belanger, Clif Berry, Pamela Braithwaite, Jim Brown, Jeanne Buffalino, Gilbert Burgess, Ben Catlin, Barbara Chambers, Tina Chandler, Sara Ciccoli, Donna Coffey, Charles Cruze, Esther Curtis, Russ Dougherty, Pearlie Draughn, Bill Farrell, Olive Felty, Dottie Flanagan, Bill Ford, Anne-Marie Gabor, Margaret Glover, John Gray, Rolla Gray, Joanne Greene, Nancy Hallock, Frank Henry, Janet Hensler, Joan Herzberg, Alan Johnson, Anna and Bud Keeler, Max Keeney, Debbie Kinback, Jana Knoska, Doreatha Kornegay, Jean Kund, Phil Lacombe, Ann Leopard, Grace Lizzio, Linda Mathieson, Kathleen McAuliffe, Jim McDonnell, Karen McReynolds, Paul Montalbano, Bill Morley, Pat Muncy, Fred Musi, Terri Nagle, Millie Neider, By Nicholas, Mike Nisos, Dave Noerr, Carol Nuetzel, Rosemary Pacenta, Clarine Penewell, Teri Pepper, Vic Powell, Jancy Roberts, Bev Rodriguez, Bill Schlitz, Bob Shaughness, Dick Skinner, Carol Smith, John Smith, Jim Straubel, Pat Teevan, Charlie Tippett, Alice Turner, Edgar Ulsamer, Barbara Vest, Ed Walker, Don Whetstone, Pat Whipp, Kathleen White, Robin Whittle, Hugh Winkler, Maria Winter, Jill Wolf, Ann Wood-Gray.

Among honored guests attending the Ak-Sar-Ben Chapter's annual awards dinner were (from left): Nebraska Governor and Mrs. Charles Thone; Donald Adams, Chapter President; Bob Hope; and Outstanding Service Award winner V. J. Skutt.

Other distinguished guests at the Chapter dinner included (from left): Mrs. Pat Davis; SAC CINC Gen. Bennie L. Davis; former SAC CINC Gen. Curtis E. LeMay; and Lyle Remde, AFA National Vice President for the Midwest Region.

Ak-Sar-Ben Chapter Of Omaha Honors V. J. Skutt

In October, AFA's Ak-Sar-Ben Chapter, Omaha, Neb., paid tribute to one of its own—long-time AFA member and supporter V. J. Skutt. The honors took place at the Chapter's annual awards dinner that was also a salute to Strategic Air Command's thirty-fifth year.

In presenting its 1981 Outstanding Service Award to Mr. Skutt, the Chapter had high praise for the Mutual of Omaha insurance executive: "The roster of his service is far too multiple to name specific organizations, but it includes a kaleidoscopic range of devotion to education, religion, health, the creative arts, safety, youth fitness, and defense of our nation."

Speaker and honored guest at the affair was Bob Hope. Also present were former SAC Commander Gen. Curtis E. LeMay; SAC's current Commander in Chief, Gen. Bennie L. Davis; and pioneer airman Lt. Gen. James H. Doolittle.

Besides local AFA leaders at the event, the national leadership was represented by newly elected AFA President Judge John Brosky.

Honors to both Skutt and Hope were in the form of SAC plaques presented by General Davis "in recognition of their contributions to the command." Chapter tribute to the two came in the presentation by Chapter President Donald Adams of sculptures of a classic aviator replete with leather helmet, goggles, scarf, and parachute.

In other happenings at the Chapter, the Chapter's annual Arthur C. Storz, Sr., Awards were presented to the Outstanding Airman, Junior Officer, and Civilian Employee at Offutt AFB, Neb. They are: Outstanding Airman, Sgt. Alfred A. Lockhart; Junior Officer, Capt. Richard L. Alley; and Civilian Employee, Mitchel P. Dorsey.

The awards are named in honor of the late Arthur C. Storz, Sr., an Omaha brewer and founder of the Ak-Sar-Ben Chapter. Mr. Storz was a long-time AFA supporter and was named AFA's "Man of the Year" for 1955.

General Davis was the guest speaker at the Storz Awards Luncheon. Past Storz Awards guests have included Lorne Greene of TV's "Battlestar Galactica," and Maxie Anderson, Ben Abruzzo, and Larry Newman, who made the first transatlantic balloon flight in *Double Eagle II* in August 1978.

Military Pay Bill Passed by Congress, Signed by President

In early October, the two houses of Congress approved a compromise pay bill—S.1181—that provides targeted increases for the enlisted force and a 14.3 percent boost for officers, and President Reagan signed the measure on October 14. *(See the accompanying tables for the new monthly basic pay scale and rates for allowance for quarters.)*

Enlisted grades are to receive the following: E-1, ten percent; E-2, 10.7 percent; E-3 and E-4, thirteen percent; E-5 and E-6, 16.5 percent; E-7 through E-9, seventeen percent. (Percentages are the percent increase in base pay.) BAQ and BAS each increase by 14.3 percent.

Officers will receive a 14.3 percent increase in base pay coupled by 14.3 percent in BAQ and BAS.

Here are additional provisions of interest to Air Force people:

- *Aviation Career Incentive Pay (ACIP) for officers.* An increase of thirty-one to thirty-five percent ($306 to $400)

Monthly Military Basic Rates of Pay

(Effective October 1, 1981)

PAY GRADE	UNDER 2	2	3	4	6	8	10	12	14	16	18	20	22	26
						YEARS OF SERVICE								
						COMMISSIONED OFFICERS								
O-10	$4,506*	$4,665*	$4,665*	$4,665*	$4,665*	$4,844*	$4,844*	$5215*	$5,215*	$5,588*	$5,588*	$5,961*	$5,961*	$6,333*
O-9	3,994	4,098	4,186*	4,186*	4,186*	4,292*	4,292*	4,471*	4,471*	4,844*	4,844*	5,215*	5,215*	5,588*
O-8	3,617	3,726	3,814	3,814	3,814	4,098	4,098	4,292*	4,292*	4,471*	4,665*	4,844*	5,038*	5,038*
O-7	3,006	3,210	3,210	3,210	3,354	3,354	3,549	3,549	3,726	4,098	4,380*	4,380*	4,380*	4,380*
O-6	2,228	2,448	2,608	2,608	2,608	2,608	2,608	2,608	2,696	3,123	3,283	3,354	3,549	3,849
O-5	1,782	2,092	2,237	2,237	2,237	2,237	2,305	2,428	2,591	2,785	2,945	3,034	3,140	3,140
O-4	1,502	1,828	1,951	1,951	1,986	2,075	2,216	2,341	2,448	2,555	2,626	2,626	2,626	2,626
O-3	1,395	1,560	1,668	1,845	1,934	2,004	2,111	2,216	2,271	2,271	2,271	2,271	2,271	2,271
O-2	1,217	1,329	1,596	1,650	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685	1,685
O-1	1,056	1,099	1,329	1,329	1,329	1,329	1,329	1,329	1,329	1,329	1,329	1,329	1,329	1,329
						COMMISSIONED OFFICERS WITH MORE THAN 4 YEARS OF ACTIVE ENLISTED OR WARRANT OFFICER SERVICE								
O-3E	—	—	—	1,845	1,934	2,004	2,111	2,216	2,305	2,305	2,305	2,305	2,305	2,305
O-2E	—	—	—	1,650	1,685	1,738	1,828	1,899	1,951	1,951	1,951	1,951	1,951	1,951
O-1E	—	—	—	1,329	1,419	1,472	1,525	1,578	1,650	1,650	1,650	1,650	1,650	1,650
						ENLISTED MEMBERS								
E-9	—	—	—	—	—	—	1,653	1,691	1,729	1,769	1,809	1,844	1,941	2,130
E-8	—	—	—	—	—	1,387	1,426	1,464	1,502	1,542	1,577	1,616	1,711	1,902
E-7	968	1,045	1,084	1,122	1,160	1,197	1,236	1,274	1,331	1,369	1,408	1,426	1,522	1,711
E-6	833	908	946	986	1,023	1,060	1,099	1,155	1,192	1,230	1,249	1,249	1,249	1,249
E-5	731	796	834	870	927	965	1,004	1,041	1,060	1,060	1,060	1,060	1,060	1,060
E-4	682	720	762	821	854	854	854	854	854	854	854	854	854	854
E-3	642	677	705	732	732	732	732	732	732	732	732	732	732	732
E-2	618	618	618	618	618	618	618	618	618	618	618	618	618	618
E-1	551	551	551	551	551	551	551	551	551	551	551	551	551	551

NOTE: Amounts less than $1 have been omitted.
*Basic pay is limited to $4,176.00 by Level V of the Executive Schedule.

for officers with six through twenty-four years of experience. Officers with more than twenty-five years in an operational flying assignment will receive $250 per month. This applies to grades O-6 and below and does not include general officers. The Air Force and the Army were not given authority to pay flight bonuses (the Navy's authority expires in September 1982), and any officer who received a flight bonus may not receive the increase in ACIP.

- *Enlisted Aircrew Flight Pay.* The floor is raised from $63 to $83 per month, with a ceiling of $131 per month remaining the same.
- *Special Pay for AWACS.* Hazardous-Duty Incentive Pay (HDIP) is authorized for AWACS Air Weapons Controllers. The pay ranges from $125 to $350 per month, depending on grade and experience.
- *Hazardous-Duty Incentive Pay.* Two new skills of interest to the Air Force were added: (1) Toxic fuel handlers and (2) personnel exposed to live, dangerous viruses, bacteria, or pesticides. Pay increased from $63 per month to $83 per month.

Monthly Basic Allowance for Quarters (BAQ)

(Effective October 1, 1981)

Pay Grade	Without Dependents		With Dependents
	Full*	Partial**	
C/S and O-10	$489.00	$50.70	$611.70
O-9	489.00	50.70	611.70
O-8	489.00	50.70	611.70
O-7	489.00	50.70	611.70
O-6	438.90	39.60	535.50
O-5	404.70	33.00	487.20
O-4	360.30	26.70	434.70
O-3	316.80	22.20	390.90
O-2	275.10	17.70	348.00
O-1	214.80	13.20	279.60
CMSAF and E-9	261.90	18.60	368.70
E-8	241.50	15.30	340.50
E-7	205.50	12.00	316.80
E-6	186.60	9.90	291.60
E-5	179.40	8.70	267.90
E-4	158.10	8.10	235.50
E-3	141.30	7.80	205.50
E-2	124.80	7.20	205.50
E-1	117.90	6.90	205.50

*Payment of the full rate of basic allowance for quarters at these rates to members of the uniformed services without dependents is authorized by 37 U.S.C. 403 and Part IV of Executive Order 11157, as amended.
**Payment of the partial rate of basic allowance for quarters at these rates to members of the uniformed services without dependents who, under 37 U.S.C. 403(b) or 403(c), are not entitled to the full rate of basic allowance for quarters, is authorized by 37 U.S.C. 1009(d) and Part IV of Executive Order 11157, as amended.

Basic Allowance for Subsistence (BAS)

Officers (Monthly)	Enlisted (Daily)		
	Separate Rations	Rations in Kind Not Available	Emergency Rations
$94.39	$4.50	$5.09	$6.73

- *Per Diem Equity.* The bill clarifies the intent of Congress that enlisted personnel be treated as are officers. Enlisted personnel on TDY will receive the same subsistence per diem ($9.30) as do officers (except when on field duty or sea duty).
- *Car to Port Allowance.* A monetary allowance to take a motor vehicle to and from a port of embarkation or debarkation is now authorized.

The following are new authorities and are subject to guidance from DoD and to the appropriation of funds by the House and Senate Appropriations Committees:

- *Temporary Lodging Entitlement.* During a PCS move, up to four days of TLE is authorized. Single personnel will receive $50 a day; married personnel $37.50 plus $25 for each dependent, up to $110 per family per day. Four days' allowance will be authorized for moves within CONUS or upon returning from overseas. (Effective April 1982.)
- *Funded Emergency Leave.* For active-duty personnel and command-sponsored dependents, funded emergency leave travel from overseas to port of entry is authorized.
- *Emergency Leave While on TDY.* Travel at government expense to return to home station from TDY is authorized, after emergency leave is approved.
- *Funded Morale and Environmental Leave.* Funded morale and environmental leave for personnel in remote areas is authorized if government transportation is not available for both members and dependents. One trip during a two-year tour or two trips during a three-year tour.
- *Continuation Bonus for Engineers and Scientific Officers.* A bonus of up to $3,000 per each additional year of obligated service may be paid to engineering and scientific officers who have between three and fifteen years of service.
- *Enlistment Bonus.* This increases enlistment bonus from $5,000 to $8,000. No more than $5,000 may be paid initially. The remainder to be paid at three-month intervals.
- *Increased ROTC Scholarships.* The bill increased the number of AFROTC scholarships from 6,500 to 9,500, to be phased in at the rate of 500 additional scholarships each year.

POWs-MIAs Honored by Wichita, Kan., for a Third Year

For the third consecutive year, citizens of Wichita, Kan., conducted memorial services in honor of America's servicemen who were prisoners of war in Southeast Asia or missing in action. Also remembered were the POWs of the Korean conflict and World War II.

The ceremonies, on July 17, were highlighted by the dedication of a new monument—a pedestal-mounted F-105 fighter—along Memorial Walk at nearby McConnell AFB. The monument has been erected in appreciation of the sacrifices of those who maintained and flew the F-105 in the Southeast Asian war, including the twenty-seven pilots from McConnell killed in combat.

Participants at the dedication ceremonies included F-105 "River Rat" pilots; more than twenty former POWs of World War II, Korea, and Vietnam; wives of those killed in action or still missing; personnel of McConnell AFB and the Kansas Air National Guard; and several hundred people from the surrounding communities.

Featured speaker at the POW-MIA Recognition Day dedication was Lt. Gen. John P. Flynn, USAF (Ret.), himself an F-105 pilot who was shot down in October 1969 and held captive by the North Vietnamese for five and a half years.

General Flynn described how action over the heavily defended North Vietnamese targets lasted only a few "split seconds" but that almost every strike by numbers of American aircraft resulted in losses. When joining up for aerial refueling following a strike, the tanker crew's inquiries about missing comrades were met with "solemn silence."

Following the General's remarks, the monument was christened with a bottle of champagne by Lt. Col. Roland Smith, a former "Red River Valley" pilot and currently Vice Commander of the ANG wing at McConnell. The dramatic conclusion of the ceremony was a flyby of three F-105s in the missing man formation.

General Flynn, guest of the Kansas AFA for the day's events, had earlier addressed an assembly of former POWs, patients, family members, volunteers, and staff at the Veterans Administration Medical Center. The General particularly praised the wheel-

During memorial services for POWs/MIAs of the Southeast Asia conflict held recently at McConnell AFB, Kan., a pedestal-mounted F-105 was dedicated to those who maintained and flew the F-105 during the war. See item above.

chair-confined veterans and their families for their daily sacrifices.

And while a proclamation from President Reagan designated this past July 17 as "POW-MIA National Recognition Day" in noting the ceremonies in Wichita, members of the Kansas AFA believe that the third Friday in July should be so proclaimed every year.

AFA's "yellow ribbon" badge is presented to former AFA President Vic Kregel by Membership Chairman Dave Blankenship at the Membership Awards Reception held during the recent National Convention. Similar ribbons, as well as Membership Award plaques, were presented to all AFA leaders whose organizations (chapter, state, or region) attained their 1981 new member goal.

Here Are the Additional AFA Membership Award Winners, as of September 30

In the November issue of AIR FORCE, on p. 125, we published the list of regional, state, and chapter winners of AFA's 1981 Membership Achievement Awards. That list—the same as appeared in the Convention program—was as of July 31. We are now able to supplement that list by publishing the names *(see the accompanying box)* of the additional units achieving their membership objectives by the September 30 close of the chapter year. Congratulations to all these units and their leaders!

Iron Gate Chapter and P-47 Pilots Association Honor Robert S. Johnson

At a recent luncheon of New York State AFA's Iron Gate Chapter held in the Hunt Room of the "21 Club" in New York City, Chapter members and well-wishers from the P-47 Thunderbolt Pilots Association gathered to honor Robert S. Johnson, a former national president of the Air Force Association and the number two living American P-47 ace with twenty-seven World War II victories. Mr. Johnson is an AFA National Director.

Iron Gate Chapter and P-47 Pilots Association members honor Robert S. Johnson. See item.

The luncheon celebrated Mr. Johnson's retirement and his move to his new residence in River Hills Plantation, Clover, S. C.

Those present at the luncheon included Iron Gate Chapter members and officers and former officers of the P-47 Thunderbolt Pilots Association. Pictured are Chapter members who are officers or past presidents of the P-47 Pilots Association. They are (back row, from left): Henry Lederer, P-47 Association Treasurer; Ramon A. Sutton, P-47 Association Secretary; former P-47 Association president Robert Forrest; Maj. Gen. J. S. Holtoner, USAF (Ret.); former P-47 Association president Everett Peters; and former P-47 Association president Herbert O. Fisher. Front row, from left: Stuart Moak, a former P-47 Association president; P-47

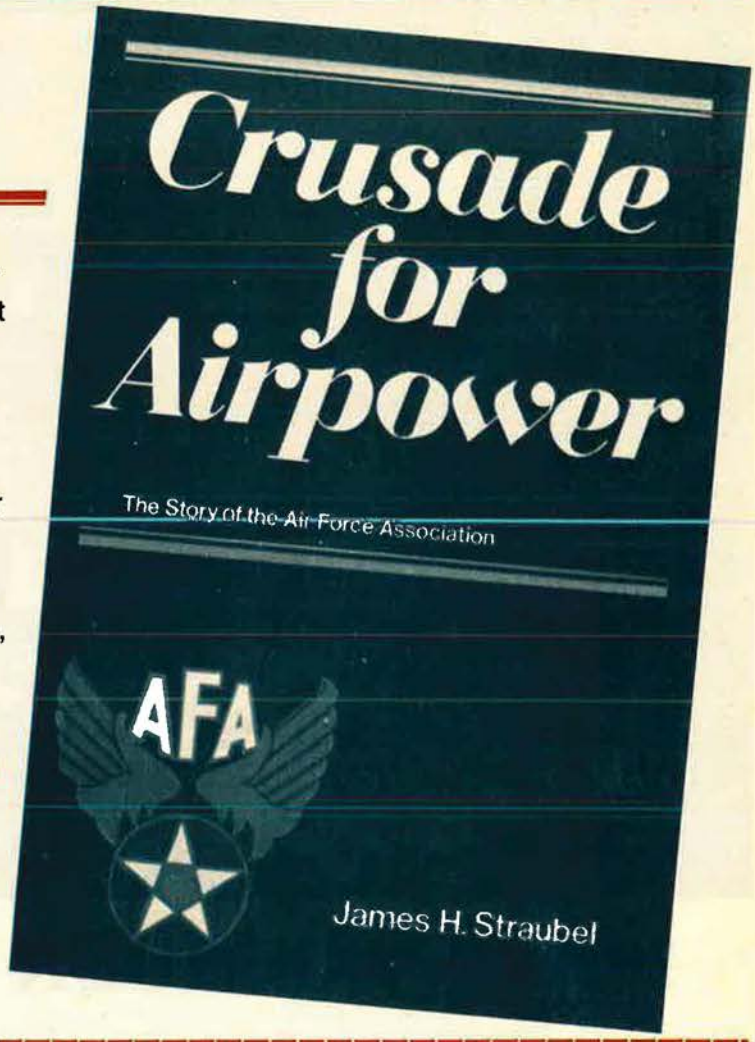
Additional 1981 Membership Award Winners

REGIONS	**VICE PRESIDENTS**
Far West	Liston T. Taylor
Northwest	Edward J. Monaghan
STATES	**PRESIDENTS**
California	Richard C. Doom
Tennessee	Polly Murphy
Texas	William W. Roth
CHAPTERS	**PRESIDENTS**
Ark-La-Tex (Louisiana)	William O. Wissman
Baltimore (Maryland)	Rick Gibbs
Boston (Massachusetts)	Mary Anne Gavin
Charleston (South Carolina)	John L. Mack, Jr.
Fresno (California)	Arnie Schweer
Mid-Ohio (Ohio)	Edwin L. Ware
Mobile (Alabama)	Elizabeth F. Martin
New Jersey Public Affairs	Nicholas A. Manochhio, Jr.
Robert H. Goddard (California)	Carrol D. Buford
Steel Valley (Pennsylvania)	Mary Ann Lash

Crusade for Airpower

CRUSADE FOR AIRPOWER is continued confirmation that "what is past is prologue," and a reminder that "the heritage of the past is the seed that brings forth the harvest in the future." The educational value of this book transcends the Air Force Association, showing how concerned and dedicated Americans can educate themselves and others to achieve the basic requirements for national security.

This book is the story of AFA, with its ups and downs detailed in highly readable form, supplemented by a large collection of photos, many published here for the first time.



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Just in time for Christmas! Selected items for AFA members. Each item is emblazoned with the AFA logo. Especially nice to give as presents, presentations, or for your own use.

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C. **Member Pin:** Gold-filled member lapel pin. $15.

D. **Stickpin:** Gold-filled member stickpin. $16.

E. **Paperweight:** Clear Lucite with embedded AFA logo. $13.

F. **Briefcase:** Suede with AFA logo. $29.50.

G. **Ties:** Fifty percent silk/fifty percent polyester, embroidered logo. Specify navy or maroon. $15.

H. **Ladies Scarf:** 100 percent silk with navy trim and logos. $15.

I. **Pocket Knife:** Light weight, engravable, made by Swiss Army Knife manufacturers. $15.

J. **Luggage Tag:** 35th Anniversary Commemorative Bag Tag. Reverse side for name and address. Leather strap. $1.

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INTERCOM

Association president Frank N. King; Francis Gabreski, America's number one living ace, with thirty-four and one-half victories in World War II and Korea; and Mr. Johnson, holding the plate awarded him at the luncheon by the Iron Gate Chapter.

Family Guidance on State Income Taxes and Child Support

During the Air Force Family Conference at Bolling AFB, D. C., in September, questions were addressed to Air

Culmination of the opening ceremonies of AFA's 1981 Convention in Washington, D. C., was the presentation of AFA's Man of the Year Award to Maj. Gen. Daniel F. Callahan, USAF (Ret.), AFA's Chairman of the Board. General Callahan, left, accepts the award from former AFA President Vic Kregel.

Also awarded during the 1981 Convention was the Donald W. Steele, Sr., Memorial Award for the AFA Unit of the Year. This year's winner was the Alamo Chapter of San Antonio, Tex. Accepting the award from former President Kregel is Chapter President James Shutt, left.

AFA STATE CONTACTS

Following each state name, in parentheses, are the names of the localities in which AFA Chapters are located. Information regarding these Chapters, or any place of AFA's activities within the state, may be obtained from the state contact.

ALABAMA (Auburn, Birmingham, Huntsville, Mobile, Montgomery, Selma): **Don Krekelberg,** 904 Delcris Dr., Birmingham, Ala. 35226 (phone 205-942-0784).

ALASKA (Anchorage, Fairbanks): **Frank X. Chapados,** 1426 Well St., Fairbanks, Alaska 99701 (phone 907-452-1286).

ARIZONA (Phoenix, Sun City, Tucson): **John P. Byrne,** 9318 Country Club Dr., Sun City, Ariz. 85373 (phone 602-974-1349).

ARKANSAS (Blytheville, Fayetteville, Fort Smith, Little Rock): **Arthur R. Brannen,** 605 N. Hospital Dr., Jacksonville, Ark. 72076 (phone 501-982-2585).

CALIFORNIA (Apple Valley, Edwards, Fairfield, Fresno, Hawthorne, Hermosa Beach, Long Beach, Los Angeles, Merced, Monterey, Novato, Orange County, Palo Alto, Pasadena, Riverside, Sacramento, San Bernardino, San Diego, San Francisco, San Mateo, Santa Barbara, Santa Monica, Yuba City, Vandenberg AFB): **Richard C. Doom,** P. O. Box 2027, Canyon Country, Calif. 91351 (phone 213-887-2923).

COLORADO (Aurora, Boulder, Colorado Springs, Denver, Fort Collins, Grand Junction, Greeley, Littleton, Pueblo, Waterton): **Karen M. Kyritz,** 17105 East Bethany Circle, Aurora, Colo. 80013 (phone 303-690-2920).

CONNECTICUT (East Hartford, North Haven, Storrs, Stratford, Westport, Windsor Locks): **Frank J. Wallace,** 935 Poquonock Ave., Windsor, Conn. 06095 (phone 203-688-3090).

DELAWARE (Dover, Wilmington): **John E. Strickland,** 8 Holly Cove Lane, Dover, Del. 19901 (phone 302-678-6070).

DISTRICT OF COLUMBIA (Washington, D. C.): **Bob Givens,** 1750 Pa. Ave., N. W., Suite 400, Washington, D. C. 20006 (phone 202-637-3346).

FLORIDA (Broward, Cape Coral, Fort Walton Beach, Jacksonville, New Port Richey, Orlando, Panama City, Patrick AFB, Redington Beach, Sarasota, Tallahassee, Tampa, West Palm Beach, Winter Haven): **Lee R. Terrell,** 39 Hemlock Dr., N. W., Fort Walton Beach, Fla. 32548 (phone 904-882-4486).

GEORGIA (Athens, Atlanta, Columbus, Rome, Savannah, St. Simons Island, Valdosta, Warner Robins): **Lee C. Lingelbach,** 217 Ridgeland Dr., Warner Robins, Ga. 31093 (phone 912-922-7615).

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): **David P. Swearingen,** 6968 Butte Court, Boise, Idaho 83704 (phone 208-386-5787).

ILLINOIS (Belleville, Champaign, Chicago, Decatur, Elmhurst, Peoria): **Richard H. Becker,** 7 Devonshire Dr., Oak Brook, Ill. 60521 (phone 312-654-3938).

INDIANA (Bloomfield, Indianapolis, Lafayette, Logansport, Marion, Mentone, South Bend): **Richard Ortman,** 2607 Sunrise Ave., Lafayette, Ind. 47905 (phone 317-743-3896).

IOWA (Des Moines): **Walter Saur,** 120 E. Charles, Oelwein, Iowa 50662.

KANSAS (Topeka, Wichita): **Cletus J. Pottebaum,** 6503 E. Murdock, Wichita, Kan. 67206 (phone 316-683-3963).

KENTUCKY (Louisville): **Elmo C. Burgess,** 116 S. 5th St., Louisville, Ky. 40202 (phone 502-585-5169).

LOUISIANA (Alexandria, Baton Rouge, Bossier City, Monroe, New Orleans, Shreveport): **Thomas L. Keal,** 404 Galway Dr., Shreveport, La. 71115 (phone 318-797-9688).

MAINE (Limestone, N. Berwick): **Arley McQueen, Jr.,** 153 Jelliegh Dr., Wells, Me. 04090 (phone 207-646-2718).

MARYLAND (Andrews AFB, Baltimore): **Thomas W. Anthony,** 4111 Carriage Dr., Temple Hills, Md. 20748 (phone 301-894-0067).

MASSACHUSETTS (Bedford, Boston, Falmouth, Florence, Hanscom AFB, Lexington, Taunton, Worcester): **Zaven Kaprielian,** 428 Mt. Auburn St., Watertown, Mass. 02172 (phone 617-924-5010).

MICHIGAN (Battle Creek, Detroit, Kalamazoo, Marquette, Mount Clemens, Oscoda, Petoskey, Southfield): **Jeryl L. Marlatt,** 740 S. Cranbrook Rd., Birmingham, Mich. 48009 (phone 313-484-8232).

MINNESOTA (Duluth): **Edward A. Orman,** 368 Pike Lake, Duluth, Minn. 55811 (phone 218-727-8381).

MISSISSIPPI (Biloxi, Columbus, Jackson): **Don Wylie,** P. O. Box 70, Biloxi, Miss. 39533 (phone 601-374-3611).

MISSOURI (Kansas City, Knob Noster, Springfield, St. Louis): **William A. Dietrich,** P. O. Box 258, Kansas City, Mo. 64141 (phone 816-561-2134).

MONTANA (Great Falls): **Dick Barnes,** P. O. Box 685, Great Falls, Mont. 59403 (phone 406-727-3807).

NEBRASKA (Lincoln, Omaha): **Edward A. Crouchley,** 514 Ridgewood Dr., Bellevue, Neb. 68005 (phone 402-291-4780).

NEVADA (Las Vegas, Reno): **James L. Murphy,** 2370 Skyline Blvd., Reno, Nev. 89509 (phone 702-786-1520).

NEW HAMPSHIRE (Manchester, Pease AFB): **Charles J. Sattan,** 53 Gale Ave., Laconia, N. H. 03246 (phone 603-524-5407).

NEW JERSEY (Andover, Atlantic City, Belleville, Camden, Chatham, Cherry Hill, E. Rutherford, Forked River, Fort Monmouth, Jersey City, McGuire AFB, Middlesex County, Newark, Trenton, Wallington, West Orange): **John P. Kruse,** 1022 Chelten Pkwy., Cherry Hill, N. J. 08034 (phone 609-428-3036).

NEW MEXICO (Alamogordo, Albuquerque, Clovis): **Ken Huey, Jr.,** P. O. Box 1946, Clovis, N. M. 88102 (phone 505-769-1975).

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): **Thomas J. Hanlon,** P. O. Box 400, Buffalo, N. Y. 14225 (phone 716-632-7500).

NORTH CAROLINA (Asheville, Charlotte, Fayetteville, Goldsboro, Greensboro, Kitty Hawk, Raleigh): **William M. Bowden,** 509 Greenbriar Dr., Goldsboro, N. C. 27530 (phone 919-735-5584).

NORTH DAKOTA (Concrete, Fargo, Grand Forks, Minot): **Maurice M. Rothkopf,** 3210 Cherry St., Grand Forks, N. D. 58201 (phone 701-746-5493).

OHIO (Cincinnati, Cleveland, Columbus, Dayton, Newark, Youngstown): **Francis D. Spalding,** 718 Martha Lane, Columbus, Ohio 43213 (phone 614-866-9381).

OKLAHOMA (Altus, Enid, Oklahoma City, Tulsa): **Aaron C. Burleson,** P. O. Box 757, Altus, Okla. 73521 (phone 405-482-0005).

OREGON (Eugene, Portland): **William Gleaves,** 2353 Oakway Terrace, Eugene, Ore. 97401 (phone 503-687-2269).

PENNSYLVANIA (Allentown, Beaver Falls, Chester, Dormont, Erie, Harrisburg, Homestead, Lewistown, Philadelphia, Pittsburgh, Scranton, State College, Washington, Willow Grove, York): **Tillie Metzger,** 2285 Valera Ave., Pittsburgh, Pa. 15210 (phone 412-884-5257).

RHODE ISLAND (Warwick): **King Odell,** 413 Atlantic Ave., Warwick, R. I. 02888 (phone 401-941-5472).

SOUTH CAROLINA (Charleston, Columbia, Myrtle Beach, Sumter): **William B. Gemmill,** 11 Victoria Ave., Myrtle Beach, S. C. 29577 (phone 803-626-9628).

SOUTH DAKOTA (Rapid City, Sioux Falls): **L. J. Reiners,** 4907 Copper Hill Court, Rapid City, S. D. 57701 (phone 605-343-2538).

TENNESSEE (Chattanooga, Knoxville, Memphis, Nashville, Tri-Cities Area, Tullahoma): **Arthur MacFadden,** 4501 Amnaicola Highway, Chattanooga, Tenn. 37406 (phone 615-622-6262).

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): **John Sparks,** P. O. Box 360 San Antonio, Tex. 78292 (phone 817-723-2741).

UTAH (Brigham City, Cedar City, Clearfield, Ogden, Provo, Salt Lake City): **Charles E. Walker,** 1243 E. 3075 North, Ogden, Utah 84404 (phone 801-782-7826).

VERMONT (Burlington): **John D. Navin,** 350 Spear St., Unit 64, South Burlington, Vt. 05401 (phone 802-863-1510).

VIRGINIA (Arlington, Danville, Harrisonburg, Langley AFB, Lynchburg, Norfolk, Petersburg, Richmond, Roanoke): **Ivan R. Frey,** 73 James Landing Rd., Newport News, Va. 23606 (phone 804-595-5617).

WASHINGTON (Seattle, Spokane, Tacoma): **William C. Burrows,** 6180 93d Ave. S.E., Mercer Island, Wash. 98040 (phone 206-773-5395).

WEST VIRGINIA (Huntington): **James Hazelrigg,** Rte. 3, Box 32, Barboursville, W. Va. 25504 (phone 304-736-9337).

WISCONSIN (Madison, Milwaukee): **Kenneth Kuenn,** 3239 N. 81st St., Milwaukee, Wis. 53222 (phone 414-747-5300).

WYOMING (Cheyenne): **Linn A. Wallace,** 409 Saddle Dr., Cheyenne, Wyo. 82001 (phone 307-771-6988).

INTERCOM

AFA's North Georgia Chapter and the 94th Tactical Airlift Wing, Dobbins AFB, Ga., recently hold an Aviation Merit Badge Clinic for more than 160 Greater Atlanta Area Boy Scouts. Above, Capt. Tim Bellury, an AFRES pilot with the 700th Tactical Airlift Squadron at Dobbins AFB, explains the theory of flight to a group of Scouts during the day-long affair. (USAF photo by TSgt. Rick Ross)

Force Secretary Verne Orr about taxation and family responsibilities. Secretary Orr promised the questioners that he would provide answers. AFA Executive Director Russ Dougherty promised that those answers would appear in AIR FORCE Magazine. Here they are:

Q: How should members of the military handle withholding of state income tax?

A: Withholding of state income tax from a member's pay regardless of rank is effected based upon the member's finance records, specifically the DD Form 2058, Certificate of State of Legal Residence. If the state indicated on that form is one of the states that taxes military pay and has an agreement with the Department of Defense, withholding takes place.

An Air Force member can file a new form whenever he wants to. When the new form is filed, a notice of the change is sent to both the former state and the new state.

Accounting and Finance does not attempt to determine the accuracy of the declaration of residence. It is the member's responsibility to list accurately his/her state of residence, and the DD Form 2058 requires that the member certify the accuracy of that declaration.

In general, a person may change his legal residence or domicile from one state to another provided he meets certain legal requirements before domi-

I N T E R C O M

cile is changed. The decision to change domicile has significance far beyond the payment of income tax and should not be made without an understanding of the full consequences of such a change.

The DD Form 2058 contains a brief discussion of the issue of changing domicile, but it is recommended that the decision be discussed with your legal assistance officer.

Q: What about child support?
A: While the civilian court system, by means of a court order and garnishment, if appropriate, is the means for an individual to ensure legally the payment of child support, the individual commander does have a responsibility in this area. The Air Force policy expects members to support their dependents. Depending on the circumstances of the case, the commander's response can range from counseling to action under the Uniform Code of Military Justice, including discharge action.

The Air Force position is set forth in AFR 35-19, Financial Responsibility, as follows:

"The Air Force expects its members to provide regular and adequate support, either direct or in kind, based on the needs of the dependents and the ability of the member to provide. The Air Force has no authority to unilaterally deduct money from a member's pay for the benefit of dependents; however, failure to comply with Air Force policy becomes a proper subject of command consideration for disciplinary or administrative action."

Greater Seattle Chapter Joins Boeing in Salute to Plant Rep Office

The Air Force Association's Greater Seattle Chapter recently joined the Boeing Co. in sponsoring a three-day commemoration of the sixtieth anniversary of the Air Force Plant Representative's Office (AFPRO) at Boeing.

Featured was an evening ceremony with the 724th Air Force Band from nearby McChord AFB providing entertainment. Speakers during the event included Col. Donald W. Dill, the Air Force Plant Representative; Brig. Gen. James C. Dever, Jr., Commander of the Air Force Contract Management Division; Maj. Gen. William C. Burrows, USAF (Ret.), President of the Greater Seattle Chapter of AFA; and Mr. T. A. Wilson, Chairman of the Board of The Boeing Co. A special exhibition of aviation photographs and artwork was on display at the Pacific Museum of Flight's Red Barn on Boeing Field. In addition, the Arizona Wing of the Confederate Air Force flew its B-17 *Sentimental Journey* to the field and displayed it near the museum. An Air Force B-52G also flew over the field during the festivities.

Begun as a small Army office to pro-

At a recent dinner meeting of the Arc Light Chapter at Andersen AFB, Guam, the Chapter elected new officers. Shown, left to right, are Board Members Rev. Dan Peck and Ling Anderson, immediate past president Joseph Gyulavics, Secretary Dr. Ben Bast, President Lee Webber, Board Members Cy Simons and Allen Pickens, Vice President Chuck McManus, and Treasurer George Baldwin. In uniform is Maj. Gen. Stanley C. Beck, the keynote speaker for the evening, and Commander of 3d Air Division at Andersen AFB.

INTERCOM

"22-42-52" is the title given this photo taken by Alwyn T. Lloyd, a Boeing employee. Snapped during the AFPRO sixtieth anniversary festivities, it shows three of Boeing's most famous airplanes: the P-12, the B-17 Flying Fortress, and the B-52. The title "22-42-52" refers generally to the years each of the aircraft was produced. See item.

vide permanent in-plant inspection of Boeing-produced MB-3As, the Boeing AFPRO has been operating continuously since 1921. Today, the office has thirty-four military people and 242 Air Force civilians assigned, and monitors more than 9,000 Air Force, Navy, Army, and NASA contracts. ■

UNIT REUNIONS

Valiant Air Command
The Valiant Air Command Air Show will be held on March 13–14, 1982, at Tico Airport, Fla., across from Cape Canaveral. Featured at the air show will be WW II fighters, bombers, and trainers. In addition, there will be demonstrations of bombing, strafing, and dogfights. **Contact:** Col. Bob Reid, VAC, 1369 S. University Dr., Plantation, Fla. 33324. Phone: (305) 475-0800 or 472-2356.

26th Fighter Sqdn., 51st FG
Members of the 26th Fighter Squadron, 51st Fighter Group "China Blitzers" will hold their reunion at the Gunther Hotel, San Antonio, Tex., January 7–9, 1982. **Contact:** Norbert Gonzales, P. O. Box 18484, San Antonio, Tex. 78218. Phone: (512) 656-0333.

Class 42-B
The fortieth annual reunion of Aviation Cadet Class 42-B (Mather and Luke Fields) is scheduled for February 19–20, 1982, in Northern California, with headquarters at the Marines Memorial Club in San Francisco. Information and reunion schedule will be sent out in January 1982. **Contact:** R. E. Monroe, 1210 Park Newport #215, Newport Beach, Calif. 92660. Phone: (714) 755-0111. W. E. Radtke, Thompkins & Co., P. O. Box 457, San Leandro, Calif. 94577. Phone: (415) 895-9200.

43d Bomb Group (H)
The 43d Bomb Group will hold its reunion on December 11–13, 1981, at the Hilton Palacio Del Rio Hotel, in San Antonio, Tex. **Contact:** Col. R. H. Butler, Box 409, Fayetteville, N. C. 28302. Phone: (919) 483-5105.

Class 57-K
The Laughlin AFB, Tex., Class 57-K is planning a spring 1982 reunion. Addresses of all graduates and flight personnel are needed. **Contact:** Dan M. Oredson, 4960 Maunalani Circle, Honolulu, Hawaii 96816.

99th Bomb Group (H)
Members of the 99th Bomb Group will hold their reunion on April 24–25, 1982, in Albuquerque, N. M. **Contact:** Thomas J. Gamm, 12225 Victoria Falls N. E., Albuquerque, N. M. 87110. Phone: (505) 296-7075.

AFA CHAMPLUS ... New, 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 Ai Force Association, pay your premiums o time, and the master contract remains i force, your insurance cannot be cancel ed.

ADMINISTERED BY YOUR ASSOCIATION . . . UNDERWRITTEN BY MUTUAL OF OMAHA

AFA CHAMPLUS insurance is admini tered by trained insurance professiona on your Association staff. You get promp reliable, courteous service from peop who know your needs and know eve detail of your coverage. Your insurance underwritten by Mutual of Omaha, t largest individual and family health insu 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 n covered by Medicare through the *Seni Age Benefit Plan* of AFA Hospital Inde nity Insurance. Members enrolled in AF CHAMPLUS will automatically receive f information about AFA's Medicare su plement program upon attainment of Ag 65 so there will be no lapse in coverage

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 $5.00 per day subsistence fee, not covered by CHAMPUS.	CHAMPLUS pays the $5.00 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 $5.00 per day, whichever is greater.	CHAMPLUS pays the greater of $5 per day or $25 of the reasonable hospital charges not covered by CHAMPUS.
Inpatient military hospital care	The only charge normally made is a $5.00 per day fee, not covered by CHAMPUS.	CHAMPLUS pays the $5.00 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!

JUST FOLLOW THESE STEPS

Choose either AFA CHAMPLUS In-patient coverage or combined In-patient and Out-patient coverage for yourself. Determine the coverage you want for dependent members of your family. Complete the enclosed application form in full. Total the premium for the coverage you select from the premium tables on this page. Mail the application with your check or money order for your initial premium payment, payable to AFA.

Get AFA's new

CHAMPLUS

QUARTERLY PREMIUM SCHEDULE

Plan 1—For military retirees and dependents

In-Patient Benefits

Member's Attained Age	*Member*	*Spouse*	*Each Child*
Under 50	$19.03	$23.30	$11.00
50-54	$23.78	$29.10	$11.00
55-59	$30.13	$36.90	$11.00
60-64	$39.65	$48.55	$11.00
*In-Patient and Out-Patient **Benefits***			
Under 50	$26.80	$31.05	$27.50
50-54	$33.48	$38.80	$27.50
55-59	$42.43	$49.18	$27.50
60-64	$55.83	$64.73	$27.50

Plan 2—For dependents of active duty personnel.

In-Patient Only	None	$ 8.80	$ 4.40
In-Patient and Out-Patient	None	$35.20	$22.00

Note: Plan II premiums are listed on an annual basis. Because of the very low cost, persons requesting this coverage are asked to make annual payments.

LIMITATIONS

Coverage will not be provided for conditions for which treatment has been received during the 12-month period prior to the effective date of insurance until the expiration of 12 consecutive months of insurance coverage without further treatment. *After coverage has been in force for 4 consecutive months, pre-existing* conditions will be covered regardless of prior treatment.

EXCLUSIONS

This plan does not cover and no payment shall be made for:

- routine physical examinations or immunizations
- domiciliary or custodial care
- dental care (except as required as a necessary adjunct to medical or surgical treatment)
- routine care of the newborn or well-baby care
- injuries or sickness resulting from declared or undeclared war or any act thereof
- injuries or sickness due to acts of intentional 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 limbs and artificial eyes), hearing aids, orthopedic footwear, eyeglasses and contact lenses
- expenses for which benefits are or may be payable under Public Law 89-614 (CHAMPUS)

APPLICATION FOR
AFA CHAMPUS SUPPLEMENT INSURANCE

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 $13 for annual AFA membership dues (includes subscription ($9) to AIR FORCE Magazine).

☐ I am over 65 years of age. Please send information on AFA's Medicare Supplement.

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 ☐ Member & Children ☐ Spouse Only ☐ Spouse & Children ☐ Member & Spouse ☐ Member, Spouse & Children

PREMIUM CALCULATION

All premiums are based on the attained age of the AFA member applying for this coverage. Premium payments are normally paid on a quarterly basis (see table for rate table). Upon request, however, they may be made on either a semi-annual or annual basis.

Quarterly premium for member (age _____) $_____

Quarterly premium for spouse $_____

Quarterly premium for _____ children @ $_____ $_____

Requests for active duty dependent coverage under Plan 2 should include annual premiums.

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 12/81

NOTE: Application must be accompanied by check or money order.
Send remittance to:
Insurance Division, AFA, 1750 Pennsylvania Ave., NW, Washington, D.C. 20006.

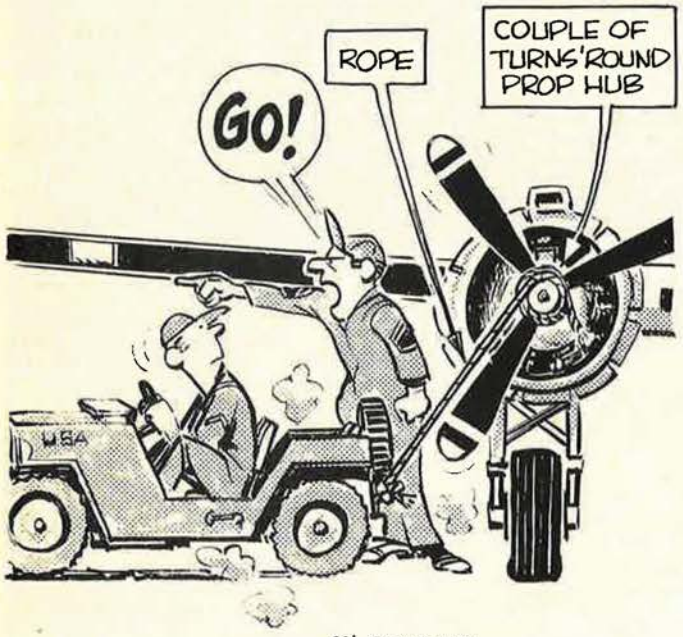
Form 6173GH App.

Bob Stevens'

"There I was..."

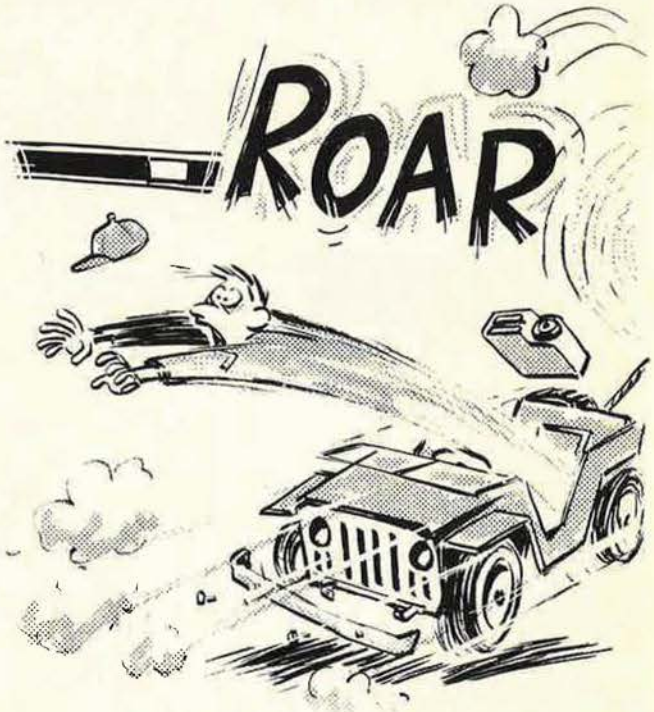
'NECESSITY IS THE MOTHER OF INVENTION–AN OLD SAW–BUT TRUE! THE GI CREWCHIEF IN A FORWARD COMBAT AREA ***HAD*** TO BE INNOVATIVE TO SURVIVE... PARTS WERE SCARCE. THERE WERE, HOWEVER, THE INEVITABLE BACKFIRES.

A GOON, MINUS A STARTER, COULD BE STARTED BY A JEEP! WITNESS:

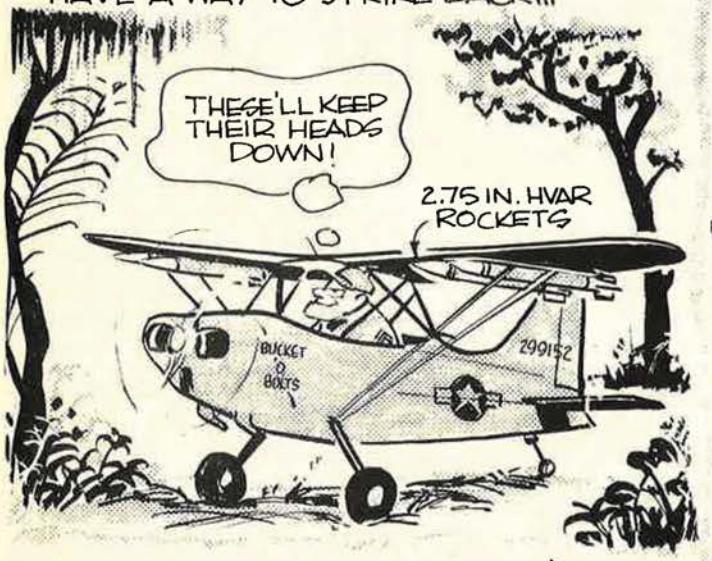


COL. ROY MILLER
SHREVEPORT, LA.

THERE WAS, HOWEVER, THE POSSIBILITY THE OL' P and W WOULD CATCH EARLY and REWIND THE STRING–



SOME ENGINEERING TYPE UP IN AIR COMMANDO GP. HQ. (BURMA) THOUGHT THE LITTLE LIAISON BIRDS SHOULD HAVE A WAY TO STRIKE BACK...



FABRIC COVERED VULTEE L-5

THE RESULT WAS PREDICTABLE

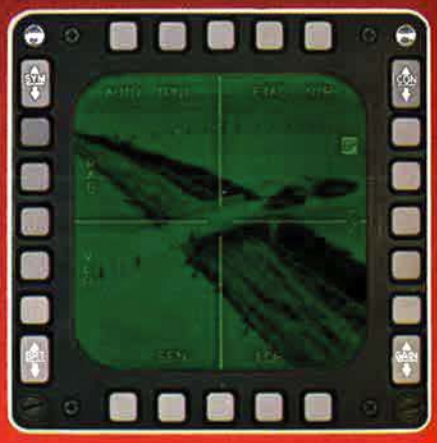
JACK GALLAGHER, FALLBROOK, CA. Bob Stevens

Sperry's F-16 display system: digital flexibility for a multirole aircraft.

The Air Force's F-16 Fighting Falcon must excel at both air-to-air and air-to-ground missions.

An advanced display system, being developed by Sperry as part of the Multinational Staged Improvement Program, will ease the pilot's workload by presenting navigation, radar, and weapons-aiming information clearly and precisely. Consisting of a digital programmable display generator and two four-inch-square CRT displays, the system includes two processors and 32K words of memory for display format control and other purposes. Display formats can thus be changed quickly, and without hardware alteration, an important asset for the multirole F-16. We're working on even more advanced systems for next-generation aircraft, too.

How can we help you? Write Sperry Flight Systems, Defense Systems Division, Box 29222, Phoenix, Arizona, 85036, or call (602) 869-2780. *We understand how important it is to listen.*



SPERRY
FLIGHT SYSTEMS

SPERRY FLIGHT SYSTEMS IS A DIVISION OF SPERRY CORPORATION

KC-10 cuts the air fare to England $300,000.

In its first operational deployment, a U.S. Air Force KC-10 Extender escorted eight Oklahoma Air National Guard Corsairs from Tulsa to RAF Wittering, Great Britain, at a savings estimated by Air Force officials at $300,000 in fuel and maintenance.

The officials pointed out that a similar deployment without the Extender would have required three C-141 freighters and eight KC-135 tankers. But carrying support cargo and personnel, plus 190,000 pounds of fuel for the Corsairs, the KC-10 flew the mission with just *two* C-141s and *four* KC-135s.

Air Force officials also noted that the savings would be the same in a rapid deployment to Europe of the service's most advanced tactical fighter planes.

McDonnell Douglas is building the KC-10 to provide total global mobility for rapid deployment. Its mission is to put aircraft, men, and equipment where they're needed when they're needed, without dependence on overseas refueling bases. Cutting the "air fare" to save taxpayer dollars is part of the bargain.

KC-10 Extender

MCDONNELL DOUGLAS